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ABSTRACTS

6TH WORLD CONGRESS OF THE INTERNATIONAL SOCIETY OF PHYSICAL AND REHABILITATION MEDICINE

JUNE 12–16, 2011, SAN JUAN, PUERTO RICO

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ABSTRACTS



6th World Congress International Society of Physical & Rehabilitation Medicine ISPRM

JUNE 12-16, 2011 • SAN JUAN, PUERTO RICO
www.isprm2011.org

Dear Colleagues and Friends,

Welcome, Bienvenidos!

It is with great happiness that we receive our friends and colleagues from every corner of the world to our home, Puerto Rico. I hope that this time you will stay with us long enough not only to enjoy an excellent academic program and learning experience, but to discover all the many wonders our island has to offer.

We want to thank the ISPRM Board of Governors for selecting the Puerto Rico Physical Medicine and Rehabilitation Association to be the host of the 6th World Congress. Thanks to all the colleagues and friends that have come a long way and from not so far away to share with us their knowledge and friendliness. A special thank to Dr. Herman J. Flax, for being a constant source of inspiration.

We want to thank all our sponsors, the Puerto Rico Convention Bureau, the Puerto Rico Convention Center, Puerto Rico Tourism Company, and Honorable Jennifer Gonzalez, President of the Puerto Rico House of Representatives, who has been a constant support to this meeting.

Let me also express my hearty thanks to the ISPRM-2011 Committee that has been working with me for the past five years, sharing the long hours, the hundreds of e-mails, and happiness in the making of this event that we offer to you as a token of appreciation and gratitude.

My hearts is full of gratitude, best wishes to all and have a wonderful stay.

Thanks and peace to all!

Verónica Rodríguez de la Cruz, MD

President, Organizing Committee

6th World Congress ISPRM

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*Only free papers and posters are included in this supplement.

PROGRAM

MONDAY, JUNE 13**7:00 AM • WORKSHOPS**

Musculoskeletal MRI: Spine, *Edgar Colón*
 Advances in Orthotic Prescription in Stroke, *Alberto Esquenazi*
 Health Coaching: A Patient Centered Approach, *Maricarmen Cruz*
 Applying ASIA Scale in the Exam, *Joel Frontera*
 Core Strengthening in Back Disease, *Carlos Seda*

8:30 AM • PLENARY SESSION

Past, Present and Future of Interventional Techniques in Rehab Medicine, *David Bagnall*

10:00 AM–3:00 PM • COURSES**ISPRM WHO – MEETING & PLENARY SESSION**

ISPRM Task Force - International PRM Societies
 ISPRM Task Force WHO Women and Health
 ISPRM Research Task Force
 ISPRM WHO Scientific Session, *Christoph Gutenbrunner, Alessandro Giustini*
 Introduction to the work of the ISPRM WHO, *Liaison Committee, Christoph Gutenbrunner*
 The WHO World Report on Disability (WRD), *Alessandro Giustini*
 The implications of the WRD on PRM, *Jan Reinhardt*
 Implementation of WHO Reports, the WRD and IPSCI as Cases in Point, *Per Von Groote*

MODULE – MUSCULOSKELETAL MEDICINE

Foot and Ankle Injury. *Chairs: Ana Cintrón, Juan Pablo Forero*
 Clinical Evaluation of the Foot and Ankle, *Félix Rodríguez*
 Lower Extremity Injuries in Performing Artists, *Keryl Motta*
 Rehabilitation of Ankle Sprain, *Ana Cintrón*
 Management of Achilles Tendon Disorders, *Jorge Sarango*
 Management of Heel Pain, *Juan Pablo Forero*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Current Concepts. *Chairs: David Cifu, MD; María Ocasio, MD*
 Blast Injuries, *David Cifu*
 TBI in Children, *María Ocasio*
 Robotics In Rehabilitation, *Hermano Igo Krebs*
 Stem Cells as Immune System Regulators, *Diego Correa*
 Advances in Prosthetic Management of Combat Victims, *Raúl Marín*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

ABPMR & UEMS: Sharing the PRM Board Experience. *Chairs: William Bockeneck, Xanthi Michael*
 Board Certification, *William Bockeneck*
 Maintenance of Certification, *Xanthi Michael*
 Subspecialty Training, *William Micheo*
 Standardization of Practice Across Europe, *Nicolas Christodoulou*
 Discussion Panel, *All faculty*

MODULE – NEUROMUSCULAR & PEDIATRICS

Pediatric Challenges. *Chairs: Ivette Pratts & Natalio Debs*
 Early Rehabilitation Intervention in Burns, *Ivette Pratts*
 Surgical Intervention, *Natalio Debs*
 Orthotics in the Burned Patient, *John Link*
 Acute Pain Management, *Lisgelia Santana Rojas*
 Discussion Panel, *All faculty*

MODULE – COURSES IN SPANISH

Avances en Fisiatría en Latinoamérica. *Moderadores: Arturo Saviñón, Juan M. Guzmán.* Panel de Expertos: *Demetria Rosario, (República Dominicana), María Palou, (Puerto Rico), Ignacio Devesa, (México), Joyce Bolaños, (Venezuela), Myrtha Vitale, (Argentina), Solangel Hernández, (Cuba)*

MODULE – ALLIED HEALTH

Robotics in Rehabilitation. *Chair: Alexis Ortiz*
 Robotics Use in Upper Extremities, *Julius PA Dewald*
 Robotics Use in Lower Extremities, *David A. Brown*
 Case Discussion, *Julius PA Dewald, David A. Brown*

MODULE – MUSCULOSKELETAL MEDICINE

Cervical Spine. *Chair: Mihai Berteanu, Carlos Rivera*
 Evaluation & Rehabilitation in Athletes, *Anton Wicker*
 Management of Cervical Radiculopathy, *Mihai Berteanu*
 Surgical Management of Cervical Radiculopathy, *Jorge Lastra*
 Management of Axial Cervical Pain, *Carlos Rivera*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Spinal Cord Injury In Adults. *Chair: Anthony Burns & Joel Frontera*
 Advances in SCI Rehabilitation, *Anthony Burns*
 Pain Management in SCI, *Anthony Chiodo*
 Bladder and Bowel: 101 Review, *Joel Frontera*
 Technology in SCI Rehabilitation, *Jerrey Berliner*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

Symposium On Rehabilitation Disaster Relief. *Chairs: Jianan Li, Andrew Haig, Jan Reinhardt*
 Medical Rehabilitation after Disasters: Why, When, How?, *Farooq Rathore*
 A New Rehabilitation Model for Major Disasters in Rural Areas based on Experiences from the Sichuan Earthquake in China, *Xia Zhang*
 Haiti - From a Post Earthquake Visit of one Month to a Collaboration of Five Years: Building a Rehabilitation Center for SCI Patients, *Sibille Bühlmann*
 Faced with the Great East Japan Earthquake Disaster: What can the Japanese Association of Rehabilitation Medicine (JARM) Do?, *Meigen Liu*
 Rehabilitation Needs in Persons with Spinal Cord Injury in Post-earthquake Haiti, *Alexandra Rauch*
 Quality of Life and Social Function of Earthquake Survivors with Spinal Cord Injury One Year after Returning to the Community, *Xiaorong Hu*
 Training of Local Rehabilitation Services, Providers: A Milestone Towards Effectiveness, and Long-Term Sustainability of Post-Disaster Interventions, *Didier Demey*
 Barriers and Opportunities to the Implementation of a Comprehensive Rehabilitation Strategy in Post-Earthquake Haiti, *Andree LeRoy*
 Spinal Cord Injury Rehabilitation in Post Earthquake Haiti: Early Responses, Critical Successes and Longer Term Challenges, *Colleen O'Connell*
 Comprehensive Rehabilitation of Amputation Patients after Crush Injuries Sustained during the Wenchuan Earthquake, *Hongchen He*
 Rehabilitation Disaster Relief: Value of a Regional Large Rehabilitation Institution after the Sichuan Earthquake, *Zengchun Sun*

Challenges in Rehabilitation Nursing in Natural Disasters in Third World Countries, *Christa Schwager*
 Comparison of Patient Education in Rehabilitation of Spinal Cord Injuries in Switzerland and in Low-Resourced Countries, *Karin Roth*
 Surgical and Rehabilitation Interventions in Response to the Haiti Earthquake, *Anthony Duttine*

MODULE - NEUROMUSCULAR & PEDIATRICS

Severe Scoliosis In Pediatrics Patients (Shriner's). *Chair: Mj Mulcahey*

Introduction & Scope of the Problem, *Randall Betz*
 Natural History of Scoliosis, *John Flynn*
 Jarcho Levin Syndrome, *Norman Ramirez*

MODULE – COURSES IN SPANISH

Agentes Físicos: Estado del Arte. *Moderadores: Solangel Hernández, Luis Parada*

Oxigenación Hiperbárica, *Juan Manuel Guzmán*
 Oscilaciones Profundas, *Solangel Hernández*
 Ondas de Choque Disparadas, *Luis Parada*
 Laserterapia, *Jorge L. González*

MODULE – ALLIED HEALTH

State of the Art in Neurorehabilitation, *Chair: Marizabel La Puerta*
 Functional Rehabilitation in TBI, *Dennis Klima*
 Rehabilitation in Parkinson Disease, *Marizabel La Puerta*

3:30–5:30 PM • COURSES

MODULE – MUSCULOSKELETAL MEDICINE

Challenges in Fibromyalgia. *Chairs: Martin Grabois, Joanne Borg-Stein*

Muscle Pain Syndromes: Differential Diagnosis, *Martin Grabois*
 Pharmacologic Management of Fibromyalgia, *Oscar Soto*
 Rehabilitation & Exercise, *Joanne Borg-Stein*
 Alternative Medicine in Fibromyalgia, *Shan-li Yang*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Pharmacotherapy Of Disabling Illness. *Chairs: Maricarmen Cruz; Nathan Zasler*

Rheumatoid Arthritis, *Efraim Carrasquillo*
 Osteoarthritis, *Maricarmen Cruz*
 Peripheral Neuropathy, *Marimie Rodríguez*
 Brain Injury, *Nathan Zasler*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

Symposium on Rehabilitation Disaster Relief. *Chairs: John Melvin, Per von Groote, Gunnar Grimby*

Panel Discussion: Topic: How Can Rehabilitation Actors Coordinate Better in Disaster?
 Panelists: Antony Duttine, Peter Poetsma, Carolina Schiappacasse, Stephen Muldoon

MODULE – NEUROMUSCULAR & PEDIATRICS

Severe Scoliosis in Pediatrics (Shriner's). *Chair: MJ Mulcahey*

Considerations in Treatment Planning, *MJ Mulcahey*
 Overview & Outcome of Surgical Treatment, *Randall Betz*
 Post Operative Rehabilitation, *MJ Mulcahey*
 Case Presentation, *All Faculty*

MODULE – COURSES IN SPANISH

Lesión Medular (SERMEF). *Moderadores: Sebastián Salvador de la Barrera, Ana Esclarín de Ruz, Manejo Inicial en la Fase Aguda, Sebastián Salvador de la Barrera, Manejo en la Fase Subaguda y Crónica, Ana Esclarín de Ruz*
 Aplicaciones de los Estudios Análisis Mov, *Angel Gil Agudo*

Investigación en la Reparación Medular, *Joan Vidal Samsó*

MODULE – ALLIED HEALTH

Advances in Therapeutic Management. *Chair: Maureen J. Simmonds*
 Pain Management: Strategies for Success? *Maureen J. Simmonds*
 Falls in the Elderly: The “Double-Edged Sword”, *Dennis Klima*

TUESDAY, JUNE 14

7:00 AM • WORKSHOPS

Exercise in Scapular Dysnergia, *Flavia Bayron*
 Wii in Rehabilitation, *Viviana Chinea*
 Writing a Scientific Manuscript: Highlights for Success, *Juan Carlos Arango*
 Examination of Pediatric Patients with Hypotonia, *María Ocasio*
 Shoulder Examination in the Injured Thrower, *Roxana Amill, William Micheo*

8:30 AM • PLENARY SESSION – TBI in the 21st Century, *David Cifu*

10:00 AM–12:30 PM • MORNING COURSES (CME 2.5)

MODULE – MUSCULOSKELETAL MEDICINE

ACL Injuries. *Chairs: Amit Bhargava, Eduardo Amy*
 ACL Injury: Evaluation & Clinical Presentation, *Amit Bhargava*
 Biomechanical Assessment, *Alexis Ortiz*
 Surgical Treatment in ACL injury, *Eduardo Amy*
 Rehabilitation after ACL Surgery, *William Micheo*

MODULE – NEUROREHAB & TECHNOLOGY

EBM in Traumatic Brain Injury. *Chair: Kristian Borg*
 Anxiety Disorders After TBI, *Nathan Zasler*
 Mild TBI, *Jorgen Borg*
 Moderate/Severe TBI - Post Acute, *Cecilie Røe*
 Moderate/Severe TBI - Long Term, *Elizabeth Sandel*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

Advances in PRM: Asia and Oceania

Session 1 Chairs: Sei Joo Kim, Simon Tang

Guide of Injection Technique in the Office Management of Pain, *Young Jin Ko*
 Assessment and treatment of the knee osteoarthritis using ultrasonography, *Joon Sung Kim*
 Diagnosis and management of torticollis, *Jeong Mee Park*

Session 2 Chairs: Hye Won Kim, Leonard S.W. Li

Effects and mechanism of physiological ischemic training on myocardial ischemia, *Jianan LI*
 Functional Change of Brain and Implication to Stroke Rehabilitation, *Nam-Jong Paik*

Current status of brain rehabilitation in South Korea: Experiences from the Korean Stroke Rehabilitation Registry, *Sam-Gyu Lee*
 Characteristics of children with cerebral palsy in South Korea: Based on Korean Database of Cerebral Palsy, *Dong-wook Rha*

MODULE – NEUROMUSCULAR & PEDIATRICS

Electrodiagnostic Medicine Update. *Chairs: Mark Lissens, Andy Haig*
 Electrodiagnosis of the Respiratory System, *Mark Lissens*
 Evaluation of NMJ Disease, *Jun Kimura*
 Carpal Tunnel Syndrome, *Ralph Buschbacher*
 Facial Nerve Injury Evaluation, *Jun Kimura*
 Electrodiagnosis in Radiculopathy, *Andy Haig*

MODULE – COURSES IN SPANISH

Daño Cerebral Vascular (SERMEF). Moderadores: *Inmaculada García, Esther Duarte*
Estrategias en Ictus en España *Inmaculada García Montes, MD*
Recomendaciones SERMEF, *Esther Duarte Oller*
Telemedicina en Disfagia, *Helena Bascunana*
Tratamiento Espasticidad en Ictus, *Lourdes López de Munain*

MODULE – ALLIED HEALTH

Pain and Physical Function. Chair: *Luis G. Vargas*
Pain and Physical Function: Is it in the Mind? *Maureen J. Simmonds*
Aquatic Interventions in Low Back Conditions, *Marty Biondi*
Efficacy of Therapeutic Aquassage in Pain, *Luis G. Vargas*

ISPRM WHO – MEETING & PLENARY SESSION

WHO – Plenary Session

Disaster Relief
International Relations and Implementation of UN Convention
Implementation of World Report and IPSCI
Strengthening Medical Rehabilitation in WHO
Implementation of ICF

12:30 PM–1:30 PM • SPECIAL WORKSHOP FOR RESIDENTS
Electrodiagnostic Testing, *Jun Kimura*

1:30 PM–5:30 PM • COURSES

MODULE – NEUROMUSCULAR & PEDIATRICS

Low Back Pain Management in an Evidence-Based Universe.
Chair: *Michael Lupinacci*
Advances in Clinical Evaluation, *Michael Lupinacci*
Lumbar Radiculopathy: What is the evidence, *Anthony Chiodo*
Implantable Techniques: Rational Use, *David Bagnall*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Evidence Based Management in Stroke. Chairs: *Nachum Soroker, Linamara Battistella*
Acute Rehabilitation of Stroke, *Anthony Ward*
Novel Approach to Stroke Rehabilitation, *Nachum Soroker*
Stroke Rehabilitation in Australia, *Andrew Cole*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

Education. Chair: *Jorge Gutiérrez*
Informatics in Medicine, *Jorge Gutiérrez*
Medical Errors and Quality of Care, *Enrique Vázquez*
How to Prepare an Electronic Template, *Jorge Gutiérrez*

MODULE – NEUROMUSCULAR & PEDIATRICS

Chair: *Ana Cintrón*
Rehabilitation in Rare Diseases, *Ana Acevedo*
CRPS: Advances in Dx & Tx, *Andrés Meléndez*
TMJ Dysfunction, *Enrique Amy*

MODULE – COURSES IN SPANISH

Trauma Craneocefálico (SERMEF). Chair: *Inmaculada Bori de Fortuny*
Tx en la Fase Crítica y Aguda, *Inmaculada Bori de Fortuny*
Tx Fase Subaguda y Crónica, *Carmen Martínez Garre*
Alteraciones Cognitivas y Conductuales, *Montserrat Bernabeu*

MODULE – ALLIED HEALTH

Rehabilitation as a Movement Science. Chair: *Brent Anderson*
Pilates in Rehabilitation, *Brent Anderson*

MODULE – MUSCULOSKELETAL MEDICINE

Management of the Lumbar Spine: AAPMR. Chair: *Anthony Chiodo*
Exercise & Core Strengthening, *Stuart Weinstein*
Evidence Based Injection Use, *Anthony Chiodo*
Case Presentations, *All Faculty*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Stroke, Chairs: *Joel Stein, Franco Molteni*
Intensive Rehabilitation, *Joel Stein*
Gait Analysis in Stroke, *Alberto Esquenazi*
Use of Botulinum Toxin in Stroke Management, *Franco Molteni*
Stroke Prevention, *Jorge Lains*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

AAP: Medical Competencies in Education & Clinical Practice.
Chairs: *Daryl Kaelin, Christophe Gutenbrunner*
Resident Critique and Emotional Intelligence, *Daryl Kaelin*
Core Competencies, *Gerard Francisco*
Field of Competence: The European Experience, *Christopher Gutenbrunner*
Oral History of PM&R (Where we come from), *Elizabeth Sandel*

MODULE – NEUROMUSCULAR & PEDIATRICS

Cerebral Palsy. Chairs: *Dennis Matthews, Elizabeth Moberg-Wol*
Advances in Evaluation & Treatment, *Dennis Matthews*
Aging with Disability, *Tom Strax*
Spasticity Management, *Elizabeth Moberg-Wol*
Family Centered Care, *Resa Aydin*

MODULE – COURSES IN SPANISH

Trauma Craneocefálico (SERMEF). Moderador: *Montserrat Bernabeu*
Alteraciones Neuropsicológicas, *Teresa Roig Rovira*
Tratamiento en Espasticidad, *Carolina Colomer Font*
Investigación en TCE, *Montserrat Bernabeu*

MODULE – ALLIED HEALTH

Functional Rehabilitation. Chair: *Alexis Ortíz*
Lower Extremity Functional Tests: Update, *Alexis Ortíz*
Advances in Upper Extremity Rehabilitation, *MJ Mulcahey*

WEDNESDAY, JUNE 15

7:00 AM • WORKSHOPS

Lumbar Exam in Chronic Pain, *Julio Martínez*
Evaluation of Fall Risk in Older Patients, *Heidi Klingbeil*
How to Publish a Scientific Article, *Walter Frontera*
Unusual Nerve Conduction Studies, *Ralph Buschbacher*
Balance & Proprioceptive Training, *Luis Lizardi*

8:30 AM • PLENARY SESSION – Ethics and Professionalism,
John Melvin

10:00 AM–5:30 PM • COURSES

MODULE – MUSCULOSKELETAL MEDICINE

Osteoporosis And Spine. Chair: *Liza Hernández, Aydan Oral*
New Therapeutic Approaches in Osteoporosis, *Sansin Tuzun*
Management of Acute Compression Fracture, *Dorian López*
WHO Fx Assessment Tool: Recommendations, *Aydan Oral*
Spine Imaging Beyond Discogenic Disease, *Fernando Zalduendo*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Advances in Prosthetics and Mobility. Chair: *Alberto Esquenazi*
Advances in Upper Extremity Amputee Management, *Alberto Esquenazi*
Exoskeletal Assisted Ambulation, *Michael Saulino*
New Advances in Wheelchair Prescription, *Enrique Toro Garratón*
Tools for Assay of Stroke Recovery, *Hermano Igo Krebs*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

Meet the Editors. *Course Director: Walter Frontera*
 Introduction to Journal publishing in PRM, *Walter Frontera*
 Narrative vs. Systematic Reviews, *Mauro Zampolini*
 The Role of Journals in Lifelong Learning, *Stuart Weinstein*
 A Critical Analysis of Peer Review, *Jerzy Basford*
 Clinical Trials: How to Publish Strength and Weaknesses of
 Randomized Clinical Trials, *Gunnar Grimby*

MODULE – NEUROMUSCULAR & PEDIATRICS

Sports and MSK Injury. *Chairs: Guy Vanderstraeten, Luis Baerga*
 Evaluation and Management of Patellofemoral Pain, *Guy Vanderstraeten*
 Radiographic Evaluation of the Knee, *Gaspar García*
 Low Back Pain in Young Athletes, *Luis Baerga*
 Management of Mild TBI, *Vilmarie Quiñones*
 Injuries in Martial Arts, *David Burke*

MODULE – COURSES IN SPANISH

Sesión Científica AMLAR. *Moderadores: Juan Manuel Guzmán, Joyce Bolaños*
 Evaluación y Manejo de Lesiones de Plexo Braquial, *Juan Manuel Guzmán, María Elva García Salazar, Jorge Gutiérrez, Joyce Bolaños, Ligia Monterola*

MODULE – ALLIED HEALTH

New Advances in Rehabilitation. *Chair: Flavia Bayron*
 Spinal Manipulation: What are the Effects?, *Brian Duncan*
 Exercise in HIV, *Farah Ramírez*

MODULE – MUSCULOSKELETAL MEDICINE

Injections: Innovative Consideration. *Chair: Brian O Young*
 Improving Functional Quality of Life in Knee OA. *Panel of Experts: Marta Imamura, Brian O Young, David Cassius, Giampaolo De Sena, Mark Young, Ning Hua Wang*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Community Based Rehabilitation. *Chairs: Daniel Wever, Gustavo Bocca. Panel of Experts: Jorge Lains, Juan Manuel Guzmán, Daniel Wever, Gustavo Bocca*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

AAPMR: Professional Societies In Lifelong Learning. *Chairs: Tom Stautzenbach, Itza Rivera*
 The Role of Professional Societies in PRM, *Tom Stautzenbach*
 Educational Offerings for Lifelong Learning, *Stephanie Mercado*
 Quality in PRM Practice, *Elizabeth Sandel*

MODULE – NEUROMUSCULAR & PEDIATRICS

Cardiac and Pulmonary Rehab. *Chair: Isabel Borrás*
 Cardiac Rehabilitation, *Matthew Bartels*
 Pulmonary Rehabilitation, *Matthew Bartels*
 Exercise in Leg Pain, *Isabel Borrás*

MODULE – COURSES IN SPANISH

Tópicos Selectos en Rehabilitación. *Moderador: Flavia Bayron*
 Confiabilidad y Validez de Pruebas Diagnósticas, *Flavia Bayron*
 Terapia Acuática Para Esclerosis Múltiple, *Fabianna Gianni*
 Rehabilitación Vestibular, *Vivian Ramos*

MODULE – ALLIED HEALTH

Manual Therapy. *Chair: Alexis Ortíz*
 Lumbar Spine Manipulation, *Brian Duncan, Alexis Ortíz*

MODULE – MUSCULOSKELETAL MEDICINE

Injections in PRM, *Chair: Jay Shah*
 Biochemical Environment of Trigger Points, *Jay Shah*
 US: Application in Trigger Points, *Jay Shah*
 US Guided Injections in PMR, *Levent Oskarar*
 Platelet Rich Plasma Injections, *Guy Vanderstraeten*

MODULE – NEUROREHABILITATION & TECHNOLOGY

Pelvic Floor Syndromes. *Chairs: Liza Hernández, Paolo Di Benedetto*
 Evaluation of Urinary Incontinence, *Paolo Di Benedetto*
 Pelvic Floor Pain, *Ignacio Echenique*
 Coccygodynia and MSK Pain Management, *Liza Hernández*
 Rehabilitation of Pelvic Floor Disorders, *Paolo Di Benedetto*

MODULE – EDUCATION & LEADERSHIP DEVELOPMENT

Evidence Based Concepts. *Chair: Luz Elena Lugo*
 How to Develop Evidence Based Guidelines, *Luz Elena Lugo*
 How to Use Evidence Based Guidelines in PMR, *Gerold Ebenbichler, Marta Imamura*

MODULE – NEUROMUSCULAR & PEDIATRICS

Cancer Rehabilitation. *Chairs: Marco Pérez, Gulseren Akyuz*
 Management of Lymphedema, *Verónica Fialka-Moser*
 Pain Management in Cancer, *Marco Pérez*
 Cancer Fatigue, *Ana Acevedo*
 Cancer Rehabilitation, *Gulseren Akyuz*

MODULE – ALLIED HEALTH

Advances in Cardiac Rehabilitation. *Chair: Marizabel La Puerta*
 Update in Cardiac Rehabilitation, *Donald Shaw*
 Rehabilitation of the CABG Patient, *Donald Shaw*

THURSDAY, JUNE 16

8:00 AM **PLENARY SESSION.** *Chair: William Micheo*
 ICF and the Future of PRM, *Gerold Stucki*
 Sidney Licht Lecture - The Future of Exercise as Medicine in PRM, *Walter Frontera*

10:00 AM–12:00 PM • COURSES

MODULE – ADVANCES IN REHABILITATION
 Collaborative Ambulation Training, *David Brown*
 Genetics of Muscle Disease, *Eduardo Ramos*
 Stem Cells in Regenerative Medicine, *Diego Correa*

MODULE – EDUCATION IN PRM: AN INTERNATIONAL PERSPECTIVE.

Chairs: Marta Imamura, Alessandro Giustini
 Introduction, *Marta Imamura*
 PRM School in Marseille, *Alan Delarque*
 Educational Curriculum Implementation in PRM, *Cristina Moran de Brito*
 Resident Competencies Evaluations, *Carmen E. López Acevedo*
 PRM Education in Bangladesh, *Taslim Uddin*
 Panel Discussion, *Xanthi Michael, Leonard Li*

MODULE – AVANES EN REHABILITACIÓN.

Chair: Guido Espinoza
 Hipoterapia en Rehabilitación, *Ana Clementina*
 Atención Aguda del Paciente de ACV, *Eduardo Buagni*
 Prescripción de Prótesis: Enfoque Clínico, *Guido Espinoza*
 Rehabilitación Espondilitis Anquilosante, *Gustavo Bocca*

12:00 PM • CLOSING CEREMONY**1:00 PM • BUSINESS MEETING APMFR-PR**

ADMINISTRATIVE OR EDUCATIONAL MEDICINE

No. 1

REHABILITATION HOSPITALS: IS WORTHWHILE DELIVERING PROGRAMS FOR INPATIENTS?

Daniel Rubio de Souza, MD; Liliana Lourenço Jorge, MD; Flávia Garcia Marchi, SLT; Ana Clara Portela Hara
Brazil

Objective: To verify the efficacy of rehabilitation programs for inpatients admitted to a hospital specialized in rehabilitation; to describe the demographics of this population. *Method:* A sample of 101 patients with major disabilities was studied, from October 2009 to September 2010 at the Institute of Rehabilitation Lucy Montoro, Sao Paulo, Brazil. The rehabilitation program consisted of 2 to 6 pre-established weeks of multidisciplinary therapies. The group was divided into: Traumatic brain injury (TBI), Stroke, Spinal cord injury (SCI), Others. The primary outcome measures were: Functional Independence Measure, Length of stay, Glasgow Outcome Scale (for TBI) and Modified Rankin Scale (for Stroke). The secondary outcome measures were qualitative data for epidemiological analysis. The study was submitted to Ethics Committee of the Institute's Research Center, and patients only admitted after signing a written informed consent agreement. Data analysis was performed using Stata SE10. *Results:* The sample distribution was the following: 50.4% SCI; 18.81% Stroke; 17.8% TBI; 12.8% others (amputees, Guillain Barré Syndrome). The sample corresponded to 72.1% of the total population admitted for hospitalization. No difference between length of stay among the subgroups. Greater improvements were observed in self-care management and mobility, and poorer effects on cognitive skills. Etiological differences observed during discharge: Stroke and SCI showed greater motor improvement. No cognitive improvements were measured. *Implications/Impact on Rehabilitation:* Demographics are comparable to expected profile of each studied neurological condition. The recommended length of stay is sufficient to promote motor improvements in groups of patients. The rehabilitation efficacy of inpatient model is similar to previous studies from other services and models of hospitalization. Results suggest the need of greater time of stay for those presenting cognitive deficits and the establishment of hospitalization patterns tailored to disabilities profiles. The proposed model of rehabilitation is effective, according to statistically significant improvement of motor function of patients submitted to treatment (stroke and SCI). Further studies are needed, with greater samples and specific functional measures, comparing the efficacy and cost-effectivity between outpatients and inpatients groups.

No. 2

EPIDEMIOLOGY OF OUTPATIENT REHABILITATION IN A HEALTH INSURANCE IN BRAZIL

Carlos Musse, MD
Faculdade Medicina PUCRS, Brazil

Objective: The aim of study is to outline the profile of outpatient department assistance given in the area by associated of UNIMED in Brazilian south. *Method:* From December to May 2009, 315,004 procedures have been analyzed, describing the most used CBHPM (Brazilian hierarchical classification of medical procedures), the most common diseases (ICD-10). Data were extracted from the BI business intelligence software and analyzed with SPSS version 15.0. *Results:* The most used CBHPM (Brazilian hierarchical classification of medical procedures) are myo articular 151,929, 48.31% spine disease 86,197 (27.41%); respiratory diseases 35,805 (11.38%); neurological diseases 25,685 (8.17%); orthopedic surgery rehab 14,149 (4.5%);

amputations 200 (0.06%); other 547 (0.17%). The most common diseases (ICD-10) enthesopathies 34,523 (17.8%), post surgery acute and traumatic injuries 29,790 (15.4%), spine diseases 52,675 (27.2%), chronic arthropathy 15,303 (7.9%), cancer 501 (0.3%), neurological diseases 1,999 (1%). International Code of Disease nonspecific 3,812 (2%), inadequate 609 (0.3%) or missing 54,699 (28.2%). *Implications/Impact on Rehabilitation:* The epidemiological importance of musculoskeletal justifies planning actions to reduce its cost in health. The skills of the Physiatrist for outpatient pain management should cover diseases and MKE, the main focus.

No. 3

APPLICATION AND EVALUATION OF CPD INTERACTIVE METHOD IN TEACHING OF REHABILITATION MEDICINE

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Objective: To evaluate the effect of CPD (clinical observation – Problem-based Teaching – discussion) teaching method on training of rehabilitation therapist. *Method:* 80 full-time undergraduate students majoring in rehabilitation medicine were randomly divided into two groups, CPD teaching group (40 students) and routine teaching group (40 students) and the teaching effect was evaluated by questionnaire and exam score. *Results:* There's no obvious difference between the two methods in the basic knowledge acquisition ($p > 0.05$). But there is a remarkable difference in the questionnaire between the two groups ($p < 0.01$). *Implications/Impact on Rehabilitation:* In the training of high-quality rehabilitation therapist, CPD teaching method is more advantageous than routine method in bringing up students' ability of self-study, clinical thought, analyzing and summarizing, and the doctor-patient communication ability as well.

No. 4

STATUS OF REHABILITATION MEDICINE IN GENERAL HOSPITALS IN CHINA

Jianan Li, MD
China

Objective: To analyze status of rehabilitation medicine in general hospitals of China for strategy making for development of rehabilitation medicine in China. *Method:* To investigate status of rehabilitation service in China by analysis of a comprehensive internet survey from top of the Ministry of Health, China down to 4,064 major general hospitals and 338 rehabilitation hospitals. All data were verified by local government and analyzed by national database. *Results:* The general hospitals with department of rehabilitation medicine were 3,288 (80.9%) with 39,408 beds. Rehabilitation doctors were 14,317, including 984 chief and 2,085 vice chief doctors. Only 52% of them had bachelor's degree or above. General therapists were 12,523. Only 34% of them had bachelor's degree or above. Most therapists (38%) were major in physical therapy, 17% in occupational therapy, 6% in speech therapy, 2% in prosthesis and orthosis, and 30% in manual therapy or traditional Chinese rehab treatment. Nurses in rehabilitation service were 8,565 and only 13% of them had bachelor's degree or above. Services in rehabilitation departments were 80% with physical medicine, 47% with occupational therapy, 24% with speech therapy, 7.68% with P&O and 75.52% with traditional Chinese Medicine. This survey also demonstrated the geographic feature, general status

of medical administration and spectrum of rehabilitation services in general hospitals in China. *Implications/Impact on Rehabilitation:* Rehabilitation services are growing rapidly in China. The quality and spectrum of service and manpower as well as rehabilitation education are under developed. Internationalization of rehabilitation services and education are major challenges in China.

No. 5

PHYSICAL AND REHABILITATION MEDICINE RELATED EDUCATIONAL PROGRAMS IN ESTONIA

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Estonia

Objective: The study-aim was to characterize the education of key professions in physical and rehabilitation medicine (PRM) – PRM doctors, occupational therapists (OTs), physiotherapists (PTs) – in Estonia by defining the onset of curricula, accreditation status, the number of specialists educated, and the male:female ratio among graduates. *Method:* The data was collected via Study Info Systems of all institutions providing OT and PT education and postgraduate training for PRM doctors, and from respective program-managers by written questionnaire. Standard statistical methods were used for data analysis. *Results:* There is one residential program for PRM doctors, one OT curriculum at bachelor level, two PT programs at bachelor, and one PT program at master level in Estonia. PRM doctors' postgraduate training started in 1997 and is coordinated by the University of Tartu (UT). Residency lasts three years. Total number of graduates is 41 (12% male, 88% female). OT education is provided by Tallinn Health Care College since 2000. Study-duration is four years. Total number of graduates is 58 (7% male, 93% female). PT bachelor programs are coordinated by UT and Tartu Health Care College, the programs started in 1990 and 2001, respectively. Both programs last for three years. Total number of graduates is 513 (15% male, 85% female). PT master program was opened in UT in 2005, it lasts for two years. There are 51 graduates (10% male, 90% female). *Implications/Impact on Rehabilitation:* All Estonian PRM-related curricula are relatively young. All curricula are accredited, corresponding to international standards. The quantitative information about curricula gives a good insight, providing basis for planning necessary developments. According to the development strategy for Estonian PRM-network by the year 2015 the ratio of PRM doctors to PTs should be 1:12 and to OT 1:3. At the moment total number of graduates is small, especially in OT.

No. 6

QUESTIONNAIRE FOR MEDICAL STAFF TO INVESTIGATE A LIAISON CRITICAL PATHWAY IN THE TREATMENT OF STROKE

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Japan

Objective: A liaison critical pathway for stroke treatment was introduced to 12 hospitals (4 acute hospitals, 8 convalescent hospitals) in Niigata city in April 2008. The purpose of the present study was to evaluate the effects of the liaison critical pathway based on medical staff responses to a questionnaire. *Method:* In the liaison critical pathway, transfer from an acute hospital to a convalescent hospital for active rehabilitation is scheduled on day 21. Subjects were 137 medical staff members, comprising 10 doctors, 68 nurses,

50 rehabilitation therapists, and 9 medical social workers (MSW) in one acute hospital and one convalescent hospital. The original questionnaire included 12 questions regarding the efficiency of medical tasks required for stroke care, communication between staff members, uniformity of the rehabilitation goal, etc. One answer for each question was chosen among 5 possibilities: completely compatible, relatively compatible, intermediate, relatively incompatible, and completely incompatible. The study was approved by the Niigata University ethics committee. *Results:* Most of the doctors, but not the other staff members, responded "completely efficient" with regard to efficiency of medical tasks. Most of the doctors and MSW in the acute hospital, but not the other staff members, responded that uniformity of the rehabilitation goal as well as communication between staff members was achieved. In the convalescent hospital, however, all the staff members responded that this pathway was not effective regarding the efficiency of medical tasks, uniformity of the rehabilitation goal, etc. *Implications/Impact on Rehabilitation:* Through the induction of this critical pathway in the treatment of stroke, the Japanese government anticipates an earlier start to stroke rehabilitation to achieve high daily living activity levels, resulting in reduced total medical costs. The findings of the present study indicated that medical doctors and MSW in the acute hospital were satisfied with this pathway.

No. 7

COMBINED MANAGEMENT PROGRAM EFFECTS OF CHRONIC HEART FAILURE REHABILITATION

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Objective: Continual cardiac rehabilitation effects for heart failure prevention are reported although persistence rate remains low, and their benefits have not generally spread. In this study, we have tried to reveal mutual effects of exercise diary and phone contacts among with hybrid management of chronic heart failure patient. *Method:* Ten outpatients with mean age 77.8 years (3 females) who have chronic heart failure, randomly formed in 2 groups; intervention group (IG) and control group (CG). 6 months totally intervention periods setting. For first 3 months both IG and CG realized following weekly exercise program: once time hospital-exercise and 4 times home-exercise. Rest 3 months only performed home based exercise. Additionally we requested to IG whole trial period to record body weight and step counts on a diary, besides we kept telephone contact to them once a week. *Results:* Improvements of a shuttle walking test in CG were approved and besides kept it better after hospital-exercise ended ($p=0.02$ baseline vs. 6 month). In IG muscle power of ankle plantar flexion and knee extension were increased (to both, $p=0.01$ baseline vs. 3 month). At the end of period, the ankle plantar flexion function was keeping well too ($p=0.02$ baseline vs. 6 month), and no significant decrease was found in knee extension power. The exercise time for one week resulted in approved improvement in IG of enforcement in the 6 month ($p=0.04$ baseline vs. 6 month), whereas in CG exercise time decreased when hospital-exercise period was ended. *Implications/Impact on Rehabilitation:* Management program such as diary recording and telephone contact combined with hospital-exercise was contributed improvement of lower extremities muscle power. Even if it was only performed as home-exercise, it will be possible to keep lower extremities muscle power. Management program will be contributed to improvement of exercise time.

No. 8

REHABILITATION SERVICES IN FAMILY MEDICINE UNITS (REHABILITATION AT THE 1ST LEVEL OF MEDICAL ATTENTION)**Juan Manuel Guzmán, MD; Ricardo Pérez Cuevas, MD; Verónica López Roldán, MD***International Affairs of the Mexican Society Of Physical Medicine and Rehabilitation, Mexico*

Objective: General Objective: Design and implementation of rehabilitation services in FMUs so that services may be provided with quality and timeliness.

Specific objectives:

- Prevention of impairments, functional limitations or disabilities caused by physical, sensorial or mental limitations.
- To early and integral detection, evaluation and diagnosis of disabling processes caused by the diseases included in the therapeutic-diagnostic guidelines.
- To elaborate videos based on clinical guidelines, for training patients and the rehabilitation team.
- Prescription, direction, supervision and evaluation of programs and procedures used in the adaptation and re-adaptation of people with disability with the purpose of restoring or re-establishing their functions and contributing to their psychological and social recovery.

Method: Design of rehabilitation services: A group of rehabilitation general managers, physiatrists, heads of family medicine units and health systems researchers was formed. This group determined the structure (including personnel, architectural and equipping), the motives for rehabilitation consultation that may be attended by family medicine, the clinical practice guidelines and the information and evaluation of service systems. Location of rehabilitation services: The delegations with the highest demand for rehabilitation services were analyzed. These services were determined to be instrumented throughout the country. Description of the rehabilitation services. Family medicine rehabilitation services are aimed at providing timely care to low complexity diseases that may be resolved in the short term and with the technology available in FMUs. The functions of FMUs' rehabilitation services are as follow:

- Prevention of impairments, functional limitations or disabilities caused by physical, sensorial or mental limitations.
- To early and integral detection, evaluation and diagnosis of disabling processes caused by the diseases included in the therapeutic-diagnostic guides.
- Prescription, direction, supervision and evaluation of programs and procedures used in the adaptation and re-adaptation of people with limitations with the purpose of restoring or re-establishing their functions and contributing to their psychological and social recovery. Rehabilitation services include: a) personnel and functions; b) medical care processes; c) equipping; and d) architectonic-medical model.

Results: Increase 40% of the rehabilitation structure of the Mexican Social Security System with this project. **Implications/Impact on Rehabilitation:** Benefits: The expected benefits of the rehabilitation process are in two directions: the patients and the institution. With regard to patients, an improvement in accessibility, service timeliness and effectiveness is expected. Effectiveness is measured through the prevention of irreversible sequels, recovery of functionality and improvement in quality of life. With regard to the institution, the expectations are: an improvement of services reflected in positive cost-benefit ratios resulting from a reduction of temporary leave of absence days, reduction of average costs spent on the item of leave of absence, and a care-costs reduction in general.

No. 9

THE COLLABORATION BETWEEN MEDICAL REHABILITATION PHYSICIAN AND MEDICAL ASSESSMENT AND WORK CAPACITY REHABILITATION PHYSICIAN IN THE MANAGEMENT OF DISABLED CHRONIC CONDITIONS**Dan Nemes, PhD; Mihai Dragoi; Livia Vidoni; Dan Surducian; Elena Amaricai; Daniel Popa; Roxana Onofrei; George Puenea***Romania*

Objective: To evaluate the collaboration between medical rehabilitation physician and medical assessment and work capacity rehabilitation physician in the management of disabled chronic conditions. **Method:** During 2½ years period (01.01.2008–01.07.2010), among all our inpatients, we analyzed those retired due to the specific disabled chronic conditions: patients requiring reassessment papers or were issued official documents demanding retirement due to the underlying disease. The parameters followed were the apportionment by age, sex, urban or rural environment I, the underlying condition and the others associated diseases. Evolution of these patients was also studied, after the medical rehabilitation therapy, by following our rehabilitation items and by medical assessment physician criteria. **Results:** From all 3,478 admitted patients during this period, 328 patients met our criteria. Among these 328 patients: 166 patients (50.60%), 77 men (46.38%) and 89 women (53.61%), were issued new documents for the Medical Assessment and Work Capacity Rehabilitation Commission Timis; 162 patients (49.39%), 97 men (58.33%) and 65 women (40.12%), were performed reassessment documents for Medical Assessment and Work Capacity Rehabilitation Commission Timis. 24 patients (14.81%), 14 men (58.33%) and 10 women (41.66%), revealed an improvement regarding the evolution and therefore the handicap grade was lowered. Twenty-eight patients (17.28%), 18 men (64.28%) and 10 women (35.71%), showed a worse evolution with an subsequent increasing of the handicap grade, 110 patients (67.90%), 65 men (59.09%) and 45 women (40.90%), had a stationary evolution and handicap grade. **Implications/Impact on Rehabilitation:** The peculiarities of the population from our geographic area (aged persons with others associated diseases, middle aged active persons with strong inherited characteristics and also with a high stress exposure which lead to a predisposition for major conditions) justify the increasing rate of the retirements caused by disabled conditions and the slowly favorable/stationary/worse evolution following the medical rehabilitation complex therapy. The enhancing of the women's rate is explained by the higher morbidity due to the autoimmune disorders. Better results were met for men and patients from urban area. The retirement, even the retirement for a short period, provides a minimum income to these patients, hence the possibility of undergoing a complex and adequate rehabilitation treatment. In the management of the chronic disabled conditions, regardless of their etiology, the team work between medical rehabilitation physician and the physician of medical assessment and work capacity rehabilitation is a landmark for a comprehensive assessment of the results regarding medical rehabilitation and for the establishment of the proper handicap grade.

ELECTRODIAGNOSTIC

No. 10

RESEARCH ON THE RELATIONSHIP BETWEEN OCULOMOTOR & ABDUCENS NERVE PARESIS AND VISUAL EVOKED POTENTIAL***Yong Yin, MD, PhD****China*

Objective: Both vision and eye movement has been well studied for a long time. People get most of the information of environments through visual system. Eye movement is a relative simple movement control system, and has also been well understood. However the interaction between visual sensory and eye movement is not very clear. The purpose of this study was to determine whether the movement eye could affect visual sensory by using visual evoked potential (VEP). **Method:** The P100 component of VEP of 10 subjects has been recorded using Keypoint 4 channels electromyography equipment. The ten subjects suffers from oculomotor or abducens nerve paresis either caused by craniocerebral injury, multiple sclerosis, glioma, brain stem infraction, brain aneurysm or diabetes mellitus. **Results:** Eight of the ten subjects show abnormal VEP. The P100 components of four of them show non-crossed asymmetrical distribution, which indicates that the damage of optic nerve happens before optic chiasm. The P100 components of the rest of the 8 subjects show crossed asymmetrical distribution, which indicates the damage that happens after optic chiasm. Two of the ten subjects show normal VEP. **Implications/Impact on Rehabilitation:** The damage of eye movement system could cause abnormality of visual function. But the interaction pathway is still unclear. A possible mechanism could be that eye movement disorders not only affect the input of visual information, but also affect the input of eye position information, which subsequently affect the integrated function between cortex and subcortex nucleus.

No. 11

RELIABILITY AND MINIMAL DETECTABLE CHANGE OF THE NERVE CONDUCTION STUDIES OF INFERIOR LIMBS***Sandra Milena Barrera Castro, MD; Fernando Ortiz Corredor****Colombia*

Objective: Few studies have tested the reproducibility and Minimal Detectable Change (MDC) of nerve conduction measurements. The purpose of the current study was to determine the intersession reliability and Minimal Detectable Change of the nerve conduction studies of tibial, peroneo and sural in healthy subjects. **Method:** In 30 healthy subjects (age 27 years, SD=7.2; height 163 cm, SD=7), there were made nerve conduction studies of tibial, peroneo and sural of the right extremity. Latency, amplitude and nerve conduction velocity were measured by using conventional techniques. Intersession reliability over 5 consecutive days was estimated using intraclass correlation coefficients ICC (2.1) and the 95% confidence interval (CI) for the ICCs. The minimal detectable change MCD90 was estimated using standard error of measurement (SEM). **Results:** The reliability of latencies and motor conduction velocity was regular. Tibial Nerve: motor distal latency ICC=0.36 (95% CI of 0.03–0.62) MCD90=1.3 ms. Nerve conduction velocity ICC=0.52 (95% CI of 0.21–0.74); MCD90=8.2 m/s. Peroneo nerve: Motor distal latency ICC=0.36 (95% CI of 0.01–0.62) MCD90=0.89 ms. Nerve conduction velocity ICC=0.59 (95% CI of 0.31–0.78); MCD90=5.4 m/s. The reliability of latency and amplitude of the sural nerve was regular. Distal peak latency ICC=0.4 (95% CI of 0.04–0.66); MCD90=0.7 ms; amplitude ICC=0.44 (95% CI of 0.12–0.69); MCD90=14 μ V. The reliability of motor amplitude of

the peroneo nerve was acceptable. ICC=0.65 (95% CI of 0.38–0.81) MCD90=2.4 mV. The reliability of motor amplitude of the tibial nerve was good. ICC=0.77 (95% CI of 0.57–0.88); MCD90=3.9 mV. **Implications/Impact on Rehabilitation:** These results are an approach to know the error magnitude of neuroconduction studies. They are also the basis to have follow-up studies on diagnosis and treatment of individual patients.

No. 12

LOCKED-IN SYNDROME IN A SCHOOL GIRL, SARY TO A GUILLAIN-BARRÉ SYNDROME OF DEMYELINATING TYPE: CASE REPORT***Angela Maryoure Gigliola Suárez Moya, MD; Fernando Ortiz Corredor; Angela Maryoure Gigliola Suárez Moya***
National University of Colombia, Colombia

Objective: Tertiary care pediatric hospital. A 6-year-old girl with quickly progressive muscular weakness, quadriplegia, ocular paralysis and no pupil reflex. **Method:** She initially presented abnormal walking, dysarthria and ophthalmoplegia. After 72 h, the patient got quadriplegic and required ventilatory support. The cerebrospinal fluid analysis showed albuminocytologic dissociation. At the 9th day neuroconductions showed unexcitable motor nerves and no sensory nerve responses. The patient was treated with immunoglobulin and supportive aids. The patient blinked in the 13th day. When leaving the hospital, day 45, the patient had achieved partial trunk control. **Results:** In the 4th month, hand muscular weakness continued, there was a dorsiflexion-plantarflexion paralysis; the patient can walk without assistance, using ankle foot orthosis. At the 5th month the electrophysiological study showed median motor: latency 10.86 ms, amplitude 200 mV and nerve conduction velocity (NCV) 25.3 m/s, ulnar motor: latency 6.98 ms, amplitude 240 mV and NCV 24.9 m/s. No sensory responses. The needle electromyography showed tibial anterior denervation. There are consistent findings with motor-sensory demyelinating polyneuropathy and sary axonal degeneration. **Implications/Impact on Rehabilitation:** It is striking to find that after 5 months, the electrophysiological study has compatible responses with demyelinating polyneuropathy. Although the findings can be seen in acute motor-sensory axonal neuropathy (AMSAN) in healing phase, it is unlikely taking into account the clinical evolution. In AMSAN axonal degeneration occurs in proximal segments to the nerves with slow clinical recovery. In acute motor axonal neuropathy (AMAN), the clinical recovery is relatively quick because there are more distal segments involved; however, the sensory neuroconductions are normal. The demyelinating Guillain Barre Syndrome can be presented as Locked-in Syndrome with unexcitable motor nerves and no sensory responses. In this case, the clinical recovery was relatively quick in spite of the severe compromise mimicking cerebral death.

No. 13

SINGLE FIBER ELECTROMYOGRAPHY WITH CONCENTRIC NEEDLE ELECTRODE AND SURFACE STIMULUS IN ORBICULARIS OCULI MUSCLE***Ana Milena Rodríguez Lozano, MD; Fernando Ortiz Corredor, MD****Department of Physical Medicine and Rehabilitation, Universidad Nacional de Colombia and Instituto de Ortopedia Infantil Roosevelt, Bogotá, Colombia*

Objective: Estimate the reference values for the jitter in the orbicularis oculi muscle through surface stimulus and recording with a concentric needle electrode. **Method:** A bipolar rod electrode was placed midway

between the tragus and the external angle of the eye. Stimulation was done for 0.05 ms at 10 Hz and a maximum intensity of 10 mA. The filters were adjusted to settings of 2 kHz and 10 kHz for the low-cut and high-pass filters respectively and the potential of one muscle fiber was recorded with a concentric needle inserted subcutaneously in the orbital portion of the orbicular oculi muscle. *Results:* The test was done on 53 normal controls (25 men and 28 women with a mean age of 30.5 years). The jitter was expressed as the mean of the consecutive difference (MCD) of 10 individual potentials. The MCD mean was $14.5 \mu\text{s} \pm 2.8$ (upper 95% limit: $21 \mu\text{s}$) minimum average $8.5 \mu\text{s}$ and maximum average $22 \mu\text{s}$. The MCD mean for all of the potentials ($n=530$) was $15.4 \mu\text{s} \pm 5.4$ (upper 95% limit: $27 \mu\text{s}$) minimum value $5.0 \mu\text{s}$ and maximum value $31.4 \mu\text{s}$. The average time for the test was 18 min and the average score on the Visual Analogue Scale was 2. *Implications/Impact on Rehabilitation:* The conclusion was drawn that doing the single fiber EMG by means of surface stimulation and a concentric needle electrode is an easy test to do, affordable, quickly done and not very painful. It is ideal for people with an altered state of consciousness and the pediatric population. The results obtained could serve as a reference point to diagnose diseases of the neuromuscular plate using a practical and safe method.

No. 14

CARPAL TUNNEL SYNDROME (CTS): CORRELATION BETWEEN PATIENT SYMPTOMS, CLINICAL EXAMINATION AND ELECTROMYOGRAPHY FINDINGS

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Objective: Carpal tunnel syndrome (CTS) may be caused by any condition that presses the wrist. The aim of our study was to list and compare the EMG records with the referred patient's symptoms and the clinical findings. *Method:* For a period of 18 months, 271 inpatients and outpatients, 200 females and 71 males, mean age 42 years, were referred and examined for CTS in the Electromyography Laboratory of our Department. We had excluded patients with trauma or surgery intervention. All patients have clinically tested, their symptoms have been listed and EMG test was performed. Main symptoms were finger pain and hand or finger numbness. We divided patients in two groups: the 1st with typical clinical signs and symptoms: 100 (36.9%) and the 2nd with no typical signs and symptoms: 171 (63.09%). As an evaluation parameter we used the percentage expression. *Results:* 1st group: 82 (82%) EMG confirmed – [motor conduction > 4.2 and sensory conduction > 3.2], 18 (18%) with no EMG findings 2nd group: 70 (40%) EMG confirmed, the rest 101 (60%) with symptoms due to other causes. CTS has not always positive EMG findings. No isolated test or symptom or sign is sufficient to define the diagnosis of CTS. *Implications/Impact on Rehabilitation:* The clinical examination in parallel with EMG test and referred symptoms can define the diagnosis.

No. 15

THE UTILITY OF COMPARISON STUDIES OF MEDIAN AND ULNAR LATENCIES IN CARPAL TUNNEL SYNDROME

Mikio Muraoka, MD, PhD; Shinji Kimura, Yuichiro Sogawa Japan

Objective: The purpose of the present study was to compare the efficacy of ordinary conduction studies vs comparison studies using the difference between median and ulnar latencies in carpal tunnel syndrome (CTS). *Method:* We studied 60 hands of 30 healthy volunteers and 120 hands of 77 patients with symptoms and signs of CTS. The distal sensory latency to the index finger (DSL) and distal motor latency to the abductor pollicis brevis (DML) were

selected for the ordinary conduction test. The difference between the second lumbrical and interosseus distal motor latencies (2L-INT DIF) was examined using Preston's method and the difference between the median and ulnar distal sensory latencies of the ring finger (Ring DIF) were examined. *Results:* The cut-off values of each parameter were as follows: DSL 3.5 ms, DML 4.2 ms, 2L-INT DIF 0.5 ms and Ring DIF 0.5 ms. The electrodiagnostic sensitivities were 96% for Ring DIF, 93% for 2L-INT DIF, 87% for DSL, and 85% for DML. We could not detect sensory nerve action potentials (SNAPs) of RING DIF in 53% hands and of DSL in 27% hands, whereas compound muscle action potentials were undetectable by DML in only 5.8% hands and by 2L-INT DIF in only 2.5% hands. *Implications/Impact on Rehabilitation:* Comparison studies using Ring DIF and 2L-INT DIF showed high sensitivity and seemed suitable for diagnosing mild CTS. Because it was difficult to detect SNAPs in severe cases, Ring DIF and DSL were not suitable as objective indicators of severe CTS. The 2L-INT DIF parameter was superior for evaluating severity in extreme CTS based on Padua's classification. Comparison studies to extract localized abnormalities by subtraction of median and ulnar latencies were demonstrated to be very effective for the electrodiagnosis of CTS.

No. 16

THE ROLE OF VASCULAR ENDOTHELIAL GROWTH FACTOR IN PERIPHERAL DIABETIC NEUROPATHY IN DB/DB MICE

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Objective: The objectives of the study were to evaluate the role of vascular endothelial growth factor (VEGF) in functional and structural neuropathic changes in db/db mice, an animal model of type 2 diabetes. *Method:* VEGF inhibition was induced by dRK6 and male db/db mice were treated with dRK6 starting at 7 weeks of age for 12 weeks (db/db-dRK6, $n=6$) or were untreated (db/db, $n=6$). The 19-week-old nondiabetic control (db/m, $n=6$) mice were used as controls in all of the experiments. For the functional neuropathic changes, we evaluated sciatic motor nerve conduction studies (MNCS) and tactile responses (50% g threshold) to stimulation with flexible von Frey filaments. The histopathological changes of sciatic nerves were investigated with electron microscopy. *Results:* The db/db-dRK6 group developed motor nerve conduction delay compared with other groups. Tactile response thresholds also increased in the db/db-dRK6 group compared with other groups. The ultrastructural features of sciatic nerves showed aberrant myelination, demyelination, axonal degeneration, proliferated Schwann cell with vacuolization, and endothelial hyperplasia of blood vessel in the db/db-dRK6 group. *Implications/Impact on Rehabilitation:* Diabetic microangiopathy relate to VEGF down-regulation could be a pathogenic factor of diabetic peripheral neuropathy in an animal model of type 2 diabetes. Endothelial dysfunction and increased oxidative stress associated with VEGF down-regulation should be identified in diabetic peripheral neuropathy. Future studies to explore therapeutic application of VEGF in diabetic neuropathy are needed.

No. 17

THE ANOMALOUS SUPERFICIAL RADIAL NERVE INNERVATION TO THE ULNAR DORSUM OF THE HAND IN KOREAN

Ki Jung Kim, MD; Dong Jin Kim, MD; Young Uhk Kim, MD; Dong-wook Rha, MD

Republic of Korea

Objective: Sometimes, dorsal ulnar cutaneous responses are not evoked or reduced in patients without responsible symptoms and

signs. The superficial radial nerve is known to provide innervations to the entire dorsum of the hand in some cases. This radial to ulnar anomaly should be carefully considered in patients who suspected to have ulnar neuropathy for confirmation of injury level. The purpose of this study is to clarify the incidence of the anomalous superficial radial innervations to the ulnar dorsum of the hand in Korean adults. *Method:* We performed the nerve conduction studies (NCSs) for superficial radial nerves and the dorsal ulnar cutaneous nerves in 115 patients (42 males and 73 females). The superficial radial nerve stimulation was performed on the dorsolateral aspect of the radius at 7 cm above the radial styloid process. The dorsal ulnar nerve was stimulated at 5 cm above the ulnar styloid between the flexor carpi ulnaris tendon and the ulna. Sensory nerve action potentials (SNAP) were recorded simultaneously using 2-channel technique. The recording electrodes were placed at the main portion of the nerve over an extended extensor pollicis longus tendon for superficial radial nerve and at the apex of "V" zone between the fourth and fifth metacarpal bones for dorsal ulnar cutaneous nerve. *Results:* The age of the patients was distributed from 18–81 years (49.9 ± 14.4). The onset latency and the amplitude of the superficial radial nerve was 1.48 ± 0.35 ms and 36.2 ± 12.7 μ V. The onset latency and the amplitude of the dorsal ulnar cutaneous nerve was 1.30 ± 0.25 ms and 34.5 ± 13.3 μ V. The anomalous superficial radial innervations to the ulnar dorsum of the hand was found in 2 (1.73%) of 115 patients and in 2 (0.86%) of 230 hands. *Implications/Impact on Rehabilitation:* To our knowledge, this is the first report for the anomalous superficial radial innervations to the ulnar dorsum of the hand in the oriental people. We founded that the incidence (0.86%) in Korean people was lower than that from the Western report.

No. 18

SIGNIFICANCE OF SYMPATHETIC SKIN RESPONSE TEST IN PATIENTS WITH CHRONIC BACK PAIN

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Republic of Korea

Objective: To evaluate the usefulness of Sympathetic Skin Reflex (SSR) in the assessment of chronic back pain in conjunction with routine electrophysiologic study and clinical characteristics. *Method:* Patients who had symptoms duration of 3 months or longer were enrolled and evaluated using physical examination and visual analogue scale (VAS) for back pain. Herniated lumbar disc (HLD) or spinal stenosis were confirmed by routine X-ray study, computer tomography (CT) or magnetic resonance image (MRI) and for diagnoses of peripheral neuropathy, lumbosacral radiculopathy or autonomic dysfunction, nerve conduction study, needle electromyography (EMG) and SSR were performed. *Results:* Compared with control group, there was a significant difference in amplitude ($p > 0.05$), but not in latency and duration ($p > 0.05$). No significant relationship was observed between VAS and SSR ($p > 0.05$). No significant relationship was observed between time after onset and SSR ($p > 0.05$). In patients with lumbosacral radiculopathy and normal EMG finding, there was no significant difference between amplitude and latency of SSR ($p > 0.05$). In patients with HLD and spinal stenosis, there was no significant difference between amplitude and latency of SSR ($p > 0.05$). *Implications/Impact on Rehabilitation:* Based on these results, we found that chronic back pain is characterized by abnormal sympathetic nerve response, and that the amplitude of sympathetic reaction is decreased. These findings may provide important information the diagnosis and establishment of treatment guidelines for chronic back pain.

No. 19

CORRELATION BETWEEN KOREAN VERSION OF OBSESSIVE COMPULSIVE DRINKING SCALE AND COGNITIVE EVOKED POTENTIAL IN ALCOHOL DEPENDENT PATIENTS

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Republic of Korea

Objective: To verify the significance of and the correlation between cognitive evoked potential and Obsessive Compulsive Drinking Scale (OCDS) in alcohol dependent patients. *Method:* The subjects of this study were 25 alcohol-dependent patients whose medical history did not contain dementia or auditory abnormality. As cognitive evoked potential study, P300 studies using an auditory paradigm were performed, and Korean Version of Obsessive Compulsive Drinking Scale was scored in these subjects. We compared P300 latency with score of OCDS. P300 latency and total amount of ethanol ingestion were compared. We also measured reliability of P300 study in 4 repetitive studies. *Results:* There were significant positive correlation between P300 latency and score of OCDS ($p < 0.05$, $r = 0.804$). There were no significant correlation between P300 latency and total amount of ethanol ingestion ($p > 0.05$). There were significant reliability in P300 latency study ($\alpha = 0.9771$). *Implications/Impact on Rehabilitation:* These findings suggest that the latency of P300 may be useful in clinical electrodiagnostic measures which can reflect characteristic drinking behavior in alcohol dependent patients with objectivity and can be used as a quantitative analysis of drinking behavior even for early asymptomatic alcohol dependent patients.

No. 20

COMPARATIVE ANALYSES OF ELECTROPHYSIOLOGICAL VERSUS HISTOLOGICAL CHANGES IN CISPLATIN-INDUCED POLYNEUROPATHY IN RATS

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Objective: This study was designed to investigate electrophysiological versus histological changes caused by cisplatin administration to identify the more sensitive electrodiagnostic method. *Method:* We conducted an experimental animal study with 32 Sprague-Dawley male rats randomly divided into one control group and three experimental groups receiving cisplatin. We assessed their weight, time required to withdraw from mechanical and heat stimuli, nerve conduction (including an H-reflex study), and responses TUNEL staining to evaluate apoptosis in sciatic nerves. *Results:* After 4 weeks of cisplatin administration, a significant decrease in sensory-threshold values was found in each intragroup comparison, and the number of cells with apoptotic features continued to increase in only the dorsal root ganglia. The nerve conduction study revealed no changes in the latency of the tail and H-reflexes and no H-related sensory changes in conduction velocity in the tibial nerve, but the amplitudes in the tail were significantly decreased in all experimental groups after 4 weeks of cisplatin administration according to each intragroup comparison ($p < 0.05$). *Implications/Impact on Rehabilitation:* Cisplatin primarily interacts with the dorsal root ganglia to meet the metabolic requirements of the axon. Therefore, the amplitude of the sensory nerve action potential, which represents axonal functioning, may be more sensitive than the latency of the sensory nerve action potential or the results of the H-wave study, which is believed to detect proximal lesions in peripheral nerves.

No. 21**PROTECTIVE EFFECT OF SESAMOL ON STREPTOZOTOCIN INDUCED DIABETIC NEUROPATHY IN RATS****Young Jin Ko, MD, PhD; Hye Won Kim, MD, PhD, Be Na Lee, MD, PhD***Department of Rehabilitation Medicine, College of Medicine, The Catholic University of Korea, Korea*

Objective: Diabetic neuropathy is one of the most common complication of chronic diabetes. Sesamol is suggested to have antioxidant properties. This study was designed to investigate the neuroprotective effect of sesamol on diabetic neuropathy in diabetic rats. **Method:** In this study, thirty Sprague-Dawley male rats were randomly divided into three groups: group 1, diabetic control rats without sesamol treatment (DM group); group 2, diabetic rats with sesamol treatment (SM group); group 3, normal control. Diabetes was induced by Streptozotocin (60 mg/kg) injection and Sesamol (10 mg/kg/d) was administered orally for 9 weeks. We measured weight, blood glucose level, behavior tests and electrodiagnostic studies at before and after 3, 6 and 9 weeks of diabetes. **Results:** After 3 weeks, SM group showed a significant higher body weight and lower blood sugar level than DM group. After 3 weeks, DM group was observed significant fast withdrawal response of mechanical stimulation and delayed response of thermal stimulation compared with normal control group ($p < 0.05$), however SM groups showed difference after 6 weeks ($p < 0.05$). DM group showed delayed sensory nerve conduction velocity (SNCV) and motor nerve conduction velocity (MNCV) after 6 weeks but SM group showed delayed MNCV at 9 weeks. H reflex did not show difference among three groups. In structural analyses, DM group showed severe myelin degenerations and morphologic changes of nerve fibers compared with SM group. **Implications/Impact on Rehabilitation:** In conclusion, this study suggests that treatment with sesamol may attenuate symptoms of diabetic neuropathy and it also has protective effects against diabetic neuropathy.

No. 22**INCOMPLETE TIBIAL NEUROPATHY AFTER INTRAMUSCULAR INJECTION INTO THE POSTERIOR THIGH. CASE REPORT****Kyoung Soo Park, MD***South Korea*

Objective: Tibial neuropathy of thigh following intramuscular injection is rare and has not been reported in Korea. A 64-year-old man, who has diabetes mellitus and chronic renal failure, had weakness

and hypoesthesia of left lower leg. He had gotten an intramuscular injection into the 10–20 cm above the popliteal fossa area 10 months ago in the local clinic. After injection, weakness in left lower leg, especially ankle plantar flexor, and hypoesthesia on the left calf area was developed. Weakness of left ankle plantar flexor was noted as 2/5 MRC grade. Left gastrocnemius atrophy was also present. Sensation decreased generally in both leg, especially left calf area compared with right. **Method:** Electrodiagnostic study. **Results:** Electrodiagnostic study revealed distal symmetric sensorimotor peripheral polyneuropathies due to diabetes and incomplete tibial neuropathy below branching to biceps femoris. **Implications/Impact on Rehabilitation:** Careful positioning of intramuscular injection with awareness of risk factors which are likely to cause tibial nerve injury can prevent injury and potential disability to the patients.

No. 23**CROSS-STIONAL AREA OF THE MEDIAN NERVE IN PATIENTS WITH SUBCLINICAL MEDIAN NEUROPATHY AT THE WRIST****Carolina Gutierrez, MD; I. Andrada; R. Sembrano; M. Carrion-Jones***United States of America*

Objective: To evaluate the correlation of the cross stional area (CSA) of the Median nerve with ultrasound with subclinical Median Neuropathy at the wrist. **Method:** This is a prospective study in an Academic Medical Center. 102 subjects were recruited with no signs or symptoms of carpal tunnel syndrome (CTS), of those 18 were found to have subclinical Median neuropathy at the wrist either by transcarpal Mixed Nerve Study delta (Median to Ulnar) > 4.0 ms and/or Median sensory peak distal latency ≥ 4.0 ms. All participants underwent a left hand Nerve Conduction Study of the Median sensory, Ulnar sensory, and mixed Median and Ulnar sensory across the wrist. Cross-stional area of the Median nerve was measured at the wrist by ultrasound. **Results:** A total of 18 subjects with subclinical Median neuropathy at the wrist were included. The subjects were divided by body mass index (BMI): 10 morbidly obese (BMI > 40), 6 obese (BMI 30–39.9), and 2 overweight (BMI 25–29.9). Subjects were divided by age group: 18–29 years, 30–39 years, 40–49 and > 50 years. 9 subjects had a Median nerve peak distal latency ≥ 0.4 ms, with a mean cross-stional area (CSA) of the Median nerve of 12.73 cm. 16 subjects with a transcarpal nerve conduction study delta of ≥ 0.4 had a mean CSA of 11.29 cm. As per our data, the mean CSA was 8.27 mm² in subjects with no evidence of Median nerve neuropathy, compared to the group with subclinical Median neuropathy with a mean CSA of 11.47 mm² ($p < 0.001$). **Implications/Impact on Rehabilitation:** To improve and advance the non-invasive evaluation of Median nerve peripheral neuropathies with the use of ultrasound.

GERIATRIC REHABILITATION

No. 24

ENHANCED SOMATOSENSORY INFORMATION IMPROVES POSTURAL STABILITY IN OLDER PEOPLE***Feng Oiu, MD, PhD Candidate^{1,2}; M.H. Cole¹; K. Davids³; E. Hennig⁴; P. Silburn^{1,5}; H. Netscher⁶; G.K. Kerr¹***

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Objective: The somatosensory system plays an important role in balance control and age-related changes to this system have been implicated in falls. Different types of insole-devices have been developed to enhance somatosensory information to improve postural stability. However, these devices are often too complex and expensive to integrate into daily life. Textured insoles may provide an inexpensive and accessible means to enhance the somatosensory input. This study investigated the effect of textured insoles on postural stability. **Method:** Participants performed standing balance tests under three footwear conditions; 1) barefoot; 2) with hard textured insoles; and 3) with soft textured insoles. For each footwear condition, participants were tested under two vision conditions (eyes open, eyes closed) on two surfaces (firm, foam). During the experiments, participants stood on a force plate (HUR Labs OY, Finland). Data from four 30 s trials were collected for each combination of footwear, surface and vision. Measurements derived from the displacement of centre of pressure (COP) included the range of anterior-posterior and medial-lateral displacement, the path length and the 90% confidence elliptical area (C90 area). **Results:** There was a significant Group*Surface*Insole interaction for C90 area, path length, anterior-posterior and medial-lateral sway. Compared to younger individuals, postural sway was greater for the older people on the firm and foam surfaces in the barefoot condition. However, both textured insoles reduced postural sway for the older group especially in the foam eyes closed condition. **Implications/Impact on Rehabilitation:** Textured insoles can improve postural stability in older people by enhancing somatosensory information, particularly during more challenging balance tasks. Such textured insoles may provide a low-cost means of improving postural stability and may act as an important intervention to prevent falls.

No. 25

THE INFLUENCE OF STATIC AND DYNAMIC FATIGUE ON BALANCE CONTROL***Thomas Bochdansky, MD; C. Bernreiter; D. Kommenda; A. Sabo****Austria*

Objective: The aim of the study was to determine the influence of static (isometric) and dynamic (concentric-eccentric) leg extensions until fatigue on the balance/postural control system. **Method:** 23 subjects (14 females, 9 males) were tested on a force

plate system (Tetrax, sunlight) before and after leg extension (iso-Legpress, BFMC, Germany). A first balance test was performed and thereafter an isometric peak force test. After this a s balance test was carried out to prove, if this has already an impact on balance control. Then either an isometric extension until fatigue (5 s maximal contraction – 1 s rest, ... until 50% of maximal value) or a concentric-eccentric extension (80% peak force and 30% of peak velocity until subjective exhaustion) was accomplished. Immediately after this the third balance test took place. There was one week between isometric and concentric tests. **Results:** Highly significant differences in balance control could be found between test 1 and 3 and between test 2 and 3 and no differences between test 1 and 2 for the parameter „stability“ (calculated out of area and length of sway, sway velocity and displacement pathway of the point of gravity and body weight) and for the “F7“ frequency band of the tetrax data (Fast Fourier Transformation 1–3 Hz) which represents the somatosensory control system. No differences could be found for other frequency bands (visual system, vestibular system). This could be found for isometric as well as for concentric-eccentric leg extensions. **Implications/Impact on Rehabilitation:** In earlier tests we found that balance training improves the somatosensory balance control system whereas strength training decelerates the muscle system. Therefore when muscle fatigue affects the somatosensory balance control system it is necessary to perform specific balance training to reduce the risk of fall.

No. 26

EFFECTIVENESS OF PILATES METHOD FOR THE POSTURE AND FLEXIBILITY OF WOMEN WITH KYPHOSIS***Silvana Junges, MD****Pontificia Universidade Católica do Rio Grande do Sul, Faculdade de Medicina – Pós-Graduação em Medicina e Ciência da Saúde, Brazil*

Objective: To evaluate the effectiveness of a physical training utilizing the Pilates method for posture and flexibility of women with thoracic hyperkyphosis. **Method:** Study design: randomized clinical trial. Participants: Forty-one women with mean age of 59.9 years old were selected for this study. These women were randomized in two groups: 22 women in the intervention group and 19 in the control group. Intervention: The exercises were carried out during 30 weeks, in devices such as: Reformer, Cadillac, Wunda Chair, and Wall Unit. The materials used on the floor were: spine corrector, thread-band and small Ball. Assessment measures: In order to analyze the posture, the radiological test and Cobb angle test were analyzed. The flexibility was measured by a fleximeter using a specific protocol for flexibility. The angles of the cervical column, hip and trunk were evaluated and measured in degrees. **Results:** Results: In the radiological analysis, a significant difference was observed between the two groups, -8.0 ± 7.5 for the experimental group and -0.6 ± 3.4 for the control group with $p < 0.001$. The BMI and body fat percentage also showed significant differences (0.001). The group that performed the Pilates training presented a significant improvement in the flexibility of all cervical and trunk movements. The comparison between the groups, before and after the intervention, demonstrated significant values of $p (< 0.05)$ for all movements, except for trunk flexion. **Implications/Impact on Rehabilitation:** The results showed that the Pilates method is efficient for improving the posture and the flexibility of women with hyperkyphosis. The exercises of the Pilates method that improve flexibility have an important role in the postural alteration as well as the technique of respiratory maneuvers.

No. 27

SHORT-TERM EFFECT OF A PHYSICAL THERAPY PROTOCOL ON THE FUNCTIONAL INDEPENDENCE OF INSTITUTIONALIZED WHEEL-CHAIR ED ELDERS

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Brazil

Objective: The aim of this work was to evaluate the short-term effect of a physical therapy protocol in the functional independence of institutionalized wheel-chaired elders, using a randomized blinded study. **Method:** Thirty wheel-chaired elders from a Brazilian care institution participated in this investigation. They were randomly assigned to two groups: control group (CG) and physical therapy group (PTG). A physical therapy protocol was proposed to obtain a short-term (two months) improvement on functional ability, by means of group kinesiotherapy exercises. The PTG underwent the protocol, twice a week, in 60-min sessions, during two months. The CG received only basic attention from institution health professionals. Functional independence was blind-assessed using the Barthel Index. For statistical analysis, the Wilcoxon and Mann-Whitney tests were used to verify intra- and inter-groups significant differences, respectively ($\alpha=0.05$). **Results:** The CG presented no functional improvements at all ($p>0.05$). Otherwise the PTG presented significant score increasing in “dressing” ($p=0.01$), “stairs” ($p<0.01$), “mobility (on level surfaces)” ($p=0.04$) and Barthel’s total score ($p<0.01$). When comparing groups, the short-term protocol lead to significant improvements in “dressing” ($p<0.01$), “transfers” ($p=0.04$), “mobility” ($p<0.001$), “stairs” ($p=0.04$) and Barthel’s total score ($p<0.001$). **Implications/Impact on Rehabilitation:** The results presented the possibility of functional independence improvements in elders living in a care institution by means of a 2-months kinesiotherapy protocol, which may dispense with the need of wheel-chairs if there are no severe orthopedic or neurological disorders associated. Therefore, for a better quality of life it can be emphasized the importance of a continuous and socializing physical rehabilitation program in geriatrics.

No. 28

THE EFFECT OF ISOMETRIC EXERCISE ON HUMAN CORONARY COLLATERAL FUNCTION DURING ACUTE CORONARY OCCLUSION

Xiao Lu, PhD; Song Lin, MD; Jianan Li, MD

China

Objective: We hypothesized that isometric exercise (i.e. sustained handgrip exercise) could increase collateral flow in remote ischemia myocardium area using the acute coronary occlusion model in patients with stable CAD. **Method:** Patients with one-vessel CAD (65) underwent routine percutaneous transluminal coronary angioplasty were assigned to isometric exercise group (33) and control group (32). Patients in isometric exercise group did isometric handgrip exercise (50% maximal voluntary contraction) during 1 min coronary balloon occlusion while patients in control group remain at rest during coronary occlusion. Collateral flow index (CFI) expressing collateral flow was determined before and at the end of 1min coronary occlusion in both groups. CFI was determined according to the following formula, using simultaneous coronary occlusive pressure (Poccl), mean aortic pressure (Pao) and central venous pressure measurements (CVP): $CFI = (Poccl - CVP) / (Pao - CVP)$. Heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were also recorded before and at the end of coronary occlusion. **Results:** In isometric handgrip exercise group, the difference values of CFI (CFI at the end of coronary occlusion – CFI before coronary occlusion) were significantly higher than those in the

control group (0.04 ± 0.05 vs 0.01 ± 0.03 , $p < 0.01$). The difference values of HR, SBP and DBP (HR, SBP, DBP at the end of coronary occlusion – HR, SBP, DBP before coronary occlusion) were also significantly higher than those in the control group (HR 7.84 ± 8.20 vs 0.88 ± 3.96 , $p < 0.01$; SBP: 3.25 ± 7.17 vs -1.88 ± 6.21 , $p < 0.01$; DBP 5.88 ± 6.40 vs -1.5 ± 6.22 , $p < 0.01$). **Implications/Impact on Rehabilitation:** Isometric exercise among patients with CAD induces an overall increase in coronary collateral flow during acute vessel occlusion. The effect of which is statistically more relevant than that of collateral flow enhancement due to the occlusion itself.

No. 29

LOW-FREQUENCY PULSE ELECTROMAGNETIC FIELDS REDUCES PAIN OF PATIENT WITH OSTEOPOROSIS

Xinshu Xia, MD

China

Objective: Osteoporosis is a systemic bone disease usually accompanied with pain complaint, which severely affects the life quality of patients with osteoporosis. The present study is designated to observe the efficacy of low-frequency pulse electromagnetic fields on pain of patient with osteoporosis. Our goal is to explore novel strategy for reducing the pain of patients with osteoporosis. **Method:** A total of 20 female patients with postmenopausal osteoporosis, which refer to the diagnostic standard of the World Health Organization, were investigated in this study. All the patients have significant pain complaints with a mean age of 65.2 years (range, 50–79 years) and the mean disease duration of 5.12 years (range, 0.5–20 years). All patients were treated using low-frequency pulse electromagnetic fields produced by an osteoporosis therapy device (Type ZH-21, Chongqing OTS Medical Equipment Co., Ltd.). Each participant was received low-frequency pulse electromagnetic fields for 40 days (1 time a day) and treatment lasted for 40 min each time. They were advised not to use any other alternative treatment during the exposure of low-frequency pulse electromagnetic fields. Outcome assessment was performed using the visual analog scale (VAS) as well as bone density assay. The data at baseline and 40 days after treatment were compared by *t*-test. *P* value of 0.05 or less was considered to be statistically significant. **Results:** VAS was 5.85 ± 1.53 before the treatment of low-frequency pulse electromagnetic fields, 3.25 ± 0.79 after the treatment of low-frequency pulse electromagnetic fields. The VAS after the treatment was lower as compared with that before the treatment with statistical significance ($p < 0.001$). The bone density was unimproved after the treatment of low-frequency pulse electromagnetic fields ($p > 0.05$). **Implications/Impact on Rehabilitation:** Low-frequency pulse electromagnetic fields could effectively reduce pain complaints of patients with osteoporosis. Our results highlighted that low-frequency pulse electromagnetic fields may be a safe and effective strategy for relieving pain of patients with osteoporosis. The significant difference was not found after the treatment of 40 days, which was possibly related with the fact that the changes of bone structure often need longer time.

No. 30

PLANTAR PRESSURE CHARACTER IN THE OLDER ADULTS WITH FALL HISTORY

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Objective: Fall is considered as the leading cause of injuries sustained by older people. The purpose of this study is to investigate the plantar pressure character of the older adults who had fall history during ambulation. **Method:** Thirty-six older adults with fall history were participated in this study. Participants were included in

the study if they were age 60 and older, living independently in the community, and free from neurological, cardiac or musculoskeletal disorders. Forty-two healthy older volunteers selected as control subjects group. Plantar pressures were measured through the Novel emed system (Novel GmbH, Munich, Germany). Walking speed was under the subject's own selected pace, and the subjects were asked to walk in a straight line for about 20 m for habituate before the tests. During each walk, data was collected from steps in the middle of the walking to avoid the starting and ending bias. Gait analysis was performed in the barefoot condition to avoid the influence of compounding factors such as shoe structure on plantar pressure. *Results:* The results showed that the older adults with fall history appeared significantly higher ($p < 0.05$) peak pressure and pressure-time integral value than the control group in lateral toes and lateral metatarsal regions. Also, the peak pressure value between the right and left foot of the fall history group exist significantly difference ($p < 0.05$), while this value was quite close in the control group. *Implications/Impact on Rehabilitation:* Identifying plantar pressure character of older adults with fall history could provide an opportunity for these individuals been treated these factors effectively, and designed useful footwear to reduce their risk of falls.

No. 31

THE SIX-MIN WALK TEST IN ELDERLY PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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China

Objective: The chronic obstructive pulmonary disease (COPD) is the common disease that affects the exercise capacity of elderly persons. The six-min walk test (6MWT) is a useful assessment instrument for the exercise capacity of elderly persons. This study was to investigate the change of 6MWT in elderly patients with COPD after rehabilitation program. *Method:* Subjects were 34 patients with COPD. The average age of the group was 78.9 ± 8.5 years old. The basic concept of COPD was explained to each patient to make sure that they understood the prognosis of COPD and the importance of the rehabilitation program for them. The program include aerobic exercises, breathing exercised and upper limb strength training. The symptoms, the pulmonary functional test and 6MWT were assessed before the start of the rehabilitation program and 6 to 9 months later. Statistic analysis was performed using SPSS 10.0 software package. Paired *t*-test was used to compare parameters. Correlation between data was performed using Pearson's correlation coefficient. *Results:* After 6 to 9 months pulmonary rehabilitation program, the patient symptoms decreased, the data of the pulmonary function were better (some of them were significantly changed), and the distance of the 6MWT increased from 326.47 ± 110.55 m to 366.76 ± 91.12 ($p < 0.01$). The 6MWT was moderate correlated with some parameters of pulmonary function. *Implications/Impact on Rehabilitation:* Pulmonary rehabilitation program is good for elderly patients with COPD. The 6MWT is a simple and effective tool to indicate the progress of COPD.

No. 32

SCREENING, TESTING AND TRAINING SOFTWARE FOR PRM PROFESSIONALS CARING FOR THE ELDERLY

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Czech Republic, EU

Objective: Professionals in physical and rehabilitation medicine use in their work mainly manual and physical tools. The use of computer technology in this field is only complementary, but can have significant benefits in diagnostics of musculoskeletal system and functional ability or in the exercise and rehabilitation plans compilation. Our goal was to develop software that would be a practical

tool for medical doctors, physical therapists and physical education trainers caring for the elderly in hospitals, long-term care facilities or homes for the elderly. Dedication MZO 00179906. *Method:* The software was designed in the form of web application, which allows to modify, store, share or print data. Into application can be inserted data such as various tests for diagnosis of musculoskeletal system, then these tests can be used in individual patients and evaluated. Other possible inserted data are e.g. physical exercises in the form of images, video, audio or text files, each exercise can be assigned to categories according to the starting position, used training equipment and other. The exercises then can be compiled into various exercises plans. *Results:* The developed software has four main parts: "Screening" for self-sufficiency and nutritional scoring, "Test" for physical fitness scoring, "Training" for exercises plan compilation and "File" for management of patient data. *Implications/Impact on Rehabilitation:* The software can make the work of professionals in the PRM more effective by allowing faster diagnosis and more targeted individual exercise.

No. 33

GENDER DIFFERENCES AMONG PATIENTS WITH PROXIMAL FEMORAL FRACTURES AND THEIR REHABILITATION OUTCOME

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Israel

Objective: The aims of the current study were to examine gender differences among PFF patients in a post-acute rehabilitation setting and to assess whether rehabilitation outcome is affected by these differences. *Method:* This was a cohort study of 823 patients, (649 females and 174 males), diagnosed with PFF and admitted consecutively to the Department of Geriatric Orthopaedic Rehabilitation in a geriatric rehabilitation centre, between January 1, 2006 to December 31, 2009. *Results:* More sub-capital fractures were found among the male study group and more per-trochanteric fractures were found among the females. More males were educated, lived at home with a caregiver, were functionally independent before the fracture event and had more co-morbidities than females. There were no significant differences in the functional outcome score between the two genders. Significantly, more males died during rehabilitation. *Implications/Impact on Rehabilitation:* Differences were found between genders among patients with PFF mainly in co-morbidity and pre-fracture status. However, no functional gain differences during rehabilitation were found between the genders. This may be explained by the similarity between the genders in functional and albumin levels on admission and their cognitive level, which were determined to be the most important factors affecting rehabilitation outcome.

No. 34

PATIENTS FALLS DURING GERIATRIC INPATIENT REHABILITATION

Irina Zwecker-Lazar, MD, MHA; Osnat Bachar, PT, MHA; Dror Wasserman, MD, MHA

Israel

Objective: 1) To render a comprehensive analysis of falls for a better understanding of the main causes of such critical events during inpatient rehabilitation. 2) To decrease the overall fall rate by means of a thorough examination of current methods of safety management on a rehabilitation ward. 3) To provide the nursing staff with clear patient handling safety guidelines (including patients with unsafe behavior). 4) To compare the annual fall incidence between 2003–2010, during implementation of safety guidelines. *Method:* Study design: Cohort study. Setting: A Geriatric Inpatient Rehabilitation Unit. Population: All consecutive patients admitted for rehabilitation between 2003–2010. Measurements: Data were collected from incident reports completed on all patients experiencing

falls during inpatient rehabilitation. The main outcome evaluation was the percentage of falls per year during the implementation of the guidelines. *Results:* Progressive introduction of different safety devices in disabled geriatric patients proved to be useful in decreasing the number of falls and the severity of injuries. *Implications/Impact on Rehabilitation:* Periodical in-service training of all nursing staff, progressive introduction of various safety guidelines, use of safety devices for disabled patients improve the quality of service in geriatric rehabilitation facilities.

No. 35

COGNITIVE IMPAIRMENT IN HIP FRACTURE PATIENTS: DATA FROM AN OBSERVATIONAL RETROSPECTIVE STUDY

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Italy

Objective: In Italy there are more than 80,000 hip fractures every year. This kind of fractures seems to be closely related with osteoporosis and is more frequent in the elderly population. Age and falls are the major risk factors but also the cognitive decline plays an important role. The aim of this study is to describe the association between cognitive decline and hip fractures. *Method:* As part of the INDACO2 project, an epidemiological survey proposed by the Italian Society of Orthopedics and Traumatology, data related to 6,285 osteoporotic patients over 65-years-old were collected. The evaluation of the cognitive status was performed by the Short Portable Mental Status Questionnaire (SPMSQ). *Results:* Of the 6,825 patients, 2,877 had a hip fracture. The 33% of them showed a moderate to severe cognitive impairment. While of the remaining 3,408 osteoporotic patients without hip fracture only the 9.25% showed a moderate to severe cognitive impairment ($p < 0.0001$). *Implications/Impact on Rehabilitation:* Cognitive decline is frequently associated to hip fractures in elderly, both as cause or consequence of them. Therefore a comprehensive rehabilitative approach should always include also accurate tests for an early cognitive impairment detection in order to plan an adequate intervention.

No. 36

FREQUENCY AND CAUSE OF MALNUTRITION IN DISUSE SYNDROME

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Objective: The purpose of this study is to determine the frequency and cause of malnutrition in disuse syndrome. *Method:* A cross-sectional study was performed in 127 patients admitted to university medical center and diagnosed disuse syndrome by psychiatrists between April and November 2010. All patients were prescribed physical therapy at bedside or gymnasium. Nutrition status at referral was assessed by Mini Nutritional Assessment Short Form (MNA-SF). Cause of malnutrition was classified starvation (less energy intake than basal energy expenditure), invasion, and pre-cachexia (underlying chronic disease, unintentional weight loss more than 5% of usual body weight during the last 6 months, chronic systemic inflammatory response, anorexia). Feeding route, body mass index, hemoglobin, serum albumin, total lymphocyte count (TLC), Onodera's prognostic nutritional index (PNI; serum albumin $\times 10 + \text{TLC} \times 0.005$), and difference in nutrition status by setting of physical therapy were assessed. *Results:* There were 79 men and 48 women with a mean age 72.6 years. Mean duration between admission and referral was 22 days. Seventy-three patients were prescribed physical therapy at bedside, 54 were at gymnasium. Based on MNA-SF, no patient was evaluated for normal nutritional status, 20 were at risk of malnutrition, and 107 were malnourished. Invasion was the most frequent cause of malnutrition and at risk (107), then starvation (57)

and pre-cachexia (37) (overlapping). Seventy-eight patients were oral intake, 30 were enteral feeding, and 80 were parenteral feeding (overlapping). Mean BMI was 20.7. Mean hemoglobin (9.52 g/dl), mean serum albumin (2.61 g/dl), mean TLC (935), and mean PNI (30.7) were below the lower normal. There was no significant difference in nutrition status between bedside and gymnasium. *Implications/Impact on Rehabilitation:* Most of patients with disuse syndrome are malnourished because of invasion. Nutrition assessment is necessary for patients with disuse syndrome regardless of setting of physical therapy.

No. 37

PHYSICAL ACTIVITY PATTERN AND ITS RELATIONSHIP TO CARDIORESPIRATORY ENDURANCE AMONG PHASE III CARDIAC REHABILITATION PARTICIPANTS

Masahiro Kohzaki, MD, PhD; Takayuki Kawamura; Atuko Kawamura; Tamami Oikawa; Osamu Ito; Makoto Nagasaka; Nobuyoshi Mori
Japan

Objective: The current physical activity recommendation encourages 20 to 30 min of moderate to vigorous intensity activity and allows for the accumulation of activity as long as the bouts are at least 10 min in duration. However, the majority of daily life activity consists of multiple brief bouts (i.e. < 10 min) of physical activity. We examined the relationship between an accelerometer-determined, moderate to vigorous intensity physical activity (MVPA) pattern and cardiorespiratory endurance in phase III cardiac rehabilitation program participants. *Method:* Subjects consisted of ten men and women (8 men, 2 women; ages: 68 ± 7 years; BMI: 24.8 ± 4.6 kg/m²) who were participating in a Phase III cardiac rehabilitation program. Physical activity was measured using a hip-mounted accelerometer (Kenz Lifecorder® EX 4-s, Suzuken Co, Nagoya, Japan) which determine the movement intensity in 4 s intervals for 35 days. Five continuous days (Monday through Friday) of physical activity data were randomly selected from the 1-month collection period for the analysis. Participants also performed a graded treadmill test to assess cardiorespiratory endurance (PeakVO₂) and ventilatory threshold (VT). *Results:* The VT and PeakVO₂ of the participants were 12.3 ± 4.1 ml/kg/min and 20.7 ± 4.9 ml/kg/min, respectively. The participants spent 37.0 ± 29.2 min/day in MVPA bouts that lasted at least 4 s. The activity maintained for more than 8 s, 16 s, 32 s, 1 min, 2 min, and 3 min were each 33.6 ± 28.1 min/day, 29.7 ± 26.2 min/day, 25.2 ± 23.0 min/day, 19.6 ± 18.4 min/day, 11.5 ± 11.6 min/day, 7.8 ± 8 min/day, respectively. There was a positive correlation between accumulated time per day in moderate to vigorous intensity physical activity and VT ($r = 0.76$, $p < 0.05$), but no significant relationship was noted between PeakVO₂ and MVPA. *Implications/Impact on Rehabilitation:* No matter how short or long the activity bout, the accumulation of MVPA may play an important role in maintaining or improving VT.

No. 38

PHYSICAL ACTIVITIES IN ELDERLY PATIENTS WITH ASPIRATION PNEUMONIA AFTER HIP FRACTURES

Akio Tsubahara, MD; Hiromichi Metani, MD; Sousuke Seki, MD
Japan

Objective: There have been few reports about aspiration pneumonia in elderly patients with hip fractures, although swallowing function is considered to decline with age. This study examined incidence rate and risk factors of aspiration pneumonia before or after hip surgery. Additionally, physical activities were investigated in order to suggest a way to prevent aspiration pneumonia in these patients. *Method:* Medical records of patients with fall-related hip fractures

were retrospectively reviewed. Subjects were over 65 years old, hospitalized between January 2008 and December 2009, and received hip surgery and medical rehabilitation. Patients were divided into 2 groups according to the presence or absence of aspiration pneumonia from their onset to one month after hip surgery. Demographics, past medical history, X-ray findings, and laboratory values were investigated. Changes of physical activities during medical rehabilitation were extracted for the patients with aspiration pneumonia. **Results:** 145 patients (78 with intertrochanteric fractures and 67 with femoral neck fractures) aged 67 to 96 years (mean \pm SD, 82.9 \pm 7.2 years) were included in the study. Of these patients, 22 patients (15.2%) suffered aspiration pneumonia. Serum albumin levels in the pneumonia group (3.34 \pm 0.43) were significantly lower than the one in the non-pneumonia group (3.80 \pm 0.45). Risk factors for development of pneumonia were albumin, total protein, and hemoglobin levels. No significant relationship was observed between pneumonia and other factors including age, sex, type of fractures. Physical activities before and after medical rehabilitation were quite low in the patients with pneumonia, although concomitant diseases including diabetes mellitus, dementia, psychiatric disorders, and stroke showed no significant relationship with pneumonia. **Implications/Impact on Rehabilitation:** Earlier intervention of rehabilitation team including oral hygiene, indirect swallowing training, nutritional support, and physical conditioning should be taken to elderly patients with hip fractures to prevent aspiration pneumonia.

No. 39

THE INFLUENCE OF A PHYSICAL EXERCISE DURING HEMODIALYSIS IN IMPROVING BODY FUNCTION

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Objective: Patients on hemodialysis (HD) experience various conditions, including physical depression, muscular atrophy, decrease in balance and flexibility, decreased cardiopulmonary function, and diminished stamina. Studies have demonstrated a high mortality rate among dialyzed patients who do not exercise. Therefore, this study aims to show that physical exercise increases ADL and QOL among HD patients. **Method:** Participants were 12 dialysis patients. First, we evaluated patients' physical function. We also administered a questionnaire to assess ADL and QOL (KD QOL-SFTM). Intervention was then initiated, and involved physical exercise of the trunk and lower limbs in bed once a week during dialysis for 2 year. We explained the need for physical exercise, which was conducted so that participants could perform it at home. After 2 year of intervention, we again measured physical function and administered the questionnaire in order to assess any differences before and after the intervention. **Results:** There were significant differences in physical function ($p < 0.05$). **Implications/Impact on Rehabilitation:** Our findings demonstrate the therapeutic effects of physical exercise during dialysis, as well as the positive relationship between physical function and both ADL and QOL. Therefore, promotion of exercise among HD patients is necessary to improve physical function, and thereby ADL and QOL. Future studies should clarify the optimal exercise program and amount of exercise that should be performed during dialysis.

No. 40

NIGHTTIME STORAGE SYMPTOMS IN FEMALE STROKE RESIDENTS STAYING AT A RESIDENTIAL FACILITY

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Objective: More than 30% of the residents in residential facilities for the elderly have experienced stroke in Japan. Most of them suffer from lower urinary tract symptoms. Nocturia is prevalent in the elderly. However, the actual nighttime storage symptoms of residents with stroke in residential facilities remain unknown. We assessed the nighttime storage symptoms of them using a monitoring machine. **Method:** This study included 20 female stroke residents without dementia in a residential facility. We monitored incontinence using a sensor in the diaper or underwear. We measured the volume of leakage by weighing the pad and/or diaper. Moreover, the voided volume was measured during micturition by a urine meter installed in the toilet in the rest room. Each subject was monitored for 48 h and the voiding time, incontinence time, volume of micturition and leakage, urinary urgency were recorded in bladder diaries. **Results:** The mean nighttime frequency was 5.4 times, and 19 of the subjects (95%) had nocturia. The mean rate of nocturnal urine production was 51.6%, and 18 of the patients (90%) exhibited nocturnal polyuria. The mean nighttime maximum voided volume was 297 ml. Thirteen of the residents (65%) experienced one or more situations of urgency at night. Eleven subjects (55%) had urinary incontinence at night. Of 11 subjects, 6 (54.5%) had urge urinary incontinence at night. **Implications/Impact on Rehabilitation:** Most female stroke residents without dementia had nocturia and nocturnal polyuria. It suggested that nocturia was due to the overproduction of urine at night, rather than a reduced bladder capacity, because most of them had a nighttime maximum voided volume of 200 ml or more. On the other hand, 65% of the residents experienced urgency during sleep. It is important to understand these factors to allow for interventional voiding therapy in these residents.

No. 41

THE EFFECT OF TRUNK COORDINATION EXERCISE ON DYNAMIC POSTURAL BALANCE

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Japan

Objective: Recently, a trunk coordination exercise device called a "core noodle" has been developed to help more easily and effectively achieve functional action between global trunk and local muscles. Here we demonstrate the efficacy of trunk coordination exercises using this device on dynamic postural balance in healthy young adults. **Method:** Ten healthy students from Kibi International University participated in this study. The subjects stood on a stabilometer twice and performed tasks to evaluate dynamic postural balance, with 15 min between evaluations. The subjects performed a trunk coordination exercise in a supine position during the 15 min. This exercise used a "core noodle" for the dynamic control of core muscles. The subjects assumed a supine position and put the device under the spine creating a state of unstable equilibrium in the trunk. They maintained a balance with raised upper and lower limbs for 30 s. This task was performed three times. The evaluation of dynamic postural balance was performed using a Gravicorder G-620 stabilometer (Anima Co.). Subjects alternately shifted the center of pressure within two circles (1 cm in radius) as fast as they could within 20 s. **Results:** The count of the number of circles in 20 s increased ($p < 0.01$), and the envelop area and length/time decreased after exercise ($p < 0.01$). **Implications/Impact on Rehabilitation:** This result shows that this exercise immediately enhances dynamic postural balance. It should be assumed that the enhancement of dynamic postural balance reduces the risk of falling. Falls of elderly people have been a big problem in this country, where

society is aging. Falls are a leading cause of death for the elderly and a major reason why they enter a nursing home. It is expected that this exercise will help prevent falls.

No. 42

THE EFFECT OF TRUNK COORDINATION EXERCISE ON DYNAMIC POSTURAL BALANCE USING AN EXERCISE BALL

Yuki Miyake, OT; Masaaki Nakajima, PhD; Atsuko Hirohata; Ryuji Kobayashi, PhD; Yasushi Sanenobu; Ryoko Yamaoka; Mika Okuda; Dolly Kelepecz, PhD
Japan

Objective: We considered that a trunk coordination exercise enhances dynamic postural balance. Here we demonstrate the efficacy of trunk coordination exercises using this device on dynamic postural balance in healthy young adults. **Method:** Twenty healthy students from Kibi International University participated in this study. The subjects performed a trunk coordination exercise in a supine position. This exercise used underinflated exercise ball for the dynamic control of core muscles. The subjects assumed a supine position and put a ball under the pelvis creating a state of unstable equilibrium in the pelvis. The subjects tilted their pelvis smoothly forward and backward ten times, next to right and left ten times. And finally they move their pelvis in circles around five times each way. They performed these movements as smoothly as their can and at a constant velocity. The evaluation of dynamic postural balance was performed before and after an exercise using a Gravicorder G-620 stabilometer (Anima Co.). Subjects alternately shifted the center of pressure within two circles (1 cm in radius) as fast as they could within 20 s. **Results:** The count of the number of circles in 20 s increased ($p < 0.01$), and the envelop area and length/time decreased after exercise ($p < 0.01$). **Implications/Impact on Rehabilitation:** This result shows that this exercise immediately enhances dynamic postural balance. It should be assumed that the enhancement of dynamic postural balance reduces the risk of falling. Falls of elderly people have been a big problem in this country, where society is aging. Falls are a leading cause of death for the elderly and a major reason why they enter a nursing home. It is expected that this exercise will help prevent falls.

No. 43

MEASURING PERCEIVED ENVIRONMENT BARRIERS IN KOREAN COMMUNITY-DWELLING PERSONS WITH PHYSICAL DISABILITIES

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Objective: The social environmental barriers are considered to be important because the “social participation” of people with impairments would be facilitated by the prevention and reduction of environmental barriers. The Craig Hospital Inventory of Environmental Factors (CHIEF) is one of the few scales to assess the environmental barriers. In this study, we evaluated the Korean version of CHIEF construct validity and utility in a sample of Korean community-dwelling persons with physical disabilities. **Method:** We evaluated the construct validity of the CHIEF by testing the original five-factor structure using a confirmatory factor analysis in 200 physical disabilities in Deajeon, Korea. The utility of the CHIEF was then assessed by examining the relationships between individual characteristics, Barthel Index and perceived environmental barriers, measured by the CHIEF, using a structural

equation modeling approach. **Results:** The confirmatory factor analysis result demonstrated the validity of a s-order factor model of the CHIEF comprising the five factors as first-order factors. The perceived environmental barrier was a s-order factor when provided acceptable fit indices after two modifications. The structural equation modeling indicated that perceived environmental barriers was significantly related to activities of daily life but not age, gender. **Implications/Impact on Rehabilitation:** The CHIEF is useful in measuring environmental factors in Korean community-dwelling persons with physical disabilities.

No. 44

IMPACT OF DEPRESSION, ADL AND COMORBID CHRONIC DISEASE ON HEALTH-RELATED QUALITY OF LIFE AMONG COMMUNITY-DWELLING OLDER ADULTS: DATA FROM SOUTH KOREA

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Objective: Many studies have reported the prevalence of depression and its negative impacts on HRQoL in community-dwelling elderly persons with comorbid chronic disease. However, the majority of the studies were performed in developed countries, with very few studies occurring in developing or non-developed countries. We evaluated associations among risk factors to have an influence on HRQoL with community-dwelling older adults. **Method:** A total of 314 community-dwelling elderly persons (age: 75.80 ± 5.64 [mean \pm SD]) who had no disease ($n = 81$) and more than two chronic diseases among arthritis, hypertension and diabetes ($n = 233$) were interviewed based on the QOL questionnaires during 2 months. The activities of daily living was evaluated using Barthel Index (BI), and Frenchay Activities Index (FAI). Neuropsychological status was evaluated using Geriatric Depression Scale (GDS) and Mini-Mental State Examination (MMSE). Health-related QOL was evaluated using the Korean version of Short Form 36 (SF-36). **Results:** With the exception of the instrumental activities of daily living, the elderly with comorbid chronic disease had significantly lower scores in BI ($p < 0.01$), GDS ($p < 0.001$), MMSE ($p < 0.001$), and lower quality of life in all the sub-scales than control group ($p < 0.001$). Especially, depression is highly related with general health (GH), vitality (VT) and mental health (MH) among subscales of SF-36 with 0.6 degree ($p < 0.05$). In the regression analysis, GDS, chronic disease and BI were significantly associated with quality of life ($p = 0.00$). **Implications/Impact on Rehabilitation:** Chronic disease had a negative influence on the Health related QOL among community-dwelling elderly and was an independent risk factor of geriatric depression.

No. 45

ACTUAL USAGE OF LEISURE AND COMMUNICATIVE DEVICES AMONG ELDERLY PEOPLE

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Japan

Objective: To communicate with family and friends and to continue leisure activities are important to maintain QOL of elderly people who live alone. We surveyed the actual usage of leisure and communication devices among elderly people who live alone and demented persons and investigated these devices' potential use as supportive systems. **Method:** The subjects were 12 elderly people, 1 male and 11 females, aged 74 to 89, who lived alone. 6 persons diagnosed with

Alzheimer Disease, 2 persons with Mild Cognitive Impairment and 4 non-demented persons participated. We administered the Mini Mental State Examination (MMSE) and Geriatric Depression Scale (GDS). Items that are used as leisure devices (TV, DVD player, CD player, radio, game machine, etc.) and communication devices (telephone, fax machine, cell phone, etc.) were surveyed using the Everyday Technology Use Questionnaire (ETUQ, Rosenberg, 2009), Japanese version: ETUQ-Kobe. *Results:* Scores of MMSE ranged from 4 to 27, and their cognitive disorders ranged from mild to severe. Five people who had above 7 GDS-scores, and seven people below 6. TVs were used without problems. 6 people had cell phones, but people with impaired cognition could not master it. No one could use e-mail functionally. Some persons were given a cell phone by their family after the onset of dementia so they could get hold of them. Most people frequently use telephones to communicate with their family. They remember phone numbers that they frequently call. They seldom or never use the other leisure devices. For example, one of them liked karaoke used a CD player, but she could not operate it anymore as her dementia progressed. *Implications/Impact on Rehabilitation:* Most elderly people did not use leisure devices. A demented people who had enjoyed karaoke could not operate CD player, and needed to use it. Demented people who lived alone could use telephone because they of frequently call their families. Some demented people who use cell phones could use it with the assistance of their family.

No. 46

CARBON DIOXIDE-ENRICHED WATER BATHING PROMOTES MUSCLES BLOOD FLOW IN DISUSE MUSCLE ATROPHY PATIENTS

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Japan

Objective: Carbon dioxide (CO₂)-enriched water bathing has a pronounced vasodilating effect and promotes muscle blood circulation. For this study, we tested the effects of using CO₂-enriched water bathing on muscle blood flow in disuse muscle atrophy patients. *Method:* Subjects consisted of 6 men with disuse muscle atrophy (average age 79.6±6.0 years) and 6 healthy adult men (average age 85.0±4.4 years). A near-infrared spectroscope was used for the evaluation of oxygen saturation (StO₂) and total hemoglobin (total Hb) on muscle. On the first of two consecutive days, the subjects were randomly assigned to have their lower extremities immersed in either fresh water or CO₂-enriched water (CO₂ concentration; 1,000 ppm) under standardized conditions (temperature, 35°C; immersion time, fifteen minutes) with concurrent measurement. On the second day, the subjects were switched to the other bath type. Four sets of measurement probes were attached to the right calves. The measurements were conducted at pre-immersion and post-immersion, as well as 10 min, 20 min, and 30 min after immersion. *Results:* The StO₂ in the disuse muscle atrophy group was much lower than for the healthy group before treatment. The StO₂ increased and total Hb was unchanged in both groups following CO₂-enriched water bathing. *Implications/Impact on Rehabilitation:* Increased StO₂ and unchanged total Hb indicate an increase in muscular blood flow. Because vascular density has decreased in the muscles of patients with disuse muscle atrophy, there is a reduction of metabolism in the muscles. Therefore, it is easy for muscles to suffer from muscle fatigue and a delay of muscle tissue repair following muscular injury. Furthermore, as a low excretion of inflammatory material occurs, pain and/or symptoms of an inflammation linger. If CO₂-enriched water bathing is applied to patients with disuse muscle atrophy, an improvement in muscle endurance and muscle fatigue and enhanced muscle damage healing are provided.

No. 47

PHYSICAL ACTIVITIES IN ELDERLY PATIENTS WITH ASPIRATION PNEUMONIA AFTER HIP FRACTURES

Akio Tsubahara, MD; Hiromichi Metani, MD; Sousuke Seki, MD
Japan

Objective: There have been few reports about aspiration pneumonia in elderly patients with hip fractures, although swallowing function is considered to decline with age. This study examined incidence rate and risk factors of aspiration pneumonia before or after hip surgery. Additionally, physical activities were investigated in order to suggest a way to prevent aspiration pneumonia in these patients. *Method:* Medical records of patients with fall-related hip fractures were retrospectively reviewed. Subjects were over 65 years old, hospitalized between January 2008 and December 2009, and received hip surgery and medical rehabilitation. Patients were divided into 2 groups according to the presence or absence of aspiration pneumonia from their onset to one month after hip surgery. Demographics, past medical history, X-ray findings, and laboratory values were investigated. Changes of physical activities during medical rehabilitation were extracted for the patients with aspiration pneumonia. *Results:* 145 patients (78 with intertrochanteric fractures and 67 with femoral neck fractures) aged 67 to 96 years (mean±SD 82.9±7.2 years) were included in the study. Of these patients, 22 patients (15.2%) suffered aspiration pneumonia. Serum albumin levels in the pneumonia group (3.34±0.43) were significantly lower than the one in the non-pneumonia group (3.80±0.45). Risk factors for development of pneumonia were albumin, total protein, and hemoglobin levels. No significant relationship was observed between pneumonia and other factors including age, sex, type of fractures. Physical activities before and after medical rehabilitation were quite low in the patients with pneumonia, although concomitant diseases including diabetes mellitus, dementia, psychiatric disorders, and stroke showed no significant relationship with pneumonia. *Implications/Impact on Rehabilitation:* Earlier intervention of rehabilitation team including oral hygiene, indirect swallowing training, nutritional support, and physical conditioning should be taken to elderly patients with hip fractures to prevent aspiration pneumonia.

No. 48

DEGREE OF DIFFICULTY OF A MODIFIED GAME OF "ROCK-PAPER-SCISSORS" FOR PREVENTION OF COGNITIVE DECLINE FROM AGING: A FUNCTIONAL NIRS STUDY

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Japan

Objective: DLPFC is focused on the preventive approach of cognitive decline from aging. We decided to use the modified game of "rock-paper-scissors" as one of the tasks for this kind of approach. In this task, subjects were required to say the names of hands (rock or paper, scissors), which lose the hand-shape images on the PC monitor. This task is known to require inhibition of habitual behavior and activate the left inferior frontal gyrus (Matsubara et al., 2004). But there is no study on validity of their degree of difficulty. We tried to find the way how to decide an effective difficulty-setting (about presentation speed of hand image) from the point of view "activation of the DLPFC" and also "subjects' feelings" during the task. The feelings of "difficulty" and "pleasant" are known to effect the motivation of continuous participation (Yatomi, 2006; Watanabe et al., 2007), so we investigated these feelings on each task conditions. *Method:* Eight right-handed healthy senior subjects are investigated the activation of the DLPFC, by using fNIRS. They worked on "easy" and "hard" conditions. In "easy" they responded to hand images presented for every 2 sec, and 1 sec for "hard". *Results:* In condition "hard", both right and left DLPFC were more activated, and lower performance results, higher rating points of "difficulty" in all participants, but there was no significant difference in rating points of "pleasant". And half of subjects rated lower points of "pleasant" on condition "hard" than "easy". *Implications/Impact on Rehabilitation:* The results suggested that the task could

activate the DLPFC more in harder condition as far as the subjects work on the task willingly. But the low performance results may lead to unpleasant feelings. So the task should have some range of difficulty so that most of participants can enjoy and activate the DLPFC as much as possible.

No. 49

RELATIONSHIP BETWEEN SARCOPENIA AND PHYSICAL PERFORMANCE: IS IT THE SAME IN OLDER ADULTS WITH WEAK MUSCLE STRENGTH?

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Objective: The relationship between sarcopenia and physical performance has not been consistent among studies. The present study aimed to clarify the relationship between muscle mass and physical performance in older adults with weak muscle strength, who could be the main target for sarcopenia treatment. **Method:** We use the baseline data of 542 older men and women from the Korean Longitudinal Study on Health and Aging. Dual X-ray absorptiometry, midhigh computed tomography, isokinetic dynamometer, and the Short Physical Performance Battery (SPPB) were performed. We divided the participants into a lower-quartile (L25) group and an upper-three-quartile (H75) group based on the knee extensor peak torque. The muscle mass parameters were appendicular skeletal mass (ASM), ASM divided by height squared (ASM/Ht²) or by weight (ASM/Wt), and midhigh muscle area (MMA). **Results:** No muscle mass parameters were significantly correlated with SPPB score in the men and women in the L25 group, whereas all of the muscle mass parameters in men and the ASM/Wt and MMA in women were in the H75 group. In adjusted logistic regression on SPPB scores below 9, no muscle mass parameters showed significant association in the L25 group. In the H75 group, all of the muscle parameters in men and ASM/Wt in women showed significant associations. These results did not change after further adjustment of peak torque. **Implications/Impact on Rehabilitation:** Muscle mass was not related to physical performance in older adults with weak muscle strength. Measures of muscle strength may be of greater clinical importance in weak older adults than is muscle mass per se. These findings can be explained by decrease in muscle quality despite muscle mass preservation. In clinical practice, the evaluation and therapeutic approach for weak, frail older adults must focus on muscle strength, rather than muscle mass.

No. 50

STUDY REGARDING THE QUALITY OF LIFE OF PATIENTS SUFFERING FROM POSTMENOPAUSAL OSTEOPOROSIS AND ASSOCIATED “REACTIVE” DEPRESSION, AFTER UNDERGOING A THERAPEUTIC PHYSICAL EXERCISE PROGRAM

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Objective: This study aimed to detect and quantify depressive disorders in patients suffering from postmenopausal osteoporosis and to follow the evolution of such patients after undergoing a specific and supervised physical exercise program. **Method:** This is a prospective study on 42 patients suffering from postmenopausal osteoporosis.

The patients have been randomly divided into two groups, the study group consisting of patients who received antiosteoporotic medication associated with the rehabilitation physical program, and the control group who only received the medication. All patients were evaluated for depression using the Hamilton depression scale (HAM-D) and the QUALEFO 41 quality of life questionnaire at the beginning of the study and after three months with additional check-ups every month. The patients in the study group were involved in a physical exercise program, 50 min supervised sessions daily for two weeks, followed by daily exercised at home. The study was conducted in the National Institute of Rehabilitation, III-rd Clinical Department, Bucharest, Romania, between Sept 1st–Dec 1st of 2010. **Results:** Both the depression and the functional scores improved significantly after three months of daily physical exercise (30 min or more daily), in the study group compared to the initial evaluation. Also, improvement was noted when compared to the results of the control group. **Implications/Impact on Rehabilitation:** 1) In accordance with others published studies, this analysis shows the importance of early detection and treatment of depression in osteoporosis patients, as well as associating a therapeutic physical exercise program to drug therapy. Its antidepressive effect is well known, as well as improvement of posture, balance, muscle strength, mobility and endurance, all very important in preventing fractures. 2) A multidisciplinary team that includes a psychiatrist must be assembled for the treatment of postmenopausal osteoporosis, an illness most common in the last few decades, that has a most dreadful complication: fracture and disability.

No. 51

INVENTING AN EFFICIENT PHYSICAL FITNESS TESTING INSTRUMENT FOR THE ELDERLY

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Objective: This research attempts to develop a set of accurate, reliable, easy to use and maintain, and safe testing equipment for physical fitness test for the elderly. Moreover, we will design software that is compatible for the equipment and is used to evaluate the physical fitness of the elderly after their testing. **Method:** We used Delphi technique to select the components of physical fitness test with 18 experts. Intra rater reliability and Test-retest reliability was done. Inter rater reliability was done in 408 healthy older persons. After that we developed the “Chula-Elderly Physical Fitness Test”. The developed stations use photo sensors, infrared sensor, accelerometer sensor and light sensor to detect the movement of the elderly that is required by the testing protocol. The data obtained from each station is transferred using a concept of radio frequency identification and the equipment is controlled and programmed using Microcontroller. The testing equipment is tested for reliability (test-retest) and objectivity (two testers) for each station with 100 healthy older persons. **Results:** The Content Validity Congruence Index; IOC of the “Chula-Elderly Physical Fitness Test” was 0.88–1.00, Intra rater reliability was 0.82–0.99 and the Inter rater reliability was 0.77–0.98. Our developed Chula-Elderly Physical Fitness Test includes six testing stations which are 1) 2-min step test station, 2) 30-s arm curl station, 3) 1-min chair stand station, 4) 8-foot up and go station, 5) chair sit and reach test station, and 6) block transfer station. We found that the reliabilities of the six stations are between 0.893 and 0.963, and the objectivities are between 0.875–0.954 for each station with 100 healthy older persons. **Implications/Impact on Rehabilitation:** As a result, our invented equipment of the six stations is reliably, accurate, and suitable for physical fitness test of the elderly. Moreover, the testing equipment is easy to use and maintain, and safe testing equipment for physical fitness test for the elderly.

No. 52

DEVELOPMENT OF SELF-CARE AND DOMESTIC LIFE STAGING FOR ELDERLY PERSONS LIVING IN THE COMMUNITY

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Objective: To describe the foundation and development of an activity staging system consistent with the International Classification of Functioning Disability and Health (ICF) for tracking the severity and types of self-reported activity limitation in Self-Care and Domestic Life activities among elderly living in the community. **Method:** Stages were established by ranking observed profiles from the United States (US) S Longitudinal Survey of Aging (LSOA II). Included were 9,447 community-dwelling persons 70 years of age and over. Discrete stages were established through analysis of self and proxy reported difficulties performing 6 Self-Care and 6 Domestic Life activities in separate domains. Face validity was confirmed through comparison to an expected ontological order of relative difficulty established from measures in the literature. **Results:** The Self-Care and Domestic Life stage sets each define 5 ordered thresholds of difficulty ranging from stage 0 (no difficulty in any activities) to stage IV (inability to perform any activities in the domain). To achieve a stage, a person can report no more than a specified amount of difficulty performing each activity. Ongoing studies of the US population indicate that stages are strongly predictive of nursing home placement, mortality, need for home environmental accessibility features and a history of falls. As example, applying sample weights from the LSOA II data, the proportions of persons with a history of falls increased with severity from 15.4% to 44.7% across stages 0, I, II, and III, then declined to 15.6% at stage IV where people are unable to perform any Self-Care activities ($p < 0.001$). **Implications/Impact on Rehabilitation:** Stages could represent a powerful tool for screening patients according to need for supportive services and risks of a variety of adverse outcomes. We hope stages will help stimulate future efforts to reduce the burden of illness and disability in the elderly populations across the developed world.

No. 53

LIMITATIONS OF THE TIMED UP-AND-GO (TUG) AND MORSE FALLS SCALE IN SAFE DISCHARGE PLANNING

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Objective: To compare common fall risk assessment tools (TUG, Morse Falls Scale) with the Functional Independence Measure (FIM) in an acute rehabilitation hospital in order to determine if a patient is safe for discharge to the home environment. **Method:** A retrospective case series analysis of 10 patients with total joint and spine procedures was completed. Patients were admitted to an acute rehabilitation hospital within a one year time period (Age: mean 67.4, SD 8.33; BMI: mean 29.3, SD 5.91; Length of Stay: mean 7.8 days, SD 1.40). Data was collected to compare fall risk scores and safety for discharge as defined by the FIM. Scores for the TUG and FIM were determined by physical therapists and the Morse Falls Scores were determined by nursing. All items were scored within 24 h of patient admission and discharge, and all patients were assessed with appropriate assistive devices. **Results:** On the TUG scale, all patients were rated as high fall risk at both admission and discharge (Admission Mean 47.03, SD 13.39; Discharge mean 20.14, SD 5.62). On the Morse Falls Scale, all patients were identified as moderate to high fall risk on both admission and discharge (Admission mean 41.43, SD 9.0; Discharge mean 35.71, SD 7.87). On the FIM, patients progressed from maximal or total assistance on admission (mean 1.80, SD 0.42) to modified independence on discharge (Mean 6.0, SD 0). **Implications/Impact on Rehabilitation:** Our case series indicates that compared to the FIM, the TUG and Morse Falls Scale are poor indicators of patient safety and falls risk on discharge from inpatient acute rehabilitation as they do not reflect change over the course of a rehabilitation stay. Future research should look to standardize assessment of patient safety and fall risk while using an assistive device.

NEURO REHABILITATION

No. 54

**REHABILITATION IN THE DEVIC SYNDROME:
AN INFREQUENT EXPERIENCE**

**Melina Longoni, MD; Virginia Tejada Jacob, MD;
Laura Juan Bennazar, MD**
Argentina

Objective: To describe two cases involving patients with Optic Neuromyelitis (ONM) or Devic's Syndrome, with atypical presentation and differential diagnosis with MS. *Method:* 2 patients were studied during rehabilitation. Case 1: A woman diagnosed with ONM in year 2000, admitted after the fourth episode characterized by generalized loss of strength and dysesthesia, conscious and oriented, tetraparesis predominantly on the right, generalized dysesthesia, changes in superficial and deep sensitivity. Hyperreflexia, – sphincter incontinence, decrease in visual acuity, brachial neuropathic pain. Case 2: A man diagnosed in year 2002. Admitted after the fifth episode characterized by decreased sensitivity and strength in lower limbs. Crohn disease, conscious and oriented, bilateral blindness, paraparesis, spastic, right hemi-hypoesthesia, sensitive level D5, hyperreflexia in lower limbs, neurogenic bowel and bladder, perianal neuropathic pain. *Results:* Case 1: Last episode studied by MRI showed thickening of the bulbo-medullary C2-C5 compatible with necrotizing myelitis. Campimetry reveals absolute scotoma in left eye and right nasal hemifield. Partial response to treatment with immunoglobulin. Currently treated with gabapentin, clonazepam, tramadol, others. Case 2: Last episode studied by MRI showed a new demyelinating focal lesion in the D7–D8 posterior segment with chronic lesions from bulb to D6. Treated with endovenous corticoids and plasmapheresis. The patient continues the treatment since October 2008 with endovenous corticoids and salicylate, without any new relapse. *Implications/Impact on Rehabilitation:* There are insufficient strategies described in current literature for ONM rehabilitation, probably due to its similarity to MS. Nevertheless, given ONM unique characteristics, different treatment response and prognosis, present rehabilitation strategies should be modified and optimized to treat symptoms, prevent complications and enhance patient's functionality as shown in these two described cases.

No. 55

**DEGLUTITORY DISORDERS IN SEVERE TBI
PATIENTS**

**Melina Longoni, MD; Celia Iachini, Lic; Juan
Bennazar Laura, MD**
Argentina

Objective: To describe affectations in deglutitory phases in severe TBI patients. To determine if there is a relation between tracheotomy and deglutitory disorders. To establish the relation between the patient's neurologic state and the evolution of these disorders. *Method:* Severe TBI patients and deglutitory disorders assessed clinically and by videofluoroscopy. *Results:* 49 patients with deglutitory disorders, 95% presented level 1 to 6 (68% correspond to levels 1–2–3) according to Rancho Los Amigos Scale, 81% presented tracheotomy, 85% of the tracheotomy patients presented deglutitory disorders in the oral phase, 64% in the pharyngeal phase, 8% in the esophageal phase and 58% presented disorders from mixed origins. At rehabilitation discharge 26% of the patients continue with deglutitory disorders (29% in oral phase, 32 in pharyngeal phase, 100% in esophageal phase and 35% presented disorders from mixed origins). 84% had levels 2 and 3 from the Rancho Scale and the rest (16%) levels 5 and 6. Eight patients (13%) without tracheotomy had deglutitory disorders at admittance to rehabilitation, 50% presented disorders in the oral phase, 50% in the pharyngeal phase, none in the esophageal phase, and 50% mixed

disorders. At discharge, 75% of the patients continued with disorders in the oral phase, 25% in the pharyngeal phase and 25% from mixed origins. *Implications/Impact on Rehabilitation:* Deglutitory disorders are frequent in severe TBI patients admitted to Rehabilitation. Neurologic dysphagia's progress is related directly to the cognitive state of the patient. It should be emphasized that respiratory and nutritional complications are evident in the acute phase of TBI. In this phase dysphagia has been identified as a factor that contributes significantly to morbidity and mortality, Early assessment and treatment of dysphagia after TBI can be of great benefit by eliminating potential complications like malnutrition and aspiration pneumonia.

No. 56

**DYSAUTONOMIC CRISIS (DC) IN PATIENTS
WITH SEVERE TBI IN THE PERIOD OF
REHABILITATION**

**Melina Longoni, MD; Tejada Jacob Virginia, MD; Juan
Bennazar Laura, MD; Garrote Jimena, MD**
Argentina

Objective: To describe clinical manifestations of DC, treatment and imaging findings in patients with severe TBI during rehabilitation period. *Method:* Patients with severe TBI (GCS <8 in the accident) who presented DC were admitted to rehab, description of symptoms caused by the crisis, specific treatment and correlate imaging in MRI. Descriptive cross-stional quantitative study – nonexperimental correlational. *Results:* From 59 patients, 10 (16%) had DC, 60% male, mean age 32. Hospitalization period in ICU between 24–150 days. Requirements in the ICU: 60% ICP monitoring and neurosurgery, 100% mechanical ventilation and treatment of infections, 90% received anticonvulsants. On admission to rehabilitation 60% showed DRS 9, 100% GCS <8 and 80% Rancho Los Amigos (RLA) Level II. At discharge 50% persisted GCS <8, 9, RLA DRS Level II and 60% had GOS Level 2, 20% Level 3 and 20% Level 5. Clinical manifestations: tachycardia 100%, 90% perspiration and hyperextension, 80% hypertension, 60% hyperthermia and abnormal movements. It was treated in emergency ward, 100% of cases with diazepam solving the clinical profile. Neuroimaging: 100% diffuse axonal injury, 70% intracranial hemorrhage, subdural hemorrhage 40% and 10% subarachnoid hemorrhage. *Implications/Impact on Rehabilitation:* The prognosis of these patients in the short and long term is bad, which can be translated into a worse score on functional scales. Regarding the imaging findings, the results are very heterogeneous, a type of radiological predictor of the picture cannot be identified, but it could be inferred that the diffuse axonal injury, can be a predisposing factor. While the DC are correlated with greater severity of TBI, in some cases the presence of the crisis did not interfere with the degree of neurological recovery.

No. 57

**SPECIALIZED REHABILITATION AFTER
SURGICAL REMOVAL OF INFILTRATING BULBO-
MEDULLARY EPENDYMOMA**

**Melina Longoni, MD; Laura Juan Bennazar, MD;
Virginia Tejada Jacob, MD**
Argentina

Objective: To describe the case of a patient presenting respiratory failure after the removal of an ependymoma and his recovery after specialized rehabilitation. *Method:* A 29 year-old male that started 1 year ago presenting night dyspnoea, limbs weakness and cervical pain. The MRI informs: infiltrating bulbo-medullary ependymoma down to the C3 vertebrae. The tumor is surgically removed. MRI

results after surgery: remarkable impairment in the bulbo-medullary junction and in the spinal cord at the highest levels, complete resection of the tumor, sequelae injuries are observed in the almost complete thinning of the medulla in its anterior segment, there are ischemic areas in this thin remaining medulla, which show in the tractography fibers that are frayed, disordered and unstructured. Physical examination 6 months after surgery: conscious patient, spasticity Ashworth 4, upper limbs paretic (strength 1/5), lower limbs plejic. Sensitivity preserved up to C5 then hypoesthesia including sacral segments. No cephalic control. Permanent need of mechanical respiratory assistance (MRA). *Results:* After 4 months of specialized and intensive rehabilitation, the patient can be out of the MRA support for a period of 10 min. Physical examination: upper limbs strength, right 1/5, left 3/5, cephalic and torso control, that allow him to achieve good posture in the wheel chair. Lower limbs: right he can lift his leg against gravity but doesn't complete full range of motion, dorsiflexors 1/5, hip flexors 1/5, left limb: he can lift his leg against gravity completing full range of motion, dorsiflexors 3/5 and hip flexors 2/5. *Implications/Impact on Rehabilitation:* This case is described due to the rareness of the infiltrating bulbo-medullary ependymoma and the aggressiveness of the tumor. Despite of the severity and the hopeless images regarding prognosis, after 4 months of integral rehabilitation (respiratory, motor, sensitive, etc.) the patient is capable of breathing on his own for a while, move his limbs specially his upper limbs enabling him to maneuver an electric wheel chair enhancing his independence and his quality of life.

No. 58

COMPARATIVE ANALYSIS OF RANCHO LOS AMIGOS SCALE AND DRS IN PATIENTS WITH SEVERE TBI IN REHABILITATION

Melina Longoni, MD; Laura Juan Bennazar, MD; Virginia Tejada Jacob, MD; Jimena Garrote, MD
Argentina

Objective: To conduct a comparative analysis of Rancho Los Amigos Scale and DRS in patients with severe TBI who are in rehabilitation. *Method:* 59 patients diagnosed with severe TBI (78% male-22% women) admitted in APREPA CIR between January 2005 and August 2010 were studied. The Level of disability was assessed through DRS and the cognitive function by Rancho Los Amigos Scale at admission and discharge from rehabilitation. Correlating cross-stional study. *Results:* At admission, 76% had a DRS between 6 and 9, showing severe disability. At the time of discharge from rehabilitation, 27% continued on same levels of DRS. In terms of cognitive function at admission, 76% had levels I to IV of Rancho Los Amigos, at discharge 25% continued on these same levels. Using the Chi2 test, the difference in Rancho Los Amigos score between admission and discharge was significant ($p=0.000002$), as well as the DRS ($p=0.000001$), but comparing the two scales, using the Chi² statistic test, it was not significant. *Implications/Impact on Rehabilitation:* Scales are fundamental tools for neurorehabilitation planning, allowing quantification of patients' outcome in rehabilitation. DRS measure quantitatively the patient's disability with severe TBI, and RLA scale assesses the cognitive function in these patients. Even though both scales upgraded to a more favorable score, according to patient progress, there was no direct correlation between them. An explanation for this is that despite the cognitive improvement of patients (which translates into a better level of RLA), they persisted with severe motor disabilities that resulted in worse scores on the DRS.

No. 59

NEUROCOGNITIVE DISORDERS IN PATIENTS WITH SEVERE TBI

Melina Longoni, MD; Laura Juan Bennazar, MD; Virginia Tejada Jacob, MD; Jimena Garrote, MD; Silvana Peralta, Lic.
Argentina

Objective: To describe neurocognitive disorders in severe TBI patients and outcome at discharge. *Method:* To assess patients at admission and discharge with the following neurocognitive tests: WAIS, Mini Mental, direct and inverse Digit, Letter Cancellation Test, Stroop Test, Trail Making B. manual sequence test, alternative sequences test. Wais Comprehension Test, Rey's Complex Figure Analogy Test, Rey Auditory Verbal Learning Test, Wais Arithmetic Sub Test, Inverse repetition of Digits, Wais Digits-Symbols, Boston Nomination Test, Verbal Fluency, Wais vocabulary Sub Test, London Tower for Procedural Memory and Rey's Complex Figure and The Clock Test. *Results:* 28 patients joined cognitive rehabilitation. 35% patients had high school education and 65% elementary school education. Attention, memory and executive function areas of the brain were affected in 100% of the patients. At discharge, regarding patients with elementary education, 33% continued with attention disorders, 22% with memory disorders and 94% with executive function disorders, whereas taking into account patients with high school education only 10% continued with attention and memory disorders and 60% with executive function disorders. 66% of the patients with elementary education and 60% with high school education had language impairments, at discharge this percentage was reduced to 16% and 10% respectively. 66% of patients with elementary education and 80% of patients with high school education presented Logical Reasoning disorders; at discharge, 55% of the patients with elementary education continued with the same disorder and in the case of patients with high school education only 10% continued with this disorder. Praxia and gnosis were affected 20% in both groups. At discharge, 5% of patients with elementary education continued with the same disorder, but they disappeared on the patients with high school education. *Implications/Impact on Rehabilitation:* Cognitive disorders are very common sequela in TBI. These sequel a can lead to long term disabilities and loss of productivity which can, sometimes, be more invalidating than any physical limitation. Since most of the patients that undergo TBI are young and active work wise, the economic cost, the time lost from work and the impact on the patient's life quality and his family is huge. Therefore, it is important to have measurements of results in TBI survivors to provide a guide to the patient, family and caregivers about the possibilities of recuperation.

No. 60

VISION IMPAIRMENT: MORE THAN MEETS THE EYE

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Australia

Objective: To quantify the participatory living skill limitations that effect vision impaired men in an Australian community setting. *Method:* A cross stional cohort of 18 men with confirmed vision impaired diagnoses (and additional disabilities), were interviewed to assess adaptive living skills using a validated tool - 'Adaptive Behaviour Assessment System 2' (ABAS-2). Thus identifying the areas of strengths and limitations with respect to adaptive living skills. *Results:* The participants were male with a median age of 22.0 years (range 18.9–34.8). The majority were caucasian ($n=17$) and living with family supports ($n=17$). Nine men were legally blind (<6/60), and 8 were part time or fully employed. Using the ABAS-2 scaled scores, mean information was collated from the 9 skill areas (excluding work). Scaled scores are graphed from 1-19 (low-high), with the 50th percentile at 10 and the first SD being between 7 and 13. Participants demonstrated limitations in 5 of the 9 domains (mean, SD): Community use 6.17 ± 3.95 , Functional academics 3.56 ± 3.38 , Home living 5.28 ± 2.76 , Health and Safety 6.11 ± 3.55 , and Social 6.67 ± 3.09 . From a functional perspective this may imply that this cohort has a reduced capacity to independently participate in activities that promote key survival skills such as shopping, using money accurately, maintaining a home, and demonstration of appropriate manners and friendships. Strengths identified include: Communication 9.89 ± 3.95 , Self direction 8.11 ± 3.12 , Self care 7 ± 3.43 , and Leisure 7.11 ± 3.43 . This suggests that vision impaired

young men are participating at a normal level in activities such as attending to personal care, and engaging in enjoyable past times. *Implications/Impact on Rehabilitation:* Specialised occupational therapy has scope to tailor meaningful training opportunities to enhance learning in all adaptive life areas to promote independence in willing participants. Further research is required to identify the effectiveness of these interventions which target adaptive living domains of young visually impaired men.

No. 61

LONG-TERM DOSAGE EVOLUTION IN ITB-THERAPY IN MS AND SCI-PATIENTS: 22 YEARS OF EXPERIENCE

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Belgium

Objective: To study the long-term (>20 years) dosage evolution of intrathecal baclofen (ITB) in patients with multiple sclerosis (MS) or spinal cord injury (SCI) in order to address the concept of tolerance. *Method:* Medical records of all patients who received an ITB-pump at our clinic between 1988 and 2010 were reviewed retrospectively. Only patients who had an ITB-pump since more than a year were included. Data were analyzed using a mixed-effect linear model. *Results:* A total of 131 patients (82 MS, 49 SCI) were included, representing 978 pumpyears. Mean follow-up was 7.5 years (range 1–22 years). Mean dosage of the group of MS patients is significantly lower ($p=2.6^{10}$) than the mean dosage of the SCI patients as a group, respectively 248 μg and 364 μg daily. In the first two years there is a significant increase in dosage in both groups. The SCI-group has a faster raise in dosage than the MS-group (104 μg versus 60 μg increase in daily dosage a year). There is no significant difference in starting dosage. Between 3 and 22 years there is no further significant increase in dosage. Therefore we conclude that tolerance (to baclofen), which is a progressive diminution of the susceptibility to the effects of a drug, is not present, even on very long term. *Implications/Impact on Rehabilitation:* This study is the first that studies the dosage evolution for specific sub-populations on a very long-term and for such a large group. This sheds a new light on the ongoing confusing discussion about the existence of tolerance to ITB-therapy. We believe this knowledge can lead to a faster diagnosis of system malfunctions (under further investigation).

No. 62

IMPACT OF TRAINING MANUAL DEXTERITY IN THE QUALITY OF LIFE IN HEMIPARETIC INDIVIDUALS, ACCORDING TO THE SF36

Viviane Rocha Portella; Teo Helou; Denise Rodrigues Xerez, PhD, MD

Brazil

Objective: The paralyzed hand is a common movement disorder after stroke. At 6 months after stroke, 38% of stroke patients recovered some dexterity in manipulation tasks but only 11.6% achieved a complete functional recovery of the paralyzed hand 1. Upper limbs makes a significant contribution to most Activities of Daily Life (ADL). The return of upper limb function has been identified as an important goal of rehabilitation 2. Loss of manual dexterity can limit ADL, social participation, and thus reduce the quality of life in patients with stroke. The assessment of quality of life includes four dimensions: physical, functional, psychological and social. The SF-36 is the most widely used generic instrument to measure quality of life. The instrument is translated into several languages, and the validity of the eight subscales is confirmed in the general population, and also in a variety of patients studied in more than 2,000 articles. Previous studies describe that the SF-36 is a useful instrument to measure quality of life in stroke patients, by assessing

their physical, mental, social and emotional profile. The objective was to assess the impact of a physical therapy program with focus on manual dexterity, in the quality of life of hemiparetic stable patients, according to the SF 36. *Method:* The physical therapy program was administered to 10 patients, 4 men and 6 women. In 20 sessions, twice a week. Exclusion criteria were cognitive impairment that prevented understanding and implementation of required activities. The SF-36 was administered individually before and after the physical therapy program. *Results:* T-test was used for analysis of the results, which showed significant difference in functional capacity and physical appearance. *Implications/Impact on Rehabilitation:* SF 36 is a generic quality of life test, and physical therapy program was able to improve the quality of life in hemiparetic stable patients.

No. 63

SUBJECTIVE IMPACT OF REDUCED SRETION OF PAROTID GLANDS BY THE APPLICATION OF BOTULINUM TOXIN IN PATIENTS WITH CHRONIC DROOLING

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Brazil

Objective: The aim of this study is to describe the subjective impact of reduced secretion of parotid glands obtained with botulinum toxin in patients with chronic drooling. *Method:* Nine patients with neurological dysphagia 6 women and 3 men, complaining of drooling and interference in their activities of daily living (ADL). Application of 50 U of botulinum toxin diluted in 1 ml saline in 2 points on one of the parotid glands. Before application of botulinum toxin, all patients were classified according to the scale of severity and frequency of drooling proposed by Thomas and Stonell Geenberg. A questionnaire on clinical ability to swallow saliva and its effects on quality of life was also applied, drawn up by Manrique, 2005. After 30 days, patients were again classified according to the scale and application of questionnaires. *Results:* Before application of the toxin, 3 patients had a severity level 3, 3 patients with severity 4 and 3 patients with severity 5. Regarding the frequency of drooling, 5 patients presented with frequency 4 (constantly drooling), 4 patients with frequency 3 (frequent drooling.) After application of the toxin, there was a decrease of both the frequency and severity of drooling, with 5 patients presenting with severity 2 (only wet lips), 3 patients with severity 1 (no drooling) and only 1 patient with severity 3 (lips compromised by leakage of saliva). 5 patients with frequency 2 (occasional drooling), 3 patients with frequency 1 (no drooling) and only 1 patient with frequency 3 (often presented drooling). *Implications/Impact on Rehabilitation:* The application of botulinum toxin into the parotid glands was effective in reducing their secretion in patients with chronic drooling. All patients reported improvement in their quality of life and social integration.

No. 64

EVALUATION OF PELVIC TILT ON SAPO AFTER THE APPLICATION OF BOTULINUM TOXIN IN THE QUADRATUS LUMBORUM IN CHRONIC STROKE SURVIVORS

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Brazil

Objective: Lesions of the central nervous system can modify normal patterns of movement, creating compensatory mechanisms that allow functional ambulation. The shortening of the hip liftors, for example, is compensated by a pseudo stretching due to hip, knee and ankle extension, during swing phase. The compensatory action of the abdominal, paravertebral and quadratus lumborum muscles, which in a normal condition causes a pelvic tilt of 3 degrees average over the normal motion of knee flexion, causes an asymmetry of

deambulation and sets the hip in shortened position. The management of spontaneous or learned adaptations are key to preventing disability due to pathological gait. Our focus is to analyze impact of reducing spasticity of the quadratus lumborum on the performance of gait in chronic stroke survivors *Method*: We analyzed the photos of the hip in bilateral leg stance in 7 chronic stroke survivors, positioned in the anterior posterior plane the camera, HP Photosmart 7.2 megapixel type with skin markers placed bilaterally on the edge of the iliac crest, to capture images at a distance of 3 meters. The images obtained were analyzed with the software and SAPO made before and after implementation of a protocol that provides an application of 300 U of botulinum toxin 500 U (Dysport) in each affected quadratus lumborum, associated with the strengthening of the gluteus medius on the opposite side for 30 days. *Results*: The 7 patients, 5 men and 2 women, with a mean age of 52 years, showed significant reduction in the compensatory elevation of the hip. There was no correlation with age, degree of impairment, laterality and time of injury. The behavior of the hip was different in men and women. *Implications/Impact on Rehabilitation*: Our study showed the impact of reducing the spasticity of the muscle quadratus lumborum on the gait of hemiplegic patients. The effect was better than when only the equinus was inhibited.

No. 65

SAFETY PROFILE OF COMBINED BOTULINUM TOXIN-A AND PHENOL BLOCKADE IN ADULTS WITH SPASTICITY: A RETROSPECTIVE ANALYSIS OF 134 POST-STROKE PATIENTS

Luiz Botelho, MD; Carolina M. Pinheiro, MD; Peter Kossmehl, MD; Lúcia H.M. Granero, MD; Karen Ethans, MD
Brazil

Objective: To analyze the incidence of pain and other complications in the adult stroke population treated with multilevel injections of botulinum toxin-A (Dysport® and Prosigne®) and/or phenol 5% alone or in combination. *Method*: Retrospective cohort study design. Consecutive data from post stroke patients that were treated for spasticity was collected from January 2007 to July 2008. *Results*: 134 patients got 167 sessions of neuromuscular blockade. 147 (88.0%) were of combined neuromuscular blockade, 18 (10.8%) were only performed using BoNT-A, and two sessions (1.2%) using phenol as single medication. 28 sessions were excluded because the patients were not re-evaluated. The overall treatment related incidence of reversible pain occurred after 29 sessions (20.8%), classified as nociceptive pain (17.3%) and neuropathic pain 3.5%). Other reversible complications appear in 4.3% of the treatment sessions including one allergic skin reaction following Prosigne®. Retrospective data analysis showed only 3.5% of reversible injection related neuropathic pain following phenol injection. This rate is comparable to a study using a similar procedure in children with cerebral palsy. *Implications/Impact on Rehabilitation*: The maximum dosage of BoNT-A is not enough to treat all the problematic spastic muscles post-stroke. The BoNT-A and phenol combined procedure showed to be safe, with a low incidence of acceptable adverse effects, and can be an option to treat severe cases of spasticity after stroke. In fact this combined BoNT A and phenol allow the rehabilitation physician to treat all the problematic spastic muscles in the same injection session. This is also an important feature for developing countries, due to unarguable economic advantages with phenol use.

No. 66

ADJUSTMENT OF PALATAL LIFT IN A CASE OF BRAIN TRAUMATISM

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Brazil

Objective: The normal velopharyngeal function is ensured by the synchronized movement of the soft palate and the lateral and posterior pharyngeal muscles, which have a central role in speech and swallowing. The term velopharyngeal incompetence is defined as lack of neuromuscular capacity in the movement due to the presence of partial or total paralysis of the structures. The symptomatology may involve hypernasality and weak intraoral pressure. The adaptation of the palatal lift is considered the most appropriate treatment in velopharyngeal incompetence. The objective is present the results of speech therapy associated with the use of palatal lift in a case of brain traumatism. *Method*: Patient MPC, 23-year-old, male, 11 years of schooling, a victim of head injury after a car rollover, with swallowing sequel (Functional Oral Intake Scale level 4) and speech sequel (severe limp dysarthrophonia). The speech assessment consisted of the auditory perceptual evaluation, miofunctional assessment, swallowing functional assessment and videofluoroscopy assessment, and an evaluation of nasal air escape during speech and blowing. The patient stayed at Lucy Montoro Rehabilitation Institute (São Paulo, Brazil) for 15 days, period during which it was possible to adjust the palatal lift to minimize the functional impact resulting from the severe velopharyngeal incompetence. *Results*: The nasal air escape evaluation showed less escape both in the emission of the phoneme /p/ and of the vowel /i/ and blowing. In speech, improvements were noticed in the production of phonemes /p/ and /t/ in motor tasks of sequential and alternate speech. In the vocal assessment, results included deepening of the voice and a decrease in hypernasality and in breathiness. According to the the GRBAS scale, the patient presented a moderate-severe deviance. The videofluoroscopy showed improvements in the preparation and ejection of the bolus if compared to performance without the use of palatal lift. *Implications/Impact on Rehabilitation*: The adjustment of the palatal lift associated with speech therapy facilitated, in this case, an improvement in speech and swallowing, and it was possible to reach results that would otherwise be more limited if only traditional speech therapy had been employed.

No. 67

LONG-TERM EFFICACY AND SAFETY OF INTRATHECAL BACLOFEN PUMP THERAPY

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Canada

Objective: The primary purpose of this study was to evaluate efficacy and safety of both programmable and gas-driven intrathecal baclofen therapy (ITB) pumps in the long term in people with severe spasticity. Efficacy, being the primary outcome measure, was assessed through comparison of Ashworth scores pre-implantation and post-implantation. A sary measure of efficacy was provided by comparing Spasm frequency scores. Safety was addressed through review and documentation of complication history and administration of a satisfaction survey. *Method*: We compared Ashworth data collected from prior to the implantation of each pump and compared to present Ashworth scores to determine the primary outcome of efficacy. As a sary measure of efficacy, Spasm Frequency Scores were assessed pre-implant to present. Changes in the Ashworth score and the spasm frequency score were analyzed by the Wilcoxon signed rank test. Additionally, the ITB related complications were documented. *Results*: 21 subjects with severe spasticity from spinal cord injury (13), multiple sclerosis (5), cerebral palsy (2), and hereditary spastic paraparesis (1) were enrolled in the study. The duration of implants ranged from 2 years to 19 years, average 11 years. The mean pre-implantation Ashworth score of 2.8 decreased to a post-implantation score of 0.72 ($p < 0.0001$). The mean pre-implantation spasm score of 3.6 declined to a post-implantation value of 1.9 ($p < 0.0001$). *Implications/Impact on Rehabilitation*: ITB therapy proved to be efficacious in the long term. Nevertheless, complications were frequent, involving mainly catheters, which will require further technical improvements for this therapy.

No. 68

TRISMUS IN LOCKED-IN SYNDROME***Amra Saric, MD, FRCPC, FAAPMR****Canada*

Objective: To evaluate treatment and determine efficacy of Botulinum Toxin A (BTX-A) for trismus in a patient diagnosed with Locked-in syndrome. To improve patient care and quality of life.

Method: Case description: Locked-in syndrome is caused by ventral pons lesion and is characterized by quadriplegia, anarthria, paralysis of lower cranial nerves, bilateral paresis of horizontal gaze, preserved consciousness, and preserved vertical eye movements. Bilateral ventral pontine lesions involving corticospinal and corticobulbar tracts lead to quadriplegia. Damage to the corticobulbar tracts leads to inability to speak, to produce facial movement. Lesion of bilateral CN VI nuclei lead to impairment in horizontal eye movement. The tegmentum of the pons is spared, so the consciousness is preserved. The condition has been described as "the closest thing to being buried alive". In French the common term is "maladie de l'emmuré vivant", literally translated as walled-in alive disease. It is estimated that several thousand patients each year survive. This case report describes a 49-year-old female with past medical history significant for hypertension who collapsed suddenly and MRI revealed extensive infarct involving pontomedullary junction, and the left hemipons. MRA showed absent flow in the mid portion of the basilar artery and diminished flow in the distal basilar and proximal PCA consistent with basilar artery occlusion. Physical exam was consistent with classical locked-in syndrome. The patient had preserved vertical eye movements up for "yes" and down for "no". At the time of the transfer to the rehabilitation hospital trismus was present and bruxism was also noted. The patient sustained a laceration to the left lateral aspect of her tongue. The patient was seen by an oral maxillofacial surgeon, and a recommendation was made that an oral airway be inserted to prevent additional injury. The patient found the use of oral airway uncomfortable and wished to pursue the option of oral orthotics (bite plate) or any other treatment. The decision was made to proceed with BTX-A injection in order to relieve the spasm. **Results:** The patient received injection at masseter muscle bilaterally and initially had a modest improvement with incomplete relaxation. At subsequent injection she received an injection at bilateral masseters and temporalis muscle group. She had significant improvement, and no further tongue injuries were noted. She did not require a bite plate. **Implications/Impact on Rehabilitation:** This was example of "off label use" of BTX-A, but the treatment had significant impact on patient's care and quality of life. Trismus and bruxism were reported in patients with altered states of consciousness including acquired brain injury. This case report demonstrated that BTX-A was a safe and effective treatment for patients with severe trismus and associated bruxism, caused by locked in syndrome.

No. 69

GOAL-SETTING MODEL AT CENTRO AMBULATORIO DE CLÍNICA LOS COIHUES (OUTPATIENT CENTER OF LOS COIHUES CLINIC)***Marcos Maldonado, PT; Lorena Jimenez; Alejandra Moya; Pamela Santibañez; Soledad Lagos****Chile*

Objective: The therapeutic processes of chronic disabling diseases have historically shown systematic and objective difficulties in achieving physical goals. Thus, the therapeutic teams must work with sound principles to guide coordinated and organized decision-making processes. After an extensive research of the literature, a model previously adapted by the same team was launched at our Center. Such a model ensures user-focused, clear, specific, measurable and time-limited goals. **Method:** Exploratory study that included two phases: 1) Launching: Evaluation scales were selected by specialty. Berg Scale (BERG), Modified Mo-

tor Assessment (MMAS), Functional Index Measurement (FIM), Change Psychic Measurement (OQ) and Neuropsi scales. (Validated, Excellent Reliability and Internal Consistency). A clinical user-categorization system was created by clinical complexity, clinical records and goal-setting meetings (GSMs). A support administration system was designed for controlling and providing follow-up of such model. 2) Pre-evaluation: The data corresponding to the period from June 2008 to July 2009 were revised. The study population was not random: 29 adult users, after-effected with High and Medium Complexity Acquired Brain Injury (ABI), with a minimum of 3 Goal Setting Meetings for every user. Upon finishing this period, a probe. High level of trust Confidence. 95%. (from scale total dissatisfaction to total satisfaction). **Results:** Evaluations: Launching: After 13 months, 94 GSMs were done. The evaluation scales selected were previously applied to every Goal Setting Meeting (GSMs). BERG, MMAS, FIM, OQ and Neuropsi scales. (Validated, Excellent Reliability and Internal Consistency). Furthermore, a speech, language and swallowing alteration scale was adapted. Pre-evaluation: Therapeutic evolution: Retrospectively; Monthly increase of 40% on BERG, MMAS, and FIM scales. Team participation: 95% in GSMs. User satisfaction: High Score. **Implications/Impact on Rehabilitation:** Relevance: The implementation of the Goal-Setting Model (GSM) at Centro Ambulatorio de Clínica Los Coihues (Outpatient Center of Los Coihues Clinic). 1) Launching the model. 2) Pre-evaluating the model through the following dimensions: therapeutic evolution, team participation and user satisfaction. Conclusions: GSMs are key to programming, following-up and analyzing the established goals, agreements and their adequate socialization. In spite of these great advantages, we had limitations related to the crossed-over setting of such goals. **Implications:** The challenge for the next study will be to determine adequate group goal-setting and the analysis of their achievement within determined time-frames.

No. 70

SPECIFIC AND NONSPECIFIC THALAMOCORTICAL FUNCTIONAL CONNECTIVITY IN NORMAL AND VEGETATIVE STATES***Jingsheng Zhou, MD****China*

Objective: Recent theoretical advances describing consciousness from information and integration have highlighted the unique role of the thalamocortical system in leading to integrated information and thus, consciousness. Here, we examined the differential distributions of specific and nonspecific thalamocortical functional connections using resting-state fMRI in a group of healthy subjects and vegetative-state patients. **Method:** A total of 14 subjects participated in this study including seven healthy volunteers and seven patients diagnosed with vegetative state. Imaging acquisition was performed using a Siemens Trio 3T scanner with a standard head coil. The regions of interest within the thalamus used as seed regions for connectivity analysis were defined in the coronal plane of each individual's high-resolution MPRAGE images. Imaging data analysis was conducted using Analysis of functional NeuroImages (AFNI). **Results:** We found that both thalamic systems were widely distributed, but they exhibited different patterns. Nonspecific connections were preferentially associated with brain regions involved in higher-order cognitive processing, self-awareness and introspective mentalizing (e.g., the dorsal prefrontal and anterior cingulate cortices). In contrast, specific connections were prevalent in the ventral and posterior part of the prefrontal and precuneus, known involved in representing externally-directed attentions. Significant reductions of functional connectivity in both systems, especially the nonspecific system, were observed in VS. **Implications/Impact on Rehabilitation:** These data suggest that brain networks sustaining information and integration may be differentiated by the nature of their thalamic functional connectivity. The result may offer the theoretical basis for PVS rehabilitation.

No. 71

ALCOHOL NEUROLYSIS OF TIBIAL NERVE MOTOR BRANCHES TO THE GASTROCNEMIUS MUSCLE TO TREAT FOOT DROP IN THE PATIENTS WITH STROKE

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Objective: To observe the clinical effects of alcohol neurolysis of tibial nerve motor branches on the gastrocnemius muscle in treatment of foot drop in patients with hemiplegia due to stroke. **Method:** Twenty-two patients with gastrocnemius ankle plantarflexor spasticity had accepted motor branch block (MBB) of the tibial nerve to the gastrocnemius muscle with 99.9% ethyl alcohol. The severity of spasticity was assessed before and after motor branch block (0 h, 24 h, 7 days, one month and three months), using the Modified Ashworth Scale (MAS) score of ankle plantarflexor, clonus score of the ankle, and the passive range of motion (PROM) of ankle dorsiflexion. The Friedman test was used to compare Means before and after the motor branch block. **Results:** The MAS score was reduced in 19 patients during the 3-month follow-up, and spasticity reappeared at the level of the pre-MBB state in 3 patients who need repeated motor block. The mean values were as follows: MAS score, $2.7 \pm 0.7 / 1.8 \pm 0.7$; Clonus score, $1.8 \pm 0.8 / 0.6 \pm 0.8$; PROM, $-18.3^\circ \pm 11.5^\circ / -3.8^\circ \pm 8.6^\circ$. No serious complications were observed during the 3-month follow-up period. **Implications/Impact on Rehabilitation:** MBB of the tibial nerve to the gastrocnemius muscle is effective and safe for relieving localized muscle spasticity of the ankle plantarflexors in patients with stroke.

No. 72

GRAPHICAL MODELS MAPPING COGNITIVE ASSOCIATIVE STRUCTURES IN APHASIA PATIENTS: A COMPARISON BETWEEN TWO TREATMENT STRATEGIES

Feng Lin, PhD; Zhongli Jiang, Li Sun
China

Objective: Picture naming task is one of the most practicable treatment options for aphasia patients. The frequencies of correct responses can be applied to evaluate the patient's naming ability. However, it remains unknown how the patients organize the connections between the concepts of pictures. Free association task is available to detect the cognitive associative structures in health populations and such structures can be analyzed by graphical modeling. This present study was to explore whether graphical modeling is a potential useful method for the study of cognitive associative structures in aphasia patients. **Method:** Data were collected by using two strategies of picture naming tasks. The first was semantic navigation strategy (SNS) which presented training pictures in a semantic sequence. The second was random strategy (RS) which showed the same set of pictures in a random sequence. The comparison between these two strategies was used to support the validity of the graphical models. Fourteen aphasia patients were randomly divided into SNS group ($n=7$) and RS group ($n=7$). One hundred and twenty-two words were chosen from Chinese word association norms, in which there were 75 words could be represented by pictures. The word sequence of semantic navigation strategy was from a dendrogram which was generated by Ucinet 6.0. Semantically related words were closely listed in this sequence. After baseline tests of Western Aphasia Battery and Mini Mental Status Examination, all the patients with aphasia received a language training project: once a day for ten consecutive days. The naming ability of each patient was evaluated with 75 pictures before and after training respectively. To evaluate the generalization effects of the training, the naming ability of 46 untrained pictures were also examined after the training projects. These 46 words were used as

stimulus words in creating the Chinese word association norms and they were semantically related to the training words. Graphical modeling used the binary data collected from examinations: 0 for correct response and 1 for wrong. The least absolute shrinkage and selection operator for generalized linear models was used to identify conditional dependent connections between the concepts of those pictures. Bootstrap method (random resample and confidence interval comparison) was used to enhance the reliability and validity of model selection. By defining words as nodes and conditional dependent connections as linkages, eight undirected network graphs were generated from the following word sets: SNS trained words before (STB graph) and after (STA graph) training project, SNS untrained words before (SUB graph) and after (SUA graph) training project, RS trained words before (RTB graph) and after (RTA graph) training project, RS untrained words before (RUB graph) and after (RUA graph) training project. The structures of these graphs were measured by k-core decomposition method and graph visualization. The graphic models were established in the R environment (version 2.11.1). Pajek 1.28 was used for the network analysis. **Results:** The first result was about the frequency data of naming tasks. For the trained words, semantic navigation strategy effectively improved the naming ability and the learning curve than random strategy. For the untrained words, both the semantic navigation strategy and the random strategy promoted significant generalization effects. The second result was about the structure comparison of graphical models. Because a higher k-core has a more robust structure than a lower k-core, the present study compared the k-cores in different graphs. The STB graph showed three 2-cores and the largest 2-core contained 4 words. The RTB graph showed a 2-core containing 5 words. The STA graph showed a 4-core composed of 5 words and this graph contained 24 words in >2 -cores. The RTA graph showed two 4-cores and the largest 4-core contained 7 words. This graph contained 16 words in >2 -cores. The SUB graph showed thirteen 1-cores and the largest 1-core contained 5 words. The RUB graph showed a 2-core containing 5 words. The SUA graph showed three 2-cores containing twelve words and the largest 2-core composed of 6 words. The RUA graph showed two 2-core and each 2-core contained 3 words. By comparing the graphs before and after the training project in a same group, it was suggested that both trained words and untrained words were more interactively organized by both strategies. By comparing the graphs of the two strategies after training project, it seemed that for the trained words these two strategies had no significant differences between their cognitive associative structures. However, given the findings before the training project, the findings from the untrained words were meaningful: the semantic navigation strategy generated more stable cognitive associative structures than the random strategy. **Implications/Impact on Rehabilitation:** Graphical modeling provided a promising method for mapping cognitive associative structures in aphasia patients. Structures revealed by this method may support the evaluation and comparison of pathological language structures.

No. 73

EFFICACY OF MENTAL PRACTICE ON REHABILITATION OF HAND FUNCTION IN PATIENTS WITH POST-STROKE: A SYSTEMATIC REVIEW

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Objective: To evaluate Mental Imagery on rehabilitation of functions in patients with post-stroke. **Method:** Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, PEDro

(www.pedro.org.au), OpenSIGLE, National Technical Information Service (NTIS), CNKI, VIP and Wanfang Data were searched for the RCTs of Mental Imagery on rehabilitation of functions in patients with stroke from the date of establishment of the databases to October 2010. The bibliographies of included studies were searched too. 2 independent researchers evaluated the included studies using GRADE. The extracted data were analyzed by RevMan 5.0.25 and GRADEprofiler 3.2.2. *Results:* A total 10 trails were discovered. Meta-analysis showed that at the end 6th, 8th, compare with Conventional Rehabilitation, the Mental Practice increase the score measured by FMA ([WMD=9.75, 95% CI (1.41,18.09)] and [WMD=12.52, 95% CI (1.67, 23.37)] respectively) and ARAT [WMD=5.70, 95% CI (3.17, 8.22), $p=0.30$], but there was no statistical significance with 4 weeks Mental Practice compared to Conventional Rehabilitation [WMD=4.42, 95% CI (-7.86,16.70)]. The 4 outcomes were all low quality in the GRADE system. *Implications/Impact on Rehabilitation:* The current evidence showed Mental Practice could improve the upper limb function in patients after stroke, and the side effects of Mental Practice was not found in the Meta-analysis. Compared with other rehabilitative therapies, it was simpler, lower input costs, low operating costs. The clinicians should recommended it. Due to the limits of includes studies, more large-sample, high-quality RCTs are required.

No. 74**EFFECTIVENESS OF HIGH- AND LOW-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION**

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Objective: To evaluate the effectiveness of repetitive transcranial magnetic stimulation for treating dysfunction in patients with Parkinson's disease. *Method:* We searched the Cochrane Library (Issue, MEDLINE, EMBASE, CBMDisc, CNKI) from the date of establishment of the databases to April 2010. Randomized controlled trials (RCTs) of rTMS for patients with Parkinson's disease. The quality of RCTs was critically appraised and data were extracted by two reviewers independently. Meta-analyses were conducted for the eligible RCTs. *Results:* Eight RCTs were included. The pooled result of 2 RCT's results showed that high-frequency repetitive transcranial magnetic stimulation treated on patients with PD after the clinical motor dysfunction, which lasted for 10 days, had no significant effect with WMD -4.75 and 95% CI -13.73 to 4.23. Pooled analysis of three studies showed that, patients with treatment of low-frequency repetitive transcranial magnetic stimulation for one month, had no significant effect with WMD -8.51 and 95% CI -18.48 to 1.46. Pooled analysis of three studies showed that, patient with treatment of low-frequency repetitive transcranial magnetic stimulation for three months, have been significantly improved in clinical symptoms (neurological, behaviour and emotional state; clinical motor function; activities of daily living). The frontal or motor cortex low frequency (≤ 1 Hz), high intensity ($\geq 90\%$ RMT), multi-frequency (≥ 3 times), long time (≥ 3 months) of repetitive transcranial magnetic stimulation have a positive effect on the clinical symptoms in patients with PD and also have a long-term effect. *Implications/Impact on Rehabilitation:* Repetitive transcranial magnetic stimulation can improve clinical symptoms and dysfunction of the patients with PD.

No. 75**EFFECTS OF PULSE MAGNETIC FIELD ON BRAIN INJURY AND INSULIN-LIKE GROWTH FACTOR-1 EXPRESSION IN RATS WITH CEREBRAL ISCHEMIA**

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Jianzhong Fan, PhD

China

Objective: To study the effects of pulse magnetic field on brain injury and insulin-like growth factor-1 (IGF-1) expression in rats with cerebral ischemia. *Method:* 48 SD rats were divided into 3 groups: sham-operation group, model group and magnetic group. 16 rats in every group. The rats in model group and magnetic group were established focal cerebral ischemia reperfusion model by the thread occlusion method. Then the rats of magnetic group were treated by pulse magnetic apparatus (0–105 Gs, 50 Hz) immediately after reperfusion 2h (20 min/time, 1 time/day, everyday till the rats were decapitated). The neurological function assessment was applied for every rat after reperfusion 2 h, 1 d, 3 d, 7 d. After reperfusion 7 d, the changes of pathology, IGF-1, infarct size in brain tissue of the rats were observed. *Results:* Compared with the model group, the neurologic deficit scores when 7 d after reperfusion were significantly less in magnetic group (0.31 ± 0.48) ($p=0.023$, $p<0.05$). The injury degree of neuron greatly reduced and the infarction area also markedly decreased in the magnetic group ($p=0.000$, $p<0.05$). At the same time, the number of IGF-1 positive neuron increased significantly in the magnetic group compared with model group ($p=0.000$, $p<0.05$). *Implications/Impact on Rehabilitation:* Magnetic field can reduce the brain injury in rats with cerebral ischemia, this effects might be associated with IGF-1 expression.

No. 76**PREDICTING RECOVERY OF UNCONSCIOUS PATIENTS WITH EEG NONLINEAR ANALYSIS**

Wu Dongyu, MD

China

Objective: To quantify the degree of unconsciousness and investigate the effect in predicting prognosis of unconscious patients with EEG nonlinear analysis. *Method:* Thirty seven unconscious patients with severe brain trauma or stroke were involved in the study, including twenty one patients in persistent vegetative state (PVS), sixteen in minimally conscious state (MCS). All of them were diagnosed unconsciousness by clinical and electrophysiological assessment. EEG was recorded under three conditions: eyes closed, auditory stimulation and painful stimulation. EEG nonlinear indices such as Lempel-Ziv complexity (Cx), approximate entropy (ApEn) and cross-approximate entropy (cross-ApEn) were calculated for all subjects. Glasgow Outcome Scale (GOS) was used to assess the prognosis of the subjects for 6 months after admission. *Results:* EEG nonlinear indexes of PVS group were significantly lower than MCS group for all states. Three of PVS group and seven of MCS group recovered (REC) and their GOS score rose to 3 during 6 months after admission. There was no statistically significant difference between REC patients and non-REC ones with brainstem auditory evoked potential, somatosensory evoked potential and traditional EEG. Under painful stimulation condition, nonlinear indices of REC patients increased more significantly than non-REC patients. *Implications/Impact on Rehabilitation:* With EEG nonlinear analysis, the degree of suppression for PVS and MCS could be quantitatively measured. EEG nonlinear indices might have effect in predicting prognosis of PVS and MCS patients and for unconscious patients better response to painful stimulation might mean better prognosis.

No. 77**EFFECTS OF RECREATIONAL REHABILITATION IN TREATING POST-STROKE DEPRESSION IN PATIENTS AND IMPROVING THE QUALITY OF LIFE AT SEQUELAE STAGE**

Wen Hua Chen, PhD

China

Objective: To observe the effects of recreational rehabilitation in treating post-stroke depression patients at sequelae stage. *Method:*

103 cases of post-stroke depression patients were selected and randomly divided into recreational rehabilitation group (RR group, 52 cases) and control group (51 cases). Depression were assessed with Hamilton Depression Scale (HAMD), and motion function of extremities were evaluated with Fugl-Meyer Assessment (FMA), ability of daily life with Modified Barthel Index (MBI) and quality of life using satisfaction with life scale (SWLS) at 3th month and 6th month respectively. *Results*: There were no significant differences between two groups on baseline before treatment. The results of HAMD and SWLS improved evidently the 3th month in RR group after treatment while the relevant result of FMA improved without statistical significance, and FMA remains at relatively lower level in control group than that of RR group. HAMD and SWLS of patients presented the tendency of decline during course of 6 months, while there still was a significant difference between two groups. *Implications/Impact on Rehabilitation*: Recreational rehabilitation can improve the condition of post-stroke depression patients and their the quality of life even at sequelae stage in a long term run. It can possibly improve the motional function as well which invites further study.

No. 78

A COMPARISON OF CONVENTIONAL THERAPY, INTENSIVE THERAPY AND MODIFIED CONSTRAINT INDUCED THERAPY TO IMPROVE UPPER EXTREMITY FUNCTION AFTER STROKE

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China

Objective: To compare the effects of 4 weeks of intervention using conventional rehabilitation (CR) intensive conventional rehabilitation (ICR) and modified constraint-induced movement therapy (mCIMT) on hemiplegic upper extremity in stroke patients. *Method*: Thirty stroke patients were randomly divided into 3 groups: CR, ICR, and mCIMT (10 individuals in each). The motor function was assessed by the Wolf motor function test (WMFT) which were carried out before treatment, 2 weeks and 4 weeks after treatment. *Results*: CIMT and ICR groups improved their function ability (FA) scores of WMFT significantly more than the CR group after 2 weeks of treatment ($p < 0.05$), but all groups reached comparable levels at the end of 4 weeks of intervention. However, only the CIMT intervention was proved to have robust and systematic effects on the FA scores as revealed by the large, positive and significant correlation between the initial scores and those 2- and 4-weeks after the intervention. The performance median time of WMFT decreased significantly in all groups after 4 weeks of treatment ($p < 0.05$), but only the mCIMT group showed significant improvements both 2 and 4 weeks after the treatment initiation. *Implications/Impact on Rehabilitation*: When compared with classical intervention, mCIMT showed an apparent advantage over patients who received either the conventional intervention or the intensive conventional rehabilitation.

No. 79

EFFECTS OF PHYSICAL EXERCISE ON THE NITRIC OXIDE SYNTHASE AFTER MIDDLE CEREBRAL ARTERY OCCLUSION IN MICE

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China

Objective: To investigate the impact of a moderate amount of physical training on the amount of nitric oxide synthase (NOS) after middle cerebral artery occlusion (MCAO) in mice. *Method*: Thirty male C57 BL/6J mice underwent MCAO (described by Bederson JB et al) and then divided into training group ($n = 15$) and control group ($n = 15$). The mice of experiment group were trained with voluntary running wheel for one hour daily (6 days/week) for 90 days. The

running wheel of the control group was fixed. Fifteen days, 45 days and 90 days after MCAO, the amount of NOS-positive neurons were respectively calculated in lesion and normal sides of the cerebral cortex. The design of the study was completely randomized between the two groups. *T-test* were performed. *Results*: There was no difference in the number of NOS positive cells in two sides of cortex between training and control group in 15 days after MCAO ($t = 2.1$ and $0.2, p > 0.05$). In 45 days after MCAO, The amount of NOS-positive neurons in normal side in cortex showed a significant increase in training group than it in control group ($t = 3.55, p < 0.05$), but not significant in lesion side ($t = 0.26, p > 0.05$). In 90 days after MCAO, comparison between training group with control group showed the amount of NOS-positive neurons increased in cortex in normal side ($t = 6.53, p < 0.05$). *Implications/Impact on Rehabilitation*: The physical training can increase the amount of NOS-positive neurons on the normal side of cerebral hemispheres in mice after MCAO and improve the brain plasticity after cerebral artery occlusion.

No. 80

DIFFERENT CHARACTERS OF ACALCULIA IN PATIENTS WITH LEFT OR RIGHT CEREBRAL HEMISPHERE DAMAGE

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Objective: The purpose of this study was to compare the number processing and calculation test scores between the patients with acalculia following acquired brain damage and normal people. To investigate features of acalculia in patients with right and left cerebral hemisphere damage. *Method*: Forty patients with acquired brain damage which included twenty left brain damaged (LBD) patients, nine right brain damaged (RBD) patients, and eleven bilateral brain damaged (BBD) patients and forty-eight healthy control subjects were tested with Number processing and calculation battery (NPC). *Results*: Patient groups had significantly lower total scores and items' scores than normal control group at number sequences, numerical comprehension, numerical transcodings, and calculation in NPC test ($p < 0.01$). For patients with LBD, total scores and items' scores on numerical transcodings and calculation in NPC test were lower than those for the patients with RBD ($p < 0.05$), which means the impairment performance of number processing and calculation in LBD patients is closely associated with verbal ability. The patients with RBD remained relatively intact ability related to the auditory verbal code in the NPC test. However, more error were detected in counting dots, number comparison Arabic, number comparison verbal, transcoding token, estimation, mental addition, mental subtraction, written subtraction, and etc., which are independent of language and reliant on visuospatial ability. There were no significant differences both between BBD group and LBD group and between BBD group and RBD group in NPC scores ($p > 0.05$). *Implications/Impact on Rehabilitation*: Acalculia is often seen in neurological conditions, but the research on diagnosis of acalculia is rather limited. A specific standardized test battery with norm for acalculia is hardly found, although tests for calculation abilities are always included in the neuropsychological evaluation of cognition. The NPC test is a good diagnosis tools for acalculia. Based on the test, different types of acalculia can be analyzed and the pinpointed treatment plan for rehabilitation of calculation disturbances can be made.

No. 81

MEASUREMENTS OF QUALITY OF LIFE FOR CHILDREN WITH CEREBRAL PALSY

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Objective: The purpose of this article is to detect common measurements of quality of life (QOL) for children with cerebral palsy (CP). **Method:** To review literatures which attempted to assess QOL in individuals with CP in MEDLINE. **Results:** Five measurements met the inclusion criteria, including PedsQL Generic Core Scales and Cerebral Palsy Module, CHQ, KIDSCEEN, PODCI and CP-QOL. **Implications/Impact on Rehabilitation:** Five instruments consist of generic and condition-specific version. Considering development of children both self and proxy report are available. All have acceptable clinical utility. However, further study should be given to confirm their reliability and validity in assessing QOL of children with CP. There are some drawbacks using these instruments, including confusion of QOL, function and participation, failure to reflex real QOL for children, weak agreement between self and proxy report on social function and psychosocial domains.

No. 82

THE APPLIED STUDY OF ACUPUNCTURE COMBINED WITH REHABILITATION ON STROKE PATIENTS

Qiang Tang, MD; Yan Wang; Luwen Zhu
China

Objective: To explore the effect of cluster needling of scalp point combined with rehabilitation technique (Acupuncture combined with rehabilitation) on stroke, and put forward normalized clinical comprehensive therapeutic scheme. **Method:** 120 patients were randomly divided into four groups, who came from the rehabilitation center of The Second Affiliated Hospital of Heilongjiang University of Chinese Medicine. A group: cluster needling of scalp point combined with rehabilitation technique group (Acupuncture combined with rehabilitation); B group: cluster needling of scalp point group; C group: rehabilitation group; D group: control group. Four groups of patients were evaluated respectively by Fugl-Meyer score and Neurological score and ADL score before and after treatment. **Results:** There were significant difference when the Simplified Fugl-Meyer motor score, the neurological deficit score and the ADL score in post-treatment compared with that in pretherapy by *t*-test ($p < 0.01$). Compared with the control group, there was no significant difference in each group which was not treated ($p > 0.05$). Compared with the control group after treatment, acupuncture and Sport Group, scalp acupuncture group and rehabilitation group were significantly different ($p < 0.01$); The Acupuncture combined with rehabilitation group were significantly superior to the rehabilitation group and the scalp acupuncture group ($p < 0.05$). The total effective rate can reach to 94.67. **Implications/Impact on Rehabilitation:** Acupuncture combined with rehabilitation is an effective method. It can reduce the ischemia damage of neurons, improving effectively the patients' nerve function and daily living activity ability. Acupuncture combined with rehabilitation is important significance to prevent and cure complication and abnormal motor mode.

No. 83

EXPRESSION OF GRIP IN THE PENUMBRA CORTEX AFTER TRANSIENT ISCHEMIA IN RATS

Hua Yuan, PhD
China

Objective: In order to explore the expression of glutamate interacting protein (GRIP) and its relationship with glutamate receptor 2 (GluR2) after ischemia in rats brain. **Method:** Thirty-six male Sprague Dawley rats were randomly divided into ischemia group and sham group. Middle cerebral artery occlusion (MCAO) was achieved with the use of an intraluminal filament to occlude the left MCA for 1, 6, 12, 24 or 72 h. Sham-operations were also done ($n = 6$). At different time point after operation, all rats were decapitated. Western blot was used to determine the expression of GRIP, GluR2 on the membrane and in the cytoplasm. Double-labelling

immunofluorescence staining was used to detect their distribution. **Results:** Compared with sham group, GRIP-positive neurons increased obviously in the ischemic penumbra cortex, mainly on the dendrites and moved to the cell body lately. Double immunohistochemical staining showed that the GRIP-positive cells were co-stained with GluR2 neurons. Western blot showed the elevated GRIP from 6 h to 24 h after ischemic treatment. The increased GluR2 on the membrane but not in the cytoplasm was shown from 12 h to 24 h after ischemia. **Implications/Impact on Rehabilitation:** It suggested that GRIP increased to transfer more GluR2 to the membrane after ischemia which may protect the neurons in the penumbra zone from the AMPA receptor mediated excitotoxic injury.

No. 84

COGNITIVE ASSESSMENT IN SUBJECTS WITH AD: COMPARISON OF MONTREAL COGNITIVE ASSESSMENT CHINESE VERSION AND MMSE

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Objective: To assess the cognitive function of subjects with AD with Chinese version of MoCA (Montreal Cognitive Assessment) and MMSE (Mini-Mental State Examination). **Method:** Two groups of volunteers participated in the study of Chinese version of MoCA translated by Wang wei. One group was 56 patients with AD (patient group) the other group was 78 subjects without neurological disorders (control group). All the subjects were assessed with MoCA and MMSE, the results were analyzed. **Results:** There was high correlation between the scores of MoCA and that of MMSE ($r = 0.898, p < 0.001$). Chinese version of MoCA took the same time as that of MMSE. **Implications/Impact on Rehabilitation:** Chinese version of MoCA could be used as a tool in clinical study of cognitive function for AD.

No. 85

EFFECTS OF 860MHZ ELECTROMAGNETIC RADIATION ON TRACE AND DELAY CLASSICAL EYEBLINK CONDITIONING IN GUINEA PIGS

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Objective: To observe the effects of 860 MHz electromagnetic radiation on an established dual task model of trace and delay eyeblink conditioning in guinea pigs. **Method:** 24 guinea pigs with established dual task model of trace and delay eyeblink conditioning were assigned randomly into four groups: microwave-exposed 1 h, microwave-exposed 20 min, sham-exposed, and normal control. The guinea pigs of microwave-exposed 1 h, microwave-exposed 20 min were radiated respectively by 860 Mhz electromagnetic system at power densities of 1 mw/cm² for 1 h and 20 min, continuously for 3 days. After electromagnetic radiation, the guinea pigs were trained classical eyeblink conditioning. **Results:** Compared with guinea pigs in normal control group, the behavioral parameters (acquisition rate and amplitude) of guinea pigs in microwave-exposed 1 h group showed obvious changes ($p > 0.05$), but latency showed no obvious changes ($p > 0.05$). The behavioral parameters of guinea pigs in microwave-exposed 20 min, sham-exposed and normal control groups showed no changes ($p > 0.05$). **Implications/Impact on Rehabilitation:** 860 MHz, 1.0 mw/cm², 1 h, electromagnetic radiation can cause changes in the behavioral parameters of guinea pigs and cause decrease in the learning capacity and memory.

No. 86

DU MERIDIAN ELECTRO-ACUPUNCTURE AND OLFACTORY ENSHEATHING CELLS TRANSPLANTED ON ANTERIOR SPINAL CORD INJURY OF RATS

Jinyu Yan, MD; Jianfeng Li; Xu Zhang; Zunnan Liu; Dongsheng Li

China

Objective: To observe the effectiveness of Du meridian electro-acupuncture and Olfactory Ensheathing cells (OECs) transplanted on anterior spinal cord injury of rats, and influence on the motor function, content of NT-3 and expression of P75NGFR receptor. **Method:** 40 Wistar rats with anterior spinal cord injury were randomly divided into four groups, a DU meridian electro-acupuncture group, a OECs transplanted group, a DU meridian electro-acupuncture + OECs transplanted group and a control group. We evaluated the motor function of experimental models with BBB (Basso-Beattie-Bresnahan) scores after 8 weeks. Furthermore, we measured the content of NT-3 and expression of P75NGFR in spinal cord tissue after 2 weeks. **Results:** The BBB scores in DU meridian electro-acupuncture + OECs transplanted group was significantly better than blank control group and other groups after 8 weeks ($p < 0.05$), the score is (47.68 ± 7.06) . It was shown that the content of NT-3 was highest in DU meridian electro-acupuncture + OECs transplanted group ($p < 0.05$). There were P75NGFR expression in both OECs transplanted group and DU meridian electro-acupuncture + OECs transplanted group, furthermore, the expression was more obviously in DU meridian electro-acupuncture + OECs transplanted group. **Implications/Impact on Rehabilitation:** Du meridian electro-acupuncture and OECs transplant can elevate the motor function and content of NT-3 in anterior spinal cord injury of rats. Du meridian electro-acupuncture can improve the survival of transplanted OECs in spinal cord injury of rats. It is a effective method to deal with anterior spinal cord injury of rats.

No. 87

THE SIDE EFFECTS OF EPHEDRINE IN RATS WITH CEREBRAL ISCHEMIC-REPERFUSION INJURY

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Objective: To evaluate the side effect of ephedrine on heart, liver, kidney and cerebrum after ischemic-reperfusion rats. **Method:** Sprague-Dawley (SD) rats, suffered from ischemic-reperfusion were randomly divided into 4 groups: A group for ephedrine, B group for ephedrine, C group for ephedrine, and control group (D group). At each week, using hematoxylin eosin staining to observe the tissue of all the organs, then, test the blood pressure, aspartate aminotransferase (AST) alkaline phosphatase (AKP) and creatinine, also using immunohistochemical method to test the expression of brain-derived neurotrophic factor (BDNF) on hippocampal CA3 area. **Results:** The blood pressure values were lower in ephedrine groups than that in control group all the time ($p < 0.05$). The biochemistry results showed that AST, AKP and serum creatinine in ephedrine groups were higher than that in control groups ($p < 0.05$). The expression levels of BDNF on hippocampal CA3 area in ephedrine groups were higher than that in control group at the last three weeks ($p < 0.05$). The pathological stion showed that in all the ephedrine groups, we can see congestion, degeneration and edema of tissues. **Implications/Impact on Rehabilitation:** These findings indicate that ephedrine may have side effects on heart, liver, kidney and cerebrum in ischemic/reperfusion rats. There may be correlation between the side effect and dose, the side effects are enhanced with an increased dose of ephedrine. The injury of the above organs also may be transient, which can be recovered when discontinuation of treatment.

No. 88

NEUROPROTECTIVE EFFECTS OF EPHEDRINE AFTER HYPOXIC-ISCHEMIC BRAIN INJURY IN NEONATAL RATS

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Objective: To explore the effects of ephedrine on hippocampal cell apoptosis and behavioral performance after hypoxia-ischemia brain injury in neonatal rats. **Method:** All 90 7-day rats were randomly divided into 3 groups: ephedrine treatment group, model group, and sham group. Hypoxia-ischemia brain injury model was established by permanently ligating right common carotid artery. Ephedrine ($1.5 \text{ mg} \cdot \text{kg}^{-1}$) was injected intraperitoneally to the rats of ephedrine treatment group for 7 d, and the rats of model group was given normal saline at the same volume. At the following time interval of 6 and 12 h, and 1, 3, 7 d after hypoxia, the expression of bcl-2 and bax were detected in the hippocampal region by immunohistochemistry staining. At 4 weeks after surgery, behavioral changes in the remaining rats were tested by Morris water maze. **Results:** Compared with model group, the expression of bcl-2 in the ephedrine treatment group was significantly increased after hypoxic-ischemic injury, peaked at 1 d and decreased in 3 days after operation. And the expression of bax in the ephedrine treatment group was decreased in 1 d after hypoxic-ischemia. The average time of escape latency was gradually decreased in each group. However, from the 3rd day to the 5th day, it is much shorter in ephedrine treatment group than in model group. In addition, the frequency platform passing in the ephedrine treatment group and the percentage of swimming distance traveled in the previous target quadrant was significantly greater than those of the control group. **Implications/Impact on Rehabilitation:** Ephedrine upregulates bcl-2 and downregulates bax in the hippocampus of neonatal rats after hypoxic-ischemic, and improves their ability of learning and memory.

No. 89

NEUROPROTECTIVE EFFECT OF PUERARIN AFTER HYPOXIC-ISCHEMIC IN NEONATAL AND ITS MECHANISM

Nong Xiao, MD; Bei Xu; Xiao-Ping Zhang

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Objective: To investigate the effects of Puerarin on the expression of BDNF, Bax, Caspase-3 in hippocampal cell and impact on learning and memory ability after hypoxia-ischemia brain injury in neonatal rats. **Method:** All SD rats (P7) were randomly divided into 3 groups: treatment with Puerarin group, control group, and sham group. Rats in Puerarin group and control received hypoxia-ischemia brain injury. Rats in Puerarin group were treated with Puerarin in doses of $50 \text{ mg} \cdot \text{kg}^{-1}$ ip at 5 min after reoxygenation, once a day for 7 days in total. Rats in control group were given the same volume of saline. The rat pups of sham group were separated the right common carotid, but not ligated and they were not exposed to hypoxia. At 1 week after hypoxia, expression of BDNF, Bax, Caspase-3 were detected in the hippocampal region by immunohistochemistry. At 4 weeks after surgery, behavioral changes in the remaining rats were tested by Morris water maze. **Results:** (1) 1 week later, the expression of BDNF in the Puerarin group was significantly higher than that of the control group after hypoxic-ischemic ($p < 0.05$); and the expression of Bax and Caspase-3 in the Puerarin group was lower than that of the control group ($p < 0.05$, $p < 0.01$) (2) The average time of escape latency in Puerarin is much shorter than control group ($p < 0.05$, $p < 0.01$). In addition, the frequency platform passing in the Puerarin group and the percentage of swimming time traveled in the previous target quadrant was significantly greater than the control group ($p < 0.05$, $p < 0.01$). **Implications/Impact on Rehabilitation:** Puerarin may reduce brain injury and improve learning and memory

in hypoxic-ischemic brain injury rats. This protection may be associated with increased BDNF levels and decreased pro-apoptotic protein (Bax) and Caspase-3.

No. 90**ACUPUNCTURE ACCELERATED THE RECOVERY OF CENTRAL FACIAL PARALYSIS AFTER ACUTE STROKE*****Chunxiao Wan, PhD; Jianan Li, MD****Nanjing Medical University, China*

Objective: To investigate the effect of acupuncture on central facial paralysis after acute stroke. **Method:** 60 patients with central facial paralysis after acute stroke (about 24-72 h after stroke attack) randomly recruited and grouped in two groups: patients in group A were received drug therapy as control ($n=30$). Patients in group B received acupuncture based on the same medication ($n=30$). The following acupoints were selected: Xiaguan (ST7), Sibai (ST2), Qianliao (SI18), Yifeng (TE17), Baihui (GV20), Zusanli (ST37), Hegu (LI4). All the chosen acupoints were located according to The National Standards of the People's Republic of China: the Meridian and Acupoint Standards, published in 1990. Sterilization and insertion were performed on these acupoints. The acupuncture was performed for 30 min during the "Qi" was reached, once a day, for a month. Functional recovery was assessed by measurement of facial movements and by electrophysiological examination. Before the therapy and 10 days later, 20 days later, 30 days later, all the patients received the Portmann analysis by the blind investigators. **Results:** There was no difference between the two groups before therapy and 10 days after acupuncture. But the significant difference ($p<0.05$) was observed between the two groups at the 20th day (Portmann score was 14.76 ± 2.6 versus control 12.13 ± 2.08 , $p<0.05$) and 30 days (Portmann score was 17.03 ± 2.5 versus control 13.03 ± 1.97 , $p<0.01$) after acupuncture, especially at the 30th days. The latency of compound muscle action potentials of musculus orbicularis oris and musculus orbicularis oculi on the ill side were longer in group B than that in group A after a month treatment ($p<0.05$). **Implications/Impact on Rehabilitation:** Acupuncture may improve the central facial paralysis recovery after 20 days performance.

No. 91**STUDY ON THE CORRELATION BETWEEN P300 AND LOTCA IN STROKE PATIENTS*****Wei Chen, MD; Zunke Gong; Shiyan Wang****Rehabilitation Medicine Department, China*

Objective: Explore the correlation between P300 and LOTCA (Loewenstein Occupational Therapy Cognitive Assessment), by which not only to analyze its clinical significance but also explore further what P300 could represent in the specific cognitive functions. **Method:** Sixty stroke patients were chosen as the case group; simultaneously thirty matched healthy people were chosen as the control group. All subjects took cognitive function tests by auditory evoked potential P300 and LOTCA, from which one could further study on comparison of the correlation. **Results:** Compared with control group, the PL of P200, N200 and P300 from case group were significantly delayed ($p<0.001$); the amplitude of P300 was obviously decreased ($p<0.001$); the total score and the sub-item score of LOTCA were all apparently lower. In case group, the amplitude of P300 has shown a slight positive relation with the total scores of LOTCA ($r=0.311$, $p=0.015$); the PL of P300 has shown an extreme negative relation with the total scores of LOTCA ($r=-0.891$, $p<0.001$) and high to medium negative relation with the sub-item score of LOTCA ($r=0.587-0.846$, $p<0.001$). The multiple regression analysis between the PL of P300 and sub-items score of LOTCA as well as the age has shown the greater impact factor on the PL of LOTCA which could arrange according to priority from thinking operations, motor praxis to spatial perception. Correlation

exists between P300 and LOTCA. The PL of P300, being most affected by thinking operations, has no specificity in reflecting cognitive function. **Implications/Impact on Rehabilitation:** By the combination of P300 and LOTCA, cognitive impairment of stroke patients can be assessed earlier more objectively and more comprehensively.

No. 92**THE IMPACT OF OCCUPATIONAL THERAPY AND THERAPEUTIC EXERCISES ON ADL OF PATIENTS WITH HEMIPLEGIA*****Ji-hong Wang, OT; Wei Chen; Ming Zhang; Qiu-yang Zhang****China*

Objective: To observe the impact that the occupational therapy and Therapeutic exercises on activities of daily living (ADL) of stroke patients. **Method:** 60 patients with stroke were divided into two groups randomly. The group of 30 patients with Therapeutic Exercises, Occupational therapy at the same time a systematic treatment in the control group, only 30 cases of Therapeutic exercises. **Results:** The Group's activities of daily living (ADL) score was significantly higher ($p<0.01$). **Implications/Impact on Rehabilitation:** Occupational therapy is of great significance to improving ADL of stroke patients with hemiplegia and patient quality of life.

No. 93**THE INFLUENCE OF ELECTRIC ACUPUNCTURE OF DIFFERENT WAVEFORM ON THE LOWER LIMB FUNCTION AND WALKING EFFICIENCY OF STROKE PATIENTS*****Li Jianhua, MD; Xu Zhisheng; Chen Wenjun; Zhi Yunnong****China*

Objective: To analyse the influence of Electric acupuncture of different waveform on the lower limb function and walking efficiency of hemiplegic patients. **Method:** 60 stroke patients were randomly divided into group of dilatational wave Electric acupuncture, group of continuous wave Electric acupuncture and group of interrupted continuous wave Electric acupuncture. Each treatment lasted 20 min. Once per day, 5 days per week, 2 weeks per course of treatment, and there were 3 courses of treatment in total. The frequency was 10–15 Hz. The lower limb function and walking efficiency of all patients were evaluated before, 1 month and 3 months after treatment. **Results:** Group of continuous wave Electric acupuncture and group of interrupted continuous wave Electric acupuncture were significantly better than group of dilatational wave Electric acupuncture ($p<0.01$) in walking ability, 10-m maximum walking speed and sports coordination of lower limb, while there were not significant differences among 3 groups ($p>0.01$) in aerobic capacity, physiological cost index and balanced capacity. **Implications/Impact on Rehabilitation:** Compared with group of dilatational wave Electric acupuncture, group of continuous wave Electric acupuncture and group of interrupted continuous wave Electric acupuncture could better improve the lower limb function of stroke patients, but had little effect on improving walking efficiency.

No. 94**EFFECTS OF RECREATIONAL THERAPY ON COGNITIVE FUNCTION AND NEUROLOGIC IMPAIRMENT OF STROKE PATIENTS IN A MIDDLE TERM RUN*****Yunyu Zhu, MM****China*

Objective: To observe the middle term effects of recreational therapy to improve cognitive function and neurologic impairment of stroke patients. **Method:** 60 cases of stroke patients were selected and randomly divided into recreational therapy group (RT group, 30 cases) and control group (30 cases). Cognitive function was assessed with mini-mental status examination (MMSE), and motion function was evaluated with modified Edinburgh Scandinavia stroke scale (MESSS) at 3th month and 6th month, respectively. **Results:** There were no significant differences between two groups on baseline before treatment. The results of MMSE and MESSS improved evidently the 3th month in RT group after treatment. MMSE and MESSS of patients presented the tendency of decline during course of 6 months, while there still was a significant difference between two groups. **Implications/Impact on Rehabilitation:** Recreational therapy can improve the cognitive function and neurologic impairment of stroke patients in a middle term run.

No. 95

FEASIBILITY OF BRIEF ICF CORE SETS FOR CHINESE STROKE PATIENTS IN COMMUNITY-BASED REHABILITATION WITH PNF TECHNIQUE

Guohui Xu, MD

China

Objective: To explore the application and feasibility of brief ICF core sets for Chinese stroke patients in community-based rehabilitation with PNF technique. **Method:** One hundred and forty-six community stroke patients were measured with brief ICF Core Sets for Chinese stroke patients, the NIH Stroke Scale (NIHSS), Barthel Index (BI) and SF-36. Repetition reliability, internal consistency and face validity were analyzed with Kappa test, Cronbach's α index and Pearson correlation analysis respectively. **Results:** The brief ICF Core Sets for Chinese stroke patients had very good repetition reliability ($Kappa=0.782-0.935$) with components of body function, body structure and activity and participation. Its reliability for environment factor were also good with Kappa coefficients (0.578-0.931). The body function, activity and participation and environment factor had good internal consistency ($\alpha=0.774-0.926$). There was concurrent validity existed for the ICF components of body function and activity and participation with BI, NIHSS and SF-36. Correlation coefficient between ICF stroke scales and NIHSS, BI and SF-36 were 0.848, 0.867, 0.798 before rehabilitation intervention, respectively. The brief ICF Core Sets for Chinese stroke patients had also good repetition reliability ($Kappa=0.787-0.965$) with components of body function, body structure and activity and participation after rehabilitation. Its reliability for environment factor were also good with Kappa coefficients (0.608-0.969). The body function, activity and participation and environment factor had good internal consistency ($\alpha=0.786-0.953$). There was concurrent validity existed for the ICF components of body function and activity and participation with BI, NIHSS and SF-36. Correlation coefficient between ICF stroke scales and NIHSS, BI, SF-36 were 0.854, 0.879, 0.832 after rehabilitation intervention respectively. **Implications/Impact on Rehabilitation:** Evidence-based practice showed brief ICF core sets evaluation was clinically feasible for stroke community-based rehabilitation with good reliability and validity in the process of application and promotion for PNF technique.

No. 96

COMPARISON AND ANALYSIS OF COGNITIVE ASSESSMENT IN SUBJECTS WITH STROKE BETWEEN LOTCA AND MMSE

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Objective: Firstly, assess the cognitive function of stroke patients with/without cognitive impairment and healthy people with Loewenstein Occupational Therapy Cognitive Assessment (LOTCA) and Mini-Mental Status Examination (MMSE). Secondly, analyze the characteristic of LOTCA and the correlation between LOTCA and MMSE. In the end, explore the application of LOTCA in Vascular Cognitive Function Impairment (VCI). **Method:** According to diagnostic standard of MMSE, thirty stroke patients with cognitive impairment and thirty stroke patients without significant cognitive impairment were selected as the case group. On the other hand, thirty normal subjects were selected as the control group. All the subjects were assessed with LOTCA and MMSE on condition that the gender, age and education level were all matched. **Results:** For case group, the total score shows a high correlation between LOTCA and MMSE ($r=0.892, p<0.001$). The correlation can also be found between the total score and the score of sub-items ($p<0.01$). For the case group without cognitive impairment, the total score between LOTCA and MMSE shows a lower correlation than that in the case group with cognitive impairment. Lower correlation can also be found between the scores of visuo-motor organization subtest and the total scores of MMSE ($r=0.444, p=0.014$). The score of the case group with cognitive impairment were significantly lower than those in the case group without cognitive impairment and were also significantly lower than those in the control group ($p<0.001$). **Implications/Impact on Rehabilitation:** Correlation was found between LOTCA and MMSE. LOTCA can be earlier and much more comprehensive than MMSE on the cases with vascular cognitive function impairment. So it is suitable to assess vascular cognitive impairment with no dementia of patients.

No. 97

FUNCTIONAL FOVEAL SPLITTING: EVIDENCE FROM NEUROPSYCHOLOGICAL AND MULTIMODAL MRI INVESTIGATIONS IN A CHINESE PATIENT WITH A SPLENIUM LESION

Chunlei Shan, PhD

China

Objective: To verify whether foveal information is double-projected to both hemispheres (bilateral projection theory, BPT) or split at the midline between the two hemispheres (split fovea theory, SFT), which remains controversial and hotly debated in Neuroscience and Psychology. **Method:** We investigated this issue in a unique patient with lesions in the splenium of the corpus callosum and the left medial occipitotemporal region, through a series of neuropsychological tests and multimodal MRI scans (high resolution 3D structural MRI, functional MRI, Diffusion Tensor Tractography). **Results:** Behavioral experiments showed that (1) the patient had difficulties in reading simple and compound Chinese characters when they were presented in the foveal but left to the fixation, (2) he failed to recognize the left component of compound characters when the compound characters were presented in the central foveal field. For instance, he misread 灯 (/deng 1/, lamp) as 打 (/da 3/, beat), and 秩 (/zhi 4/, order) as 铁 (/tie 3/, iron), (3) his judgments of the gender of centrally presented chimeric faces were exclusively based on the left half-face and he was unaware that the faces were chimeric. Functional MRI (fMRI) data showed that Chinese characters, only when presented in the right foveal field but not in the left foveal field, activated a region in the left occipitotemporal sulcus in the mid-fusiform, which is recognized as visual word form area (VWFA). Results of the current study are in coincidence with SFT and cannot be explained by BPT. **Implications/Impact on Rehabilitation:** The results have significance for understanding neural mechanism of word reading and for applying a mechanism-based rehabilitative treatment for reading disorders such as alexia. It is also helpful for broadening thinking in the rehabilitation of other neuropsychological deficits.

No. 98

EFFECTIVENESS OF FAMILY REHABILITATION FOR CHRONIC STROKE UNDER THE CURRENT CHINESE MEDICAL SYSTEM: A RANDOMIZED CONTROLLED TRIAL**Tiebin Yan, MD, PhD; Shuiheng Zhu, MD; Xiaofeng Jiang, MD; Meifeng Ye, MD**

China

Objective: To investigate the effectiveness of family rehabilitation for chronic stroke at a city community in Guangzhou under the current Chinese medical insurance system. *Method:* Sixty patients with chronic stroke were recruited within a community of Yuexiu District, Guangzhou, China between July 2006 and December 2008. They were 55–77 years old, 27 male and 32 female, 43 with ischemia and 16 hemorrhage between 3 months and 12 months post-stroke. Twenty-three were left hemiplegia and 36 right hemiplegia. They were all covered by the current Chinese medical insurance system. Patients were randomized by a computer program into 2 groups: family rehabilitation and family control. Patients in the rehabilitation group received family training based on the neurodevelopment approach, motor relearning program, activities of daily living and acupuncture, carried out by community doctors and therapists. Treatment lasted for 1 h daily, 5 days weekly for 8 weeks. Patients in the control group received general instruction of rehabilitation without specific training and acupuncture. Outcome measurements included composite spasticity scale (CSS), Fugle-Meyer movement assessment (FMA), Berg balance scale (BBS), Holden functional ambulation scale (FAS) and modified Barthel Index (MBI). They were evaluated at 1 m, 2 m during the treatment and 3 m post finishing treatment. *Results:* One case in the control group was dropped out due to re-admit to hospital. No significant differences were found in the scores of all measurement between two groups before treatment ($p > 0.05$). However, the scores of CSS, FMA, MAS, BBS, FAC, MBI were significantly improved in the rehabilitation group at 1 m and 2 m during treatment as well as 3 months after finishing treatment when they were compared with the control group. *Implications/Impact on Rehabilitation:* Family rehabilitation for chronic stroke is effective in significantly improving motor function and ADL as well under the current Chinese medical insurance system.

No. 99

THE EFFECT OF REHABILITATION COMBINED WITH QI-SUPPLEMENTING TREATMENT ON THE DEGREE OF FATIGUE OF PATIENTS WITH POST STROKE FATIGUE**Hongxia Chen; Guo Youhua; Xie Renming; Wangzhifei**

China

Objective: To study the clinical effect of Qi-supplementing treatment combined with Rehabilitation on the degree of fatigue of patients with Post Stroke Fatigue. *Method:* 90 patients with Qi deficiency ischemic stroke were randomly divided into 3 groups. Each group has 30 patients. The treatment group was treated with oral decoction of Qi-supplementing Chinese medicine and rehabilitation. The western medicine control group was treated with Chinese medicine placebo, western medicine and rehabilitation. The blank control group was treated with Chinese medicine placebo and rehabilitation. All groups were evaluated with SS-QOL and FSS before and 4 weeks after treatment. *Results:* After treatment, the assessment score of SS-QOL and FSS were significantly improved than those of before treatment, especially in the treatment group. There was significant difference before and after treatment ($p < 0.001$). After 4 weeks treatment, there was significant difference between the treatment group and western medicine control group, the treatment group and blank control group in the assessment score of the two scales ($p < 0.001$). There also was significant difference between western medicine control group and blank control group in the assessment score of SS-QOL ($p < 0.005$).

While there was no significant difference between western medicine control group and blank control group in the assessment score of FSS ($p > 0.05$). *Implications/Impact on Rehabilitation:* Post stroke fatigue (PoSF) is a common symptom of stroke PoSF, defined as a feeling of early exhaustion developing during mental activity, with weariness, lack of energy and aversion to effort, and Independent of depression. The incidence of PoSF is 39%–72%. 40% patients with PoSF thought that fatigue is one of the most serious symptoms and main suffering of stroke and it can cause serious consequence. Recent studies showed that PoSF is associated with the extent of its recovery of limb function, ADL level and reduce of quality of life, and may be associated with high mortality. Those patients without depression and cognitive impairment who had good recovery of limb function may not return to work because of severe fatigue. In addition, the functional impairment and fatigue can be interacted each other, and in a vicious circle, which seriously affect the rehabilitation of stroke patients. Our study suggested that PoSF mostly exist in patients with Chinese Qi Deficiency Syndrome. Therefore, we treated PoSF with Qi-supplementing treatment combined with rehabilitation, and achieved a certain effect. The three treatments had good effect on improving the degree of fatigue of patients with Qi deficiency ischemic stroke. The method of Qi-supplementing combined with rehabilitation was the best, and then the western medicine combined with rehabilitation.

No. 100

EFFECTS OF FUNCTIONAL ELECTRICAL STIMULATION ON NEURAL FUNCTION RECOVERY AND EXPRESSION OF NESTIN AROUND CEREBRAL INFRACTED AREA OF RATS WITH ACUTE STROKE**Xiuyuan Zheng, MD; Zheng Xiu-yuan; Li Sheng-huo; Yan Tie-bin; Liu Hui-hua; Xiang Yun; Zhuang Zhi-qiang; Jin Dong-mei; Peng Yuan**

China

Objective: To study the effects of functional electric stimulation (FES) on neural function recovery and expression of nestin around cerebral infarct area of rats with acute stroke. *Method:* The model of middle cerebral artery occlusion (MCAO) of male adult SD rats was established with the method of modified intraluminal filament occlusion. Sixty successfully established model rats were randomly allocated into FES group, placebo group and control group (20/group). Three days after MCAO's surgery, rats in FES group were treated with FES device while the ones in placebo stimulation group were treated with the same FES device but without electrical output. Rats in control group had no treatment. All groups were randomly assigned into 4 subgroups according to treatment time: 1 d, 3 d, 7 d and 14 d (5/subgroup). The modified neurological severity score (mNSS) was adopted to evaluate neural function recovery before and after treatment in 4 time points as mentioned above. Meanwhile, the nestin expression in various time points was detected by immunohistochemistry stain in distant area of ipsilateral cortex of infarction. *Results:* The mNSS scores in FES group is lower than that in placebo simulation group and control group at the 7th d and 14th d ($p < 0.05$); The expression of nestin-positive cells in distant area of ipsilateral cortex of infarction of rats in FES group is higher than that in placebo stimulation group and control group ($p < 0.05$). *Implications/Impact on Rehabilitation:* FES may improve the recovery of neural function in the earlier stage of cerebral infarction. FES treatment could improve the expression of nestin around cerebral infarct area and it could be one of the mechanisms of FES's effect.

No. 101

THE EFFECT OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION COMBINED WITH BODY-WEIGHT-SUPPORTED TREADMILL TRAINING IN PATIENTS WITH CHRONIC INCOMPLETE SPINAL CORD INJURY

Yanping Xiang, MD

China

Objective: This study aimed to investigate the effect of repetitive transcranial magnetic stimulation (rTMS) combined with Body-Weight-Supported Treadmill Training (BWSTT) in patients with incomplete spinal cord injury (iSCI). **Method:** 4 chronic (at least 1 year post-injury) iSCI patients (four male) participated in this study. Participants were first treated with rTMS (1,000 10Hz stimuli at 90% of resting motor threshold in 20 trains of 5s separated by 10s) over the lower limbs motor cortex and then trained with BWSTT. The intervention was daily performed during 5 consecutive days in 1 week, lasting for 1 month. Patients were assessed with clinical and functional measures including ASIA motor score, ASIA pin prick score and light touch score, 10 m walking time (10MWT), sense of effort, Functional Ambulation Category (FAC), Modified Ashworth Scale (MAS) and ADL before treatment, 1 day and 3 weeks after treatment. Two out of four patients were assessed with electrophysiological measures (Hmax, H latency and Hmax/Mmax) before and after the treatment. **Results:** In two out of four patients, ASIA clinical measures of motor/sensory function and 10MWT improved, as well as sense of effort. These improvements lasted for at least 3 weeks after the intervention. But FAC, MAS, ADL were not significantly changed. No significant differences were found in another two patients. In electrophysiological measures, only one patient's Hmax and H/M amplitude ratio decreased while H wave latency and duration remained unchanged. The other one had no change. **Implications/Impact on Rehabilitation:** In this preliminary trial, It has been shown that High-frequency rTMS combined with BWSTT may improve the clinical and functional outcomes and alter excitability of spinal motoneurons in chronic incompleting SCI patients. These results justify testing the efficacy of this technique with larger groups of subjects with neurological impairments.

No. 102

THE COMBINATION OF SWALLOWING TRAINING AND ACUPUNCTURE: AN EFFECTIVE REHABILITATION METHOD FOR POST-STROKE DYSPHAGIA

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Objective: To assess the effect of swallowing training combined with acupuncture on the swallowing function of patients with post-stroke dysphagia. **Design:** A randomized single-blind controlled design. **Patients:** A total of 120 people with post-stroke dysphagia. **Method:** Participants were randomly divided into two groups. The subjects in the experimental group were given swallowing training and acupuncture treatment, while those in the control group received swallowing training alone. The Standardized Swallowing Assessment (SSA), Videofluoroscopic Swallowing Study (VFSS), Modified Barthel Index (MBI) and Swallowing-Related Quality of Life (SWAL-QOL) were used to assess the swallowing function and quality of life of patients in the two groups. **Results:** Compared with the values before treatment, the SSA, VFSS, MBI and SWAL-QOL scores at the fourth week post-treatment were significantly changed in both groups. The VFSS, MBI and SWAL-QOL scores of patients in the experimental group were significantly higher and the SSA scores were significantly lower than those in the control group. The SSA score was negatively correlated with the VFSS, MBI and SWAL-QOL scores. **Implications/Impact on Rehabilitation:** Swallowing training combined with acupuncture provided better rehabilitation treatment for patients with swallowing disorders after stroke than conventional swallowing training alone.

No. 103

THE REHABILITATING EFFICACY OF BOTH PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF) AND RESISTIVE THERAPY IN STROKE

Zhuowei Yu; Jiejiao Zheng, MD; Guohui Xu; Yueying Xu; Zhou Xu; Wen Xia; Yong Li; Haitao Shi

China

Objective: To study the efficacy of both proprioceptive neuromuscular facilitation (PNF) and resistive therapy in stroke in the activities of daily living, psychoanxiety, cognition, balance, exercise and functional independence measure. **Method:** 302 cases with stroke were randomly divided into control, rehabilitation and PNF group. Control group without rehabilitation, rehabilitation group with routine rehabilitation therapy and PNF group intervened by both PNF and resistive therapy after the routine rehabilitation therapy. **Results:** Preliminary and final evaluation were in pretreatment and posttreatment of 90 days respectively. Compare with the preliminary, the final evaluation was significant difference in rehabilitation and PNF group in the activities of daily living, psychoanxiety, cognition, balance, exercise and functional independence measure ($p < 0.05$). Compare with control group, the final evaluation was significant difference in rehabilitation and PNF group ($p < 0.05$, $p < 0.01$). Compare with rehabilitation group, the final evaluation was significant difference in PNF group ($p < 0.05$). **Implications/Impact on Rehabilitation:** Comprehensive rehabilitation of both PNF and resistive therapy improve the functions in the exercise, sensory perception and mental function, which is beneficial to rehabilitation of stroke.

No. 104

THE ROLE OF TREADMILL EXERCISE IN THE TREATMENT OF NEURAL STEM CELLS TRANSPLANTATION IN RATS OF ISCHEMIC STROKE

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Objective: To study the influence of treadmill training after neural stem cells transplantation on the neural function and cerebral ultrastructure of rats with focal cerebral ischemia. **Method:** Select middle cerebral artery ischemia / reperfusion Sprague-Dawley rats as subjects. The subjects are divided into control and treatment (including: treadmill training, neural stem cells transplantation, neural stem cells transplantation combined with treadmill training) groups, each with 6 or 10 animals. Five days after operation, neural stem cells marked with SPIO (superparamagnetic iron oxide) were transplanted into ischemic striatum and electric treadmill training begun 6 days after operation. For all groups during four weeks of training, assessment of motor function are conducted regularly. Four weeks after training, rats were sacrificed and SPIO marked neural stem cells were observed in terms of survival and movement. Host ultrastructural changes are also observed. **Results:** Compared with the control group, there is a of significant difference in both treadmill training group and combined group ($p < 0.05$, $p < 0.01$) concerned with mNSS 14 days after the training while the mNSS of neural stem cells transplantation group is not of significant difference ($p < 0.05$). The SPIO marked neural stem cells in the combined group had a greater density and spread more extensively and their cerebral ultrastructure are better than other groups. **Implications/Impact on Rehabilitation:** Treadmill training combined with neural stem cell transplantation is of potential benefit in the treatment of rats with cerebral infarction, but the mechanism underlying this effect need to be studied further. (This study was supported by the Development Program of China (863 program, No. 2007AA02Z482).)

No. 105

AN ANALYSIS ABOUT THE COMMUNITY-BASED REHABILITATION THERAPY ON COMPREHENSIVE FUNCTION FOR STROKE PATIENTS

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Objective: To evaluate the community-based rehabilitation therapy on comprehensive function for stroke patients in Shanghai area.

Method: A prospective, single-blind, randomized, controlled, multicenter design was used. 737 stroke patients in communities were chosen randomly in every center. The communities of rehabilitation and control groups were chosen randomly in 737 stroke patients. The rehabilitation group received an additional standardized community-based intervention including rehabilitation therapy and prevention at home. The intervention was applied for 5 months. We had a program which was suitable to Chinese condition. The patients should do functional exercise at least 3 times per week, and 45 min per time. Functional Comprehensive Assessment (FCA) was used to evaluate for functional comprehensive function before intervention, at the end of 2 and 5 months respectively. The score is between 13 to 108. If the score is higher, the comprehensive function is higher. The scores include two parts. Each part includes some items. There are totally 18 items: (1) Motor function: (a) self-care: eating, dressing, grooming, bathing, toileting; (b) sphincter control; (c) transfer; (d) locomotion; (2) Cognitive function: (a) interaction: comprehension of seeing and hearing, language expression; (b) social cognitive: the ability of solving problem, memory, social communication.

Results: The comprehensive function scores between rehabilitation and control group had no significant difference at the time when was entered the trial. After 5 months, the comprehensive function scores of rehabilitation group and control group improved 17.25 and 5.21 separately. There was statistical difference between rehabilitation group and control group ($p < 0.01$). The patients in rehabilitation group got better improvement of comprehensive function, especially motor function.

Implications/Impact on Rehabilitation: Standardized community-based rehabilitation therapy during 5 months is an effective program to improve the comprehensive function, especially motor function for stroke patients in the community.

This study was supported by national 10th Five-Year Project follow-up Research “The Research of Tertiary Rehabilitation Program of Acute Cerebral vascular Disease” (No. 2004BA703B09-01)

No. 106

A PILOT STUDY OF BILATERAL UPPER LIMB TRAINING IN SUBACUTE STROKE PATIENTS WITH MODERATE TO SEVERE AFFECTED UPPER LIMB

Hu Xiquan, MD, PhD; Zheng Yadan; Kang Zhuang
China

Objective: To evaluate the effect of bilateral training on upper limb motor function in subacute stroke patients with moderate to severe affected upper limb. **Method:** A single-blind, randomized clinical trial was conducted with 27 subjects with moderate to severe affected upper limb at 1 to 3 months poststroke onset. Subjects were randomized to an experimental group ($n = 13$) and a control group ($n = 14$). The experimental group received an upper limb therapy program (60 min sessions) based on repetition of symmetrical bilateral tasks. The control group received usual upper limb therapy,

mainly unilateral tasks, of a similar duration and frequency to the experimental treatment. Both groups finished 20 sessions on weekday over 4 weeks. Upper-limb outcomes were blindly assessed by Fugl-Meyer Assessment of Upper Extremity (FMA-UE, 0-66), Motor Assessment Scale of Upper Extremity (MAS-UE, 0-18) and Modified Barthel Index (MBI, 0-100) at the beginning and end of treatment. **Results:** As expected, both groups demonstrated significant improvements in all impairment and activity measures after training. The experimental group showed significantly greater gains on the FMA-UE ($p < 0.05$) than the control group. No significant differences between the two groups on MAS-UE ($p > 0.05$) and MBI ($p > 0.05$). **Implications/Impact on Rehabilitation:** These preliminary findings suggest that bilateral training may be more advantageous on upper limb motor control of stroke subjects than usual therapy. Bilateral upper limb training could be an effective method for upper limb rehabilitation of subacute stroke patient with moderate to severe affected upper limb.

No. 107

EFFECT OF REHABILITATION WITH THE THERAPY OF THE INTEGRATED TRADITIONAL AND WESTERN MEDICINE ON RECOVERING STROKE PATIENTS

Gu Bo-lin, MD

China

Objective: To explore the effect of the rehabilitation with the therapy of the integrated Traditional and Western medicine on motor function in patients with stroke. **Method:** 57 patients with ischemic or hemorrhagic stroke at the recovery stage were divided into two groups (group A and group B). They were given the routine medical treatment and rehabilitation. The patients in group A were given rehabilitation of the integrated traditional and western medicine, while the patients in the group B were given rehabilitation of western medicine like the PT/OT therapy. They were evaluated with Fugl Meyer Assessment (FMA) and the NIHSS at the beginning and the end of the treatment. **Results:** After the treatments, the scores of FMA and NIHSS improved obviously in both groups. The scores of FMA and NIHSS of the group A improved more than that of the group B after the treatments. **Implications/Impact on Rehabilitation:** Both the rehabilitation of the integrated Traditional and Western medicine can significantly improve the function of stroke patients during the convalescent stage and the rehabilitation of integrated Traditional and Western medicine is more effective.

No. 108

THE EFFICACY OF THE EARLY COMPREHENSIVE REHABILITATION ON THE ELDERLY PATIENTS WITH ACUTE FACIAL NEURITIS AND STRENGTH/DURATION (S/D) CURVE MEASUREMENT

Guohui Xu, MD; Zheng Jiejiao; Yong Li; Wen Xia

China

Objective: To explore the efficacy of the early stage rehabilitation on acute facial neuritis and to study the change of Strength/Duration (S/D) curve measurement. **Method:** The comprehensive physical therapy were taken for 32 acute patients with facial neuritis. Sunnybrook facial scales and S/D measurement curve (rheobase and chronaxie) were conducted immediately, after 1 week, 2 weeks, 3 week and 4 weeks respectively. **Results:** After the 4 weeks of comprehensive rehabilitation therapy, Sunnybrook facial scales increased with statistical significance ($p < 0.01$). The value of rheobase increased while chronaxie declined in the length of 4 weeks on the whole. There were different electric reactivity among three muscle groups with the rheobase and chronaxie value of the orbicularis oris surpassing that of the orbicularis oculi, and the later surpassing the

frontalis. There was closed correlation between Sunnybrook facial scale and chronaxie ($p < 0.05$), but it was weak for rheobase. *Implications/Impact on Rehabilitation:* The efficacy of the early stage rehabilitation on the elders with facial neuritis was obvious and the outcome of clinical symptom progress was distinct especially after 2 weeks. Chronaxie was one of useful assessment method for the elders with facial neuritis after 1 week.

No. 109

OBSERVATION OF CORTICAL ELECTRICAL ACTIVATION IN SWALLOWING APRAXIA WITH EEG NONLINEAR DYNAMICS ANALYSIS

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China

Objective: To investigate the changes of cortical electrical activation in the patient with swallowing apraxia with EEG nonlinear dynamics analysis. *Method:* One subject with swallowing apraxia caused by left hemisphere infarction was involved in the study. EEG was recorded under three conditions: eyes closed, reflexive swallowing and volitional swallowing. EEG nonlinear indice approximate entropy (ApEn) was calculated. The EEG of 6 healthy subjects was recorded in 3 different conditions as control. *Results:* Compared with eyes-closed condition, the ApEns of the control group increased in C3, C4, P3, P4 and T6 for reflexive swallowing task, and additional F4 and T5 for volitional swallowing task. ApEns of the control group in F4 and T6 for volitional swallowing task was higher than those for reflexive swallowing task. ApEns of the swallowing-apraxia patient for reflexive swallowing increased in C3 and P3 and decreased in T6, yet ApEns for volitional swallowing did not change but decreased in T6. ApEns of the patient in C3, P3 and T5 for volitional swallowing task were lower than those for reflexive swallowing task. *Implications/Impact on Rehabilitation:* Corresponding with the clinical characteristic of swallowing apraxia, the excitability of cortex in the patient with swallowing apraxia did not increase but decreased on the left central, parietal and inferior temporal. The changes of cortical electrical activations in two hemispheres correlated with swallowing tasks could be observed with EEG nonlinear dynamics analysis.

No. 110

THE EFFECT OF REHABILITATION COMBINED WITH QI-SUPPLEMENTING TREATMENT ON THE DEGREE OF FATIGUE OF PATIENTS WITH POST STROKE FATIGUE

Chen Hongxia; Guo Youhua; Xie Rrenming; Wang Zhifei
China

Objective: To study the clinical effect of Qi-supplementing treatment combined with rehabilitation on the degree of fatigue of patients with Post Stroke Fatigue. *Method:* Ninety patients with Qi deficiency ischemic stroke were randomly divided into 3 groups. Each group has 30 patients. The treatment group was treated with oral decoction of Qi-supplementing Chinese medicine and rehabilitation. The western medicine control group was treated with Chinese medicine placebo, western medicine and rehabilitation. The blank control group was treated with Chinese medicine placebo and rehabilitation. All groups were evaluated with SS-QOL and FSS before and 4 weeks after treatment. *Results:* After treatment, the assessment score of SS-QOL and FSS were significantly improved than those of before treatment, especially in the treatment group. There was significant difference before and after treatment ($p < 0.001$). After 4 weeks treatment, There was significant difference between the treatment group and western medicine control group, the treatment group and blank control group in the assessment score of the two scales ($p < 0.001$). There also was significant difference between western medicine control group and blank control group

in the assessment score of SS-QOL ($p < 0.005$). While there was no significant difference between western medicine control group and blank control group in the assessment score of FSS ($p > 0.05$). *Implications/Impact on Rehabilitation:* Post stroke fatigue (PoSF) is a common symptom of stroke PoSF, defined as a feeling of early exhaustion developing during mental activity, with weariness, lack of energy and aversion to effort, and Independent of depression. The incidence of PoSF is 39%–72%. 40% patients with PoSF thought that fatigue is one of the most serious symptoms and main suffering of stroke and it can cause serious consequence. Recent studies showed that PoSF is associated with the extent of its recovery of limb function, ADL level and reduce of quality of life, and may be associated with high mortality. Those patients without depression and cognitive impairment who had good recovery of limb function may not return to work because of severe fatigue. In addition, the functional impairment and fatigue can be interacted with each other, and in a vicious circle, which seriously affect the rehabilitation of stroke patients. Our study suggested that PoSF mostly exist in patients with Chinese Qi Deficiency Syndrome. Therefore, we treated PoSF with Qi-supplementing treatment combined with rehabilitation, and achieved a certain effect. The three treatments had good effect on improving the degree of fatigue of patients with Qi deficiency ischemic stroke. The method of Qi-supplementing combined with rehabilitation was the best, and then the western medicine combined with rehabilitation.

No. 111

EFFECT OF A POOL-HYDROTHERAPY SESSION IN SPASTIC PATIENTS

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Colombia

Objective: To describe the effect of a pool-hydrotherapy session in the muscular tone of spastic patients. *Method:* All the spastic patients who assist at the hydrotherapy service of the Clinica Universitaria Teletón (CUT) to a pool-hydrotherapy session, during a work-week were evaluated with the Modified Ashworth Scale (MAS) before and after the session. *Results:* 20/56 patients who assisted to the hydrotherapy service had spasticity; all of them had a pool-hydrotherapy session; 6 women and 14 men, with an age and the average time of disease evolution between 3–65 years and 36.6 months respectively for women, 4–69 years and 44.6 months for men. The etiology of the spasticity in these patients was encephalopathy 6/20, spinal cord injury (SCI) 5/20, stroke 7/20, multiple sclerosis (MS) 1/20 and traumatic brain injury (TBI) 1/20. After the pool-therapy session 13/20 patients had 1 point less in MAS after the intervention (3 patients with encephalopathy, 4 with stroke, 5 with SCI and 1 with MS), the rest of patients (7/20) had a MAS without changes. *Implications/Impact on Rehabilitation:* The hydrotherapy is a safe well tolerated technique to treat spasticity, that is seen in the literature were the reports show good response in treatment of spasticity. In our country, Colombia, are not studies of treatment of spasticity with hydrotherapy. Therefore, with the results we found, and that we have the resources to do so, because in our clinic we have the devices; the pool-hydrotherapy become an alternative and adjuvant option to treat spasticity of different etiologies; and the first step for future investigations in our population.

No. 112

HUMAN MACHINE INTERFACE (HMI) FOR MONITORING AND BIOFEEDBACK OF A KNEE EXOSKELETON FOR REHABILITATION

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Colombia

Objective: Design and implement the HMI of a knee exoskeleton for rehabilitation. **Method:** The HMI allows the exoskeleton and patient interaction through biofeedback and monitoring biomechanical and biological variables. It also allows the configuration of the device in a technical and application level. This work is part of the research project “Design and making of an exoskeleton for assisted rehabilitation in patients with knee injuries,” developed at the Universidad del Valle. An interdisciplinary work was made to identify the technical support needs in rehabilitation taking into account the epidemiology, the flaws during the process, and technical possibilities. The variables to be measured were established: the use of the angle, force and electromyographic sensors. The HMI includes: 1) software tool; 2) database of the patient data; 3) communication for programming the exoskeleton (TCP) and capturing the sensing variables (UDP); 4) auditive and visual biofeedback. **Results:** Implementation of the software tool in JAVA consisted of three modules: 1) collecting the patient data; 2) exoskeleton configuration and programming; 3) monitoring and biofeedback. The use of the HMI is adaptable and can be operated by the rehabilitation staff and the patient. **Implications/Impact on Rehabilitation:** The HMI is a contribution to the measurement procedures, evaluation and patient tracking. It also improves the practice, gives options of biofeedback during the execution and contributes to the adjustment of the motor tasks proposed in the rehabilitation process. The knowledge developed by this interdisciplinary work contributes to future projects in the aids of technical support to the impairment. The next applications may be focused on the recognition of the user intentionality, to provide better patient adaptability.

No. 113

EXOSKELETON FOR ASSISTED REHABILITATION OF PATIENTS WITH KNEE INJURIES

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Colombia

Objective: Design and make an exoskeleton to improve the performance of the knee joint in patients with partial or complete loss of movement. **Method:** Steps for design and construction: 1) Development of the state of the art in design and construction of exoskeletons used in rehabilitation. 2) Interdisciplinary work to identify the technical support needs in rehabilitation taking into account the epidemiology, the flaws during the process, and technical possibilities. 3) Design of a virtual prototype of the exoskeleton combining mechanical, electrical and electronic design with systems controller design based on the system requirements. 4) Integration and construction of the exoskeleton. 5) Technical validation of the prototype. 6) Proposals of clinical validation. 7) Results publication and a proposal of a research project to design and build a complete exoskeleton legs. **Results:** State of the art. Design and construction of the exoskeleton (mechanical structure, electronic instrumentation). Mathematical model for static and dynamic analysis of the exoskeleton. User interface to monitoring the knee angle, torque, speed, power and electromyographic signals. Protocols for clinical validation. Research proposed presented and developed with Colciencias “Exoskeleton for assisted rehabilitation of patients with partial or complete loss of movement of the lower limbs. Phase 1: balance”. Publications, presentations and training of students and researchers. **Implications/Impact on Rehabilitation:** With this interdisciplinary project of the mechanical, electrical, electronics, biomechanics, physical medicine and physiotherapy areas, a technological solution in the field of human rehabilitation has been obtained, facilitating the rehabilitation processes and improving their performance. Con-

solidation of the research groups on control of biological systems and rehabilitation, from engineering and health faculties of the Universidad del Valle. In the academic field the project aids on the consolidation of the physical therapy and electrical engineering undergraduate academic programs from the Universidad del Valle, providing them with technological and scientific infrastructure in the biotechnology area.

No. 114

NEUROANATOMY OF SPATIAL MIS-ORIENTATION IN RIGHT HEMISPHERE STROKE

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France

Objective: Hemispheric strokes frequently bias representations of the vertical and body axis. These disorders are amplified in case of spatial neglect and are characterized by a contralesional tilt of the subjective vertical (SV) and an ipsilesional bias of the body midline (subjective straight ahead, SSA). The aim of this study was to evaluate the neuroanatomical correlates of these pathological representations. **Method:** The analysis focused on right hemisphere lesions of 22 neglect and 21 non-neglect patients (using MRIcro), and relationship with performance in experimental tasks (SV and SSA), neuropsychological tests (cancellation, line bisection) and balance assessment (PASS). A statistical method based on regression analysis was used to highlight areas of brain lesions which best explained biases and errors in these tasks (Matlab-based VLSM code; $p < 0.01$). **Results:** Performances in the different tests were significantly different between groups. The posterior parietal cortex was more specific of the estimation of the subjective vertical (Brodmann area 40, xyz 60–46 38), while the representation of body orientation was more anterior (Brodmann area 40; xyz 41–33 37). Poor performance in cancellation task correlated with the right frontal area, and in line bisection with a region centred on the parietal cortex. Imbalance was preferentially associated with subcortical lesions, especially in the thalamic area. **Implications/Impact on Rehabilitation:** This study confirmed the current data from the literature on the involvement of specific regions in the manifestation of various components of spatial neglect. For the first time, a cortical dissociation was demonstrated for the two main biases of spatial representations (SV, SSA). This may reflect the specific involvement of these regions in spatial information processing.

No. 115

CONSTRUCTION AND VALIDATION OF A FUNCTIONAL SCALE FOR THE UPPER LIMB: UL-ADL

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France

Objective: The functionality of the upper limb of hemiplegic patients can be estimated either using scales assessing abilities in testing conditions or using scales assessing daily use through active and distal abilities, i.e. object manipulation. A new scale (upper limb assessment in daily living, UL-ADL) was developed to explore daily use capacities so as functionality in testing conditions. **Method:** The 17-item UL-ADL scale follows a proximal-distal progression and includes passive and active functions. Each item corresponds to a specific activity of daily life. In a first step (Q) functionality is assessed by questionnaire. In a second step (T) the patient performs the activities previously assessed by questionnaire. Each item is quoted between 0 (cannot perform) and 100 (perform with no difficulty). Internal consistency was assessed with the Cronbach’s alpha coefficient. Intra-rater and inter-rater

reliabilities were assessed with the intraclass correlation coefficient (ICC) and the Bland and Altman method. UL-ADL was also compared to the arm movement of the Rivermead Motor Assessment scale (RMA). *Results:* Overall, 49 stroke patients were rated over 7 days by 21 physicians leading to 142 ratings. Total time of UL-ADL was 16 ± 8 min compared to 9 ± 5 min for RMA. The Cronbach alpha was 0.95 and 0.97 for Q and T respectively. Global UL-ADL scores were slightly higher at s rating, especially Q score. Intra-rater ICC was 0.65 (95% CI [0.44–0.79]) and 0.97 [0.95–0.98] for the Q and T steps, respectively. Inter-rater ICC was of 0.95 for the Q and T steps. Bland and Altman method showed good intra- and inter-rater reliabilities with no systematic trend. Correlation with RMA was > 0.80 with Q and with T. *Implications/Impact on Rehabilitation:* The UL-ADL has fair metrological properties and seems suitable for patients with all levels of upper limb impairment.

No. 116

ASYMMETRIC STANDING POSTURE AFTER STROKE IS RELATED TO A BIASED EGOCENTRIC COORDINATE SYSTEM

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France

Objective: Weakness and somatosensory deficits have long been known to be involved in the postural instability of subjects with stroke. Recently, it has been shown that impaired representations of the orientation of the longitudinal axis of the body (LBA, egocentric reference) and of verticality (allocentric reference) may also play a role. The objective of the present study was to determine whether these two references were independently linked to postural asymmetry in standing stroke patients. *Method:* Twenty-two subjects were tested after a first hemispheric stroke (13 ± 7.5 weeks). The LBA perception was investigated in the supine position by adjusting the orientation of a luminous rod in the frontal plane to correspond to the subjective LBA. The subjective visual vertical (SVV) was assessed by adjusting the orientation of a luminous line in the frontal plane to correspond to the SVV in upright patients. Weight distribution was measured in the standing position for about 2 min and 45 s by two separate force platforms under the feet. *Results:* LBA and SVV were strongly associated ($r=0.7$; $p=0.001$). The estimate of the LBA was a better predictor ($r=0.52$; $p=0.02$) of weight bearing asymmetry than was SVV ($r=0.41$; $p=0.074$) when adjusted for motor weakness and hypoesthesia. *Implications/Impact on Rehabilitation:* Conclusion: Contralateral rotation of the longitudinal axis of the body could lead to unequal distribution of loading on the feet. This novel interpretation of weight bearing asymmetry underlines the complexity of control of the erect stance following stroke and brings new perspectives for rehabilitation programs.

No. 117

SENSORY REWEIGHTING FOR BALANCE CONTROL EARLY AFTER STROKE

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Objective: Balance control is a major challenge for patient after stroke. Rehabilitation programme should be adapted to the real ability of the patient to use the different sensorial inputs. Continuous re-weighting of sensory information from the visual, vestibular, and somatosensory systems is required for a flexible,

context dependent control of upright stance. Given, the variety of perceptive styles in Humans and the heterogeneity of the CNS lesions following stroke, large inter-individual differences should be observed in the way stroke patients re-weight sensory information and control their posture. *Method:* Methods: Subjects with a first, unique and recent hemispheric stroke ($n=20$, age = 51.4 ± 10.5 , 13 men, 7 women, right lesion = 11, left lesion = 9) and control subjects (age = 43.8 ± 16.5 , 12 men, 8 women) were studied. Postural control while standing at rest was probed with tendon vibration, optokinetic and vestibular galvanic stimulation, both in the sagittal and frontal planes. Patients were investigated when admitted in our PRM department for the first rehabilitation programme, mean 25 days after stroke, using a force platform (Technoconcept®) and two miniature inertial sensors (Xsens sensors MTx®) placed on the head and the trunk. Analysis was conducted from composite scores for each sensory stimulation. *Results:* Results: Both control and stroke patients showed large inter-individual variations in response to the three types of sensory stimulation. All of the patients were disturbed by at least one of the stimulations. As previously described, they were excessively reliant on visual information, but they were also far more sensitive to vestibular and proprioceptive stimulations. The main result is that there are specific sensory profiles for each subject, controls as patients. *Implications/Impact on Rehabilitation:* These results suggest that a systematic quantitative assessment of the specific sensory responses of each stroke patient could be useful to define an adequate balance rehabilitation protocol.

No. 118

HOW TO RECALIBRATE THE SENSE OF VERTICALITY IN REHABILITATION

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France

Objective: Aubert effect is a tilt of visual vertical (VV) towards the body during lateral body tilt. Interpretation refers to internal model of verticality, with greater reweighting of somesthetic graviception upon vestibular graviception. The neural basis for this synthesis of somesthetic and vestibular graviception remains to be investigated. This was the first objective of this study. Testing the possibility to recalibrate a biased verticality perception after stroke was the second objective. *Method:* Fourteen paraplegic subjects (T4-T12 ASIA A), 23 hemispheric subjects (unique hemisphere stroke) and 39 control subjects were studied. VV was assessed in upright sitting position and in laterally-tilted postures (50° for paraplegics subjects, 30° for hemiplegic subjects). In hemiplegics hypoesthesia was quantified and cerebral lesion location analysed using modern imagery technics (MRIcro software). *Results:* Upright, VV was accurate, but more variable in paraplegics. This indicates that the somesthetic graviception contributes to the sense of verticality, even in upright position. As expected, a spontaneous contralesional VV tilt ($-4.7^\circ \pm 4.7$; $p < 0.001$) was found in hemiplegics. Lateral tilts induced Aubert effect in controls (average = 5°), whereas it was abolished in paraplegics. This means there is a modulation of VV by somesthetic informations. In hemiplegics, Aubert effect was decreased during contralesional tilt, proportionally to hypoesthesia degree ($r = -0.55$; $p < 0.01$). This gradient proves the existence of a synthesis of vestibular and somesthetic graviceptions. Anatomical analysis showed that this synthesis was made in the posterolateral thalamus ($p = 0.003$). Interestingly, ipsilesional tilt in hemiplegics corrected VV ($-4.7^\circ \pm 4.7$ vs $1.1^\circ \pm 4.5$; $p < 0.01$). *Implications/Impact on Rehabilitation:* Aubert effect is a synthesis of vestibular and somesthetic graviceptions, and posterolateral thalamus plays a major role in this synthesis. The Aubert effect could be useful in clinical practice to recalibrate biased verticality perception in stroke patients. Persistence of this improvement and positive effects on balance need further investigations.

No. 119

STUDY OF VIRTUAL HAND PERCEPTION IN FMRI

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France

Objective: To study in a population of healthy volunteers brain activation induced by the observation of a hand in movement which is virtual or real. **Method:** 11 healthy subjects (mean age=27 years) have been included in this work. During fMRI acquisition, subjects observed through LCD glasses the movements of the wrist realized or by real hands (RH) or by virtual hands (VH). Tasks of observation of cross (+), of static hands (SH) or realization of a movement of wrist extension (EXE) were used as controls tasks. Every run of acquisition of the BOLD contrasts alternated in a random way every 30°. Total sequence lasted 4 mn. 2 runs were realized for every subject. The images obtained in fMRI were analyzed with the SPM 5 software. **Results:** The observation of a virtual hand in movement by comparison to the observation of a cross (VH - +) is responsible for a bilateral activation of the visual areas, of the dorsal and ventral premotor cortex (PMd, PMv), of the inferior parietal lobe (IPL inf. BA 40) and of the extra body area (EBA). The activation is dominant in the right hemisphere. The same network is activated by the observation of a real hands (RH - +) but with an intensity significantly more important. **Implications/Impact on Rehabilitation:** The movement of a virtual hand even with a low degree of dumping is recognized as the movement of a human part. The movement observation of a real or virtual hand allows to recruit a network interesting not only the visual cortex but also the premotor cortex. This activation of the premotor areas could be a substratum of the virtual reality use in motor rehabilitation.

No. 120

INFLUENCE OF POST-STROKE SPASTICITY SEVERITY ON PATIENT-REPORTED OUTCOMES: FINDINGS FROM THE BOTOX® ECONOMIC SPASTICITY TRIAL (BEST)

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Objective: The aim of this analysis was to determine how Post-Stroke Spasticity (PSS) severity impacts patient physical function and health-related quality of life (HRQoL). **Method:** In this prospective, international, double-blind study, adults with focal PSS were randomised to BOTOX® (BoNT-A)+standard care (SC) or placebo+SC for 1 or 2 treatment cycles, followed by an open-label phase up to 52 weeks. Eligible patients were BoNT-A-naïve, demonstrated preserved function in the limb to be treated, and considered likely to benefit from intervention. Those with fixed contractures and causes of spasticity other than stroke were excluded. Baseline patient-reported outcome measures examined included: the Stroke Impact Scale (SIS-16), the EuroQoL questionnaire (EQ-5D), and the 12-item Short Form Survey (SF-12). The SIS-16 measures physical function limitations of stroke survivors with lower scores indicating worse function. The EQ-5D and SF-12 are generic HRQoL instru-

ments where lower scores indicate poorer HRQoL. Spasticity severity (mild, moderate or severe) was assessed using the Resistance to Passive Movement scale (REPAS-26). **Results:** The intent-to-treat study population comprised 273 patients (mean age, 61.5 years; 59% male; median time since last stroke, 22.8 months). Spasticity severity according to REPAS-26 was mild ($n=15$, 5.5%), moderate ($n=204$, 74.7%) or severe ($n=54$, 19.8%). The SIS-16 total score decreased from 70.3 ± 23.39 (mean \pm standard deviation) to 50.8 ± 18.59 with increasing spasticity severity (mild to severe). The EQ-5D index score decreased from 0.66 ± 0.21 in patients with mild spasticity to 0.47 ± 0.28 in those with severe spasticity. For the SF-12, the mental component score decreased from 53.9 ± 8.33 to 49.6 ± 9.67 with increasing spasticity severity (mild to severe), while the physical component score decreased from 53.3 ± 10.08 to 45.00 ± 10.73 . **Implications/Impact on Rehabilitation:** Increasing severity of spasticity in stroke survivors impacts the ability to undertake everyday tasks and self-care, as well as overall HRQoL. Reducing PSS severity therefore represents a priority for rehabilitation.

No. 121

IMPROVEMENT OF PERCUTANEOUS ENDOSCOPIC GASTROSTOMY(PEG) TUBE CARE AFTER PEG TEAM ESTABLISHED

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Hong Kong

Objective: PEG was proven to be beneficial for dysphagia patients. However the after-care of PEG is always neglected. Good after-care of PEG should improve quality of life of the patients and prolong the life-span of the PEG tubes. We adopted a team approach to improve the PEG care for the in-patients in our unit for 2 years and we reviewed the results of our team. **Method:** We compare the quality of the PEG exit sites and PEG tube life-span before and after the introduction of PEG team in our unit from January 2009 to December 2010. The PEG team composes of one senior rehabilitation physician, one nursing officer and link-nurses in each ward. The team has regular ward round to review the PEG tube condition and change the PEG tube when necessary. **Results:** Totally 20 patients were recruited into our services. The mean age of the patients is 65.6 (± 28.3), 60% male and 40% female patients, 75% of them has old stroke and the remaining patients has motor neuron diseases. 20% of exit sites were classified as good, 40% satisfactory and 40% bad before the PEG team established. The mean life-span of the PEG tube at that time was 110.3(± 31.6) days. After introduction of the PEG team, 60% of exit sites classified as good ($p < 0.05$), 35% satisfactory ($p < 0.05$) and 5% bad ($p < 0.05$). The mean life-span of the tubes improved to 153.6(± 35.5) days ($p < 0.05$). **Implications/Impact on Rehabilitation:** Team approach can improve the PEG exit site condition of our patients and increases the life-span of the PEG tubes. This can improve the quality of life of the patients and decrease the financial burden to purchase the replacement tube. This approach may also extend to out-patient basis and further study should be performed in the future.

No. 122

THE LATE ADMISSION OF PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY INTO A REHABILITATION UNIT: REASONS AND CONSEQUENCES

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Hungary

Objective: In cases of patients with severe traumatic brain injury the mean time of admission to our rehabilitation unit is 3 to 8 weeks post-trauma. The aim of this study was to observe the reasons of late admission and its consequences in patients with severe brain injury. Late admission is defined as those patients who were admit-

ted into the rehabilitation unit more than 9 weeks after accident. *Method:* Retrospective study in Brain Injury Rehabilitation Unit between 1. April 2009. and 1. April 2010. *Results:* During this period 28 patients were admitted to our unit 9 weeks or more post-trauma. Mean age of patients was 31 years (18–64). The majority of the patients were involved in traffic accidents (19). On average 226 (63–2160) days passed between the accident and admission to the rehabilitation unit. Duration of coma was 10 (2–52) weeks and the length of post-traumatic amnesic period was 24 (2–52) weeks. Complications that delayed admission: septicaemia in 12 cases, pneumonia 5, and psychotic problems in 1 case. Six patients were admitted from the nursing unit. All 28 patients were admitted with complications: contracture (17/28), decubital ulcer (9/28), heterotopic ossification (6/28). The mean length of stay in the rehabilitation unit was 130 (9–405) days. Mean FIM score was 67 (18–115) at time of admission and 81 (18–126) at discharge. 18 of the 28 patients were discharged home. 4 patients were transferred to the orthopaedic unit for limb contracture operation. 6 patients were sent to a nursing home. *Implications/Impact on Rehabilitation:* Serious complications were the main reasons of late transfer of patients with severe brain injury to the rehabilitation unit. But in several cases patients were sent to the nursing unit instead of rehabilitation. The rehabilitation of patients with late admission was longer than usual and more complications had to be treated. Early and direct admission of patients with fewer complications promotes easier and more successful rehabilitation.

No. 123

ERGONOMICS OF INDIAN MARKET CHAIRS

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India

Objective: To develop recommendations for work stations for Indian population (north India). To evaluate the office chairs available in the Indian market for correct work-posture and ergonomics. *Method:* The anthropometric dimension for Indian population were taken from a National Institute of Design study published earlier. Six measurements for an ideal seating system were defined using the data of six anthropometry parameters. The market was then surveyed to get the measurements of the available seating systems and these were then compared with the ideal system defined earlier. The observations are presented in this study. *Results:* Survey was done in the markets of Delhi and using company catalogues. We were able to collect data for about 26 chair models. Seat height: 15–19". During the survey it was found most of the adjustable chair seat height was from 16" to 18" and fixed chairs seat height was 18". Seat depth: 12.6–16.8". In our survey all the chairs exceeded this measure and were 18–20" deep. This would be the single most important measure for affecting the ergonomics. Seat width: 14.3–23.8". 35% chairs were of width <18" and the rest were 19%. Back rest height: 18.2–25". In our survey it was found that most had a back rest height of only 18 to 20 inches. Back rest width: 7.8–12.5". Most chairs had met this minimum criteria. Arm rest height: 4.9–10.6". 75% of chairs were of 8", 21.42% of chairs were 9" and the rests were 8.5". *Implications/Impact on Rehabilitation:* The chairs measured in this study were found to be lacking in most parameters. Better awareness of the recommendations amongst the users and improved designing can result in decrease in posture related complaints.

No. 124

REHABILITATION COURSE OF A PATIENT WITH NEUROMYELITIS OPTICA

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Israel

Objective: NMO is usually a relapsing disorder associated with early, severe, attack-related residual disability. In contrast to MS, clinical

experience and case series suggest that NMO requires long-term immunosuppressive therapy for attack prevention. Persons with NMO experiencing severe disabilities may demonstrate improved function only after long term rehabilitation program. The current case study presents a successfully rehabilitated woman with NMO after a very long term intensive rehabilitation program. *Method:* A 37-year-old woman suffering from NMO with paraplegia D6 ASIA A, and treated at the rehabilitation department of Bnai Zion Medical Center, Haifa. In 1994 she has developed the first episode of transient vision disturbance. During the following six years she has developed some episodes of transient lower-extremities weakness, and was diagnosed with MS and was treated accordingly. Clinical data was collected from her medical files. *Results:* After 3 years of rehabilitation, she is now independent in most of daily living activities and is capable of walking 100 m with two KAFO's. In addition she has regained her driver's license and returned to work in her profession. *Implications/Impact on Rehabilitation:* Little is known about NMO rehabilitation outcome in literature. The current strong positive outcome give better knowledge about rehabilitation prognosis.

No. 125

ACTION OBSERVATION IN STROKE PATIENTS: INVESTIGATING THE NEUROPHYSIOLOGICAL EFFECTS USING EEG

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Objective: To investigate whether μ -suppression can be used clinically to monitor the neurophysiological effects of AO in stroke rehabilitation. *Method:* EEG was recorded while 20 stroke patients and 24 healthy controls observed and executed different manual grasping movements. μ -suppression was calculated relative to a baseline condition during which the participants observed a ball rolling on the screen. Concomitant EMG was recorded from right and left upper-limb muscles in order to investigate the relationship between μ -suppression and muscle activation. CT scans were analyzed using the Analysis of Brain Lesions (ABLE) module implemented in Medx software with the aim of reporting on anatomical structures in the normalized brain, and quantifying the amount of lesioned tissue in those standard structures. *Results:* Observing video clips showing human upper limb movements induced μ -suppression in all biological movement conditions relative to baseline. The effect was more conspicuous at sites: C3, C4, and F3, F4 in the low alpha/ μ band (8–10 Hz). The effect was more conspicuous for P3 and P4 in the 6–8 Hz. The suppression was smaller and more asymmetrical across the cerebral hemispheres in stroke patients than in healthy controls, both in the observation and execution conditions. *Implications/Impact on Rehabilitation:* These results support the hypothesis that μ -suppression reflects the involvement of the motor system during AO. Therefore, we preliminary conclude that μ suppression in the low power spectrum band is likely to serve in the future as a useful marker of therapeutic effects of AO in hemiparetic stroke patients, thus helping to select the patients that might be more responsive to AO therapy.

No. 126

ROBOT-ASSISTED GAIT TRAINING IN MULTIPLE SCLEROSIS: A PILOT RANDOMIZED TRIAL

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Israel

Objective: To evaluate the efficacy of robot-assisted gait training (RAGT) using the Lokomat system in multiple sclerosis (MS) pa-

tients with severe walking disabilities (EDSS 5.5–7) as compared to regular physiotherapy. *Method:* A prospective randomized controlled clinical trial comparing RAGT with regular physiotherapy in a group of stable MS patients with EDSS between 5.5 to 7. RAGT included 12 sessions over 3–4 weeks and the control group was treated with conventional walking training (CWT). The primary outcome measures were Functional Ambulatory Category (FAC) and 6 min walking distance and the secondary outcomes were TUG test, 10 m walking test, Berg balance test (BBT), EDSS score, FIM score, and SF36. All tests were performed at baseline and at the end of the treatment and 3 and 6 months thereafter by a blinded rater. *Results:* Fifteen and 17 patients were randomly allocated to RAGT and to CWT, respectively. Both groups were comparable at baseline in all parameters, mean age of treatment group was 47.7 ± 12 as compared to 50.5 ± 11 in the control group ($p=0.49$). Following the treatment, FAC score improved significantly ($p<0.05$) in both groups without difference between the groups. 6 min walking distance improved significantly ($p<0.01$) only in the CWT group but not in the RAGT group. Both FIM and EDSS scores improved significantly after the treatment ($p<0.05$) in both groups without significant difference between the groups. Other gait parameters did not change significantly. In both groups, all parameters at the 6 months evaluation were similar to baseline. *Implications/Impact on Rehabilitation:* Robot-assisted gait training is feasible and may be an effective additional therapeutic option in MS patients with severe walking disabilities.

No. 127

EPIDEMIOLOGICAL CHARACTERISTICS OF POLIO AND POST-POLIO PATIENTS IN JERUSALEM

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Israel

Objective: To compare the medical status as well as social and economic status of polio survivors with the general population in Israel and to determine the parameters associated with post-polio syndrome (PPS). *Method:* This is an ongoing prospective cohort study of polio patients attending the post-polio clinic in Jerusalem between 2005–2010. Demographic, medical, social, and functional data were recorded using a particular questionnaire which was adjusted to the polio population. The data was compared to the same data of 3 similar patients matched in age and gender from the general population of Israel. The severity of PPS had been determined according to the index of PPS (IPPS) score. *Results:* 72 patients out of 269 polio patients were screened. The mean age of polio survivors is 60.2 ± 9.3 ; there were 41.7% men and 58.3% women. In comparison with the general population, 70.8% vs 75.3% ($p=0.4$) are married, 47.8% vs 60.4% ($p=0.2$) have high education and only 38.6% vs 51.9% ($p=0.06$) are employed. Polio patients tend to have higher co-morbidity including back pain, headache and chronic pain, cardiovascular diseases and diabetes. PPS was diagnosed in 61% of the participants, among them 63.6% had mild and 36.4% had severe PPS. Polio patients with PPS have significantly more difficulties in walking outdoor and indoor and in ADL functions ($p=0.04$, $p=0.08$, and $p=0.016$, respectively). *Implications/Impact on Rehabilitation:* Polio survivors, especially those with PPS, show significant difficulties in ambulation at home and work and in ADL function, in comparison to the general population. This can be explained by their sedentary way of life and emphasizes the need for special exercise program to prevent further deterioration.

No. 128

STATIC AND DYNAMIC BALANCE MODIFICATIONS AFTER TREATMENT OF FOCAL SPASTICITY WITH BOTULINUM TOXIN

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Italy

Objective: The aim of this study is to evaluate and quantify the effects on balance, posture and postural strategies of Botulinum Toxin inoculation in adult leg muscles affected by focal spasticity, through the observation of changes in barycentre, postural oscillations and somatosensory, visual and vestibular afference. *Method:* 8 patients with spasticity in the leg muscles so severe as to interfere with correct posture and static and dynamic balance were injected with a dose of botulinum toxin. Performance was evaluated before and 20 days after treatment through a kinematic and stabilometric study in a modifiable environment provided by the Smart Balance Master system. The parameters considered were: assessment of body barycentre with eyes opened and closed during oscillation of the system platform or walls; sensory analysis through the observation and differentiation of somatosensory, visual and vestibular afference; joint compensation strategies; analysis of postural oscillations; study of trajectories and speed to achieve an end-point in a stable and dynamized situation. *Results:* Following the botulinum toxin treatment we observed an overall improvement of the data considered. There was better control of body barycentre, both with eyes opened and closed, and a decrease in postural oscillations as demonstrated by an analysis of the bundles. The trajectories for reaching the proposed end-point were improved and the recovery of the ability to achieve the target on the injured side and a reduction of compensation strategies during performance of exercises were observed. Sensory analysis revealed an improvement of the somatosensory components in the recovery of balance compared to the visual and vestibular ones, but difficulties during the dynamic situation persisted. *Implications/Impact on Rehabilitation:* In this study the efficacy of botulinum toxin in reducing spasticity and the disappearance of the foot clonus destabilizing effect is also supported by increased barycentric and postural control. In addition, improved foot-ground contact results in better stability and balance control, shown by a decrease in the number and speed of postural oscillations and by an increase in the ability to achieve a predetermined end-point resulting in an improvement of the patient's functional abilities.

No. 129

USE OF CHEMICAL NEUROLYSIS WITH PHENOL IN REDUCING SERIOUS SPASTICITY AND WORK LOAD FOR INDIVIDUALS IN VEGETATIVE STATE. A RANDOMIZED CONTROLLED TRIAL

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Italy

Objective: Individuals in vegetative state, are often affected by a diffuse spasticity which is an important obstacle in caring. Spasticity should be always treated when it interferes with nursing care and personal hygiene. Different modalities are available to approach spasticity, chemical blocks are often preferable for local spasticity. In our centre we admit patients in vegetative state treated daily with passive mobilization to prevent joint limitation. We wanted verify if the treatment of spasticity with phenol is useful in increasing Range of Motion (ROM) improving position in wheelchair, reducing work load and time in nursing operations. *Method:* We enrolled 18 patients in vegetative state. They were affected by a serious spasticity of upper and lower limbs. Patients of group A (9) were treated with injections of phenol solution at 6%, in tributary nerves of muscles interested by spasticity. Before the injection, patients were evaluated in their Range of Motion (ROM) of more limited joints and in calculating nursing time (washing, wound dressing and getting dressed). In group B, patients (9) were enrolled, evaluated and treated with phenol 6 months later. Then we reversed the treatment (cross-over) waiting 6 months for the repetition of injections in treated patients. Paired *t*-test of the evaluated parameters with a significant *p*-value <0.05 for an IC of 95% was used. *Results:* Results were both statistically significant in increasing of elbow and abduction of hip ROM ($p<0.003$) and in reducing nursing time ($p<0.004$). Calculating the NNT for the effectiveness of the treat-

ment it was 2. *Implications/Impact on Rehabilitation:* Treatment with phenol of spasticity of limbs in patients with vegetative state could be useful in improving quality of nursing and in increasing ROM, useful in this kind of patients and in changing position to prevent pressure ulcers and wounds in general.

No. 130

PARAMETERS FOR CLINICAL DECISION MAKING ON FOOT-DROP

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Italy

Objective: Foot-drop is a common gait impairment on the Upper Motor Neuron Syndrome (UMNS). FES therapy combined with conventional therapy treatment effectively improves the walking ability and enhances the motor recovery when compared with conventional therapy in UMNS. The FES effect is not only limited to a peripheral level but its effect is also associated to a cortical reorganization. In commerce there are stimulators in which stimulus is controlled through a switch able to detect the heel-floor contact and others in which foot control is assured by tibia forward. The aim of this retrospective study is to identify some parameters that may be used for choosing the most adequate type of stimulator to correct foot drop and analyze FES effect for foot-drop correction. *Method:* 26 subjects with foot-drop and characterized by UMNS were analyzed. Kinematic assessment (3D gait analysis), 50 Meters Walking Test (50MWT), 6 min Walking Test (6mWT) were performed in gait standard condition (shoes) with and without FES. Additionally surface EMG is applied without using shoes. *Results:* Results show that for patients with a proximal weakness, stiff knee and unbalanced control of body weight, stimulator controlled by a switch seems to be the best solution while for patients able to flex partially or completely their knee (voluntary or if someone gives them a verbal feedback) the "tilt stimulator" seems to be more adequate. Comparing the groups with and without shoes results show an increase of self-selected velocity, cadence, swing velocity, stride length, ankle dorsi-flexion in terminal stance and in swing phase, knee and hip flexion in heel contact phase, hip power generation, reduction of step width, hip flexion in terminal stance, better trunk control and loading response with FES. 50MWT shows an increase of stride length and self-selected speed; 6mWT shows endurance increase. *Implications/Impact on Rehabilitation:* The study should allow the identification of specific parameters in order to better adapt the clinical decision to the personal condition of each patient.

No. 131

TRIAL OF COMBINATION TREATMENT OF ELECTROMYOGRAPHY-TRIGGERED NEUROMUSCULAR STIMULATION AND MIRROR THERAPY FOR PARETIC HAND AFTER STROKE

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Japan

Objective: Electromyography-triggered neuromuscular stimulation (ETMS) and Mirror therapy (MT) are recent neuro rehabilitation techniques for the treatment of paretic arm function after stroke. It seems likely that a greater effect might be brought by coupling these two methods compared to either one alone. The purpose of this study was to explore the feasibility of the combination treatment of ETMS and MT (ETMS-MT) on the arm and hand function in stroke patients. *Method:* A randomized crossover design was applied. The subjects were four stroke patients. Following written informed consent, the subjects were randomly assigned to receive either: (a) ETMS-MT in addition to conventional physical and occupational therapy (PT/OT) or (b) PT/OT for 4 weeks, then the intervention was changed for the next 4 weeks. The subjects received two 20-min sessions

of ETMS-MT 5 days a week. Electrical stimulation was applied to the wrist extensors of the paretic arms. The upper extremity items of Fugl-Meyer assessment (FM), active range of motion of wrist extension (AROM), grip strength, Box and Block test (BBT), Wolf Motor Function Test (WMFT) and Motor Activity Log (MAL) were measured at the entry of the study and completion of each phase. *Results:* After ETMS-MT phase, the mean changes were greater in all of the measurements compared to PT/OT phase (3.0 point in FM, 8.75 degree in AROM, 1.50 kg in grip strength, 5.8 in BBT, 140.1 s in WMFT and 0.52 point in MAL, respectively). Even a case with poor function who scored 0 in AROM and BBT at the entry measurement, he showed some improvements after ETMS-MT phase. *Implications/Impact on Rehabilitation:* Greater improvements related to wrist and hand function were seen after ETMS-MT phase. Considering that 3 months or more had passed in all subjects after stroke onset, it seemed likely that ETMS-MT might enhance functional recovery of paretic hand in stroke patients.

No. 132

EFFECTS OF EXTERNAL FEEDBACK OF VISUAL AND AUDITORY STIMULI WITH A NON-DOMINANT HAND FINGER TAPPING MOVEMENT - A FUNCTIONAL MRI STUDY

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Japan

Objective: Using external feedback for motor learning makes it more effective. There have been few reports examining the influence of motor learning stimulation on brain. In the present study, we compared neural activity in the brain, monitored by functional MRI (fMRI), during a non-dominant finger tapping task performed in response to visual stimuli, auditory stimuli, as well as both visual and auditory stimuli in healthy subjects. *Method:* Subjects were 6 healthy right-handed adults (mean: 20.6 years) with no history of neurological disease. All subjects gave informed consent. fMRI images were obtained from subjects in a supine position in a 3-T MR scanner (Philips). The motor task was simple finger tapping (1 Hz), the visual task was an imitation movement while looking at finger tapping, the auditory task was movement listening to numbers being read out, and the visual and auditory tasks involved visual and auditory stimuli. *Results:* All tasks activated the bilateral prefrontal area, bilateral parietal association area, and the bilateral cerebellum. Brain activity was highest during the visual task, and lowest during the auditory task, and activity was observed in different parts of the brain for different tasks. *Implications/Impact on Rehabilitation:* Since there is a difference between how the brain is activated depending on the type of external feedback, it has been suggested that there are differences in how the brain is activated depending on the method of teaching movement, and therefore it is important to understand the level of motor learning and to utilize external feedback, depending on the situation.

No. 133

THE DEVELOPMENT OF AN INTERACTIVE ELECTROPHONE TYPE REHABILITATION SYSTEM FOR TRAINING HEMIPLEGIC ARMS

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Japan

Objective: Recently, a form of arm rehabilitation for patients with cerebrovascular events resulting in hemiplegia, called constraint-

induced (CI) movement therapy has started to attract attention. However, CI movement therapy requires a personal staff member for each patient and on-site therapy. We decided to develop an interactive electrophone type rehabilitation system which could allow for training of patients at home. *Method:* We performed a music questionnaire survey with a population of 132 hemiplegic patients to grasp the needs of the patients who have experienced cerebrovascular events. We then decided on a musical instrument and a training method most suitable for rehabilitation based on the results, and developed an interactive electrophone type rehabilitation system jointly with the Shibaura Institute of Technology department of engineering. We consulted with a hemiplegic patient during the development of the system. We had him try it and evaluated the change in his hemiplegia. *Results:* The patients younger than 60 years-old for whom rehabilitation was expected used musical instruments. However, there were many patients who were anxious about whether they would be able to do so. Therefore, we devised a training system consisting of an electronic percussion-type instrument which patients beat with the paralyzed arm. Patients can train like a game while the system measures the frequency, position and timing of the beat by the sensor, and the system can provide feedback. The first hemiplegic patient tried it at home 30 min a day for 3 months. He experienced improvements as follows: Fugl-Meyer Assessment: 25→28, WMFT: 1327 s FAS 27→967 s FAS 33, MAL-14: AOU 0.07/QOM 0.14→AOU 0.43/QOM 0.43. *Implications/Impact on Rehabilitation:* We therefore expect that this system can provide effective training at home as a voluntary training device.

No. 134

THE EFFECT OF BRAIN COMPUTER INTERFACE (BCI) TRAINING COMBINED WITH TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) AMONG PATIENTS WITH CHRONIC SEVERE HEMIPARETIC STROKE

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Japan

Objective: Application of EEG-based BCI to patients with stroke is limited because it is difficult to detect stable brain signals. In our previous study, we found that anodal tDCS could increase event related desynchronization (ERD) during the imagery of paretic finger extension in chronic stroke patients. The aim of this study is to investigate the effect of Brain Computer Interface (BCI) training combined with transcranial direct current stimulation (tDCS) among patients with chronic severe hemiparetic stroke. *Method:* The participants were 12 chronic stroke patients with severe hemiparesis. They were divided into two groups; BCI group and tDCS + BCI group. In the tDCS+BCI group, anodal tDCS (1 mA, 10 min) was applied to the affected motor cortex just before BCI training. In the BCI training, passive finger extension was triggered with ERD during the imagery of paretic finger extension. The training was performed 1 h a day for 10 days. We calculated the accuracy of the BCI response in each BMI session. Before and after the intervention, we assessed Fugl-Meyer Assessment upper extremity motor score (FMA-M) and modified Ashworth Scale as well as neurophysiological measures including reciprocal inhibition and intracortical inhibition. *Results:* The accuracy of BCI response was significantly higher in the tDCS + BCI group. FMA U/E motor score and MAS significantly improved in both groups. Restoration of reciprocal inhibition in the affected forearm and intracortical inhibition in the unaffected hemisphere were observed in the tDCS+BCI group. *Implications/Impact on Rehabilitation:* BCI training can improve motor function in severe hemiparesis. It was suggested that anodal tDCS to the affected motor cortex could increase the efficacy of BCI training.

No. 135

CHANGES IN DIFFICULTY ORDER OF ITEMS OF ACTIVITIES OF DAILY LIVING IN STROKE PATIENTS

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Japan

Objective: The order of difficulty of items of activities of daily living (ADL) has often been studied by independent ratios at discharge from rehabilitation wards. The difficulty order characteristically differs between patients with a low ADL level and those with a high ADL level. We attempted to reveal changes in the difficulty order between the time of admission and discharge for each total score for ADL. *Method:* Subjects were 1022 stroke patients with a unilateral supratentorial lesion who were discharged from the Kaifukuki (subacute) Rehabilitation Ward from September 2004 to October 2009. Excluded were patients who had a previous stroke episode or a complication that would negatively affect rehabilitation. Subjects were subdivided into a younger group (under 60 years, $n=295$) and elderly group (75 years or over, $n=272$). Mean days from onset to admission were 33.5 and 40.7, respectively, and mean length of stay was 67.0 days and 70.3 days, respectively. ADL was evaluated by the Functional Independence Measure (FIM) version 3 on admission and at discharge. Ranked logistic analysis that predicted each item comprising the FIM score from the motor subscore of the FIM (FIMM) was employed to calculate the percentages of item scores from 1 to 7, with 1 meaning totally dependent and 7 meaning completely independent. Thereafter, the mean scores for each item in the FIMM from admission and discharge data, respectively, were calculated using these percentages and the difficulty order was decided. *Results:* Among the lower FIMM scores, transfer items (bed, toilet) became easier and sphincter control had become more difficult at discharge than on admission in both groups. Locomotion items became easier at discharge than on admission in only the elderly group. *Implications/Impact on Rehabilitation:* In conclusion, order of difficulty of ADL differed between admission and discharge. Age also affected the difficulty order.

No. 136

INDEX TO EVALUATE PHYSICAL CAPABILITIES FOR GENERAL WORK IN TRAUMATIC BRAIN INJURY (TBI) PATIENTS WITH HIGHER BRAIN DYSFUNCTION

Kikuo Ota, PhD; Yasunori Ozeki; Kiyomi Odachi; Shigeru Sonoda; Eiichi Saitoh; Shiho Mizuno; Wataru Narita; Naoko Sakihara

Japan

Objective: In patients with TBI, not only higher brain dysfunction but also impaired physical capabilities sometimes present problems in returning to work. Physical capabilities in TBI patients were evaluated from the viewpoint of establishing an index for social participation. *Method:* Of TBI patients evaluated in the model project for higher brain dysfunction, 55 patients (45 males, 10 females) less than 60 years of age (average age, 32.7 years) who were able to walk outside alone were enrolled in this study. Methods of evaluation were: 1) brain imaging, MRI and SPECT; 2) 7 tests for physical capabilities, which included the side step test, one-leg standing time and so on; 3) neuropsychological tests (WAIS-R and TMT-A); 4) General Aptitude Test Battery (GATB) by the Ministry of Health, Labor and Welfare; 5) IADL: FIM+FAM; and 6) CIQ (status of social participation). Results of these examinations were evaluated and compared with physical assessment parameters. *Results:* With regard to the physical capability tests, there was a reduction in speed and dynamic balance ability (51 cases). The results of the side step test showed a wide range of distribution (3-

42 times) and those results most closely correlated with Balance board test (Pearson's correlation coefficient $r=0.792$), followed by FIM+FAM ($r=0.677$) and TMT-A ($r=-0.613$). Discrimination of the general work group and the welfare work group: The combination of the side step test (25 times or more) and the average of GATB (56 or higher) yielded the highest discrimination ratio (CART: discrimination ratio, 80.6%). *Implications/Impact on Rehabilitation:* Evaluation of 7 physical parameters in 55 patients with TBI revealed that combination of the side step test and the average of GATB was considered the most appropriate index to evaluate physical capabilities for general work.

No. 137

INDEPENDENCE IN BLADDER MANAGEMENT UPON DISCHARGE AMONG STROKE PATIENTS WHO WERE TOTALLY DEPENDENT IN BLADDER MANAGEMENT UPON ADMISSION TO KAIFUKUKI (SUBACUTE) REHABILITATION WARD

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Japan

Objective: The aim of this retrospective study was to elucidate the characteristics of stroke patients whose bladder management score on the Functional Independence Measure (version 3) (BL-FIM) changed from 1 to 7 while at the Kaifukuki (subacute) Rehabilitation Ward (KRW). *Method:* We studied 1,353 patients with unilateral supratentorial stroke admitted to our KRW from September 2004 to November 2009. We categorized the patients into 3 groups: large improvement (L) group (BL-FIM changed from 1 on admission to 7 at discharge, $n=19$), insufficient recovery (I) group (BL-FIM changed from 1 to 6 or less, $n=320$), and control (C) group (BL-FIM on admission was 2 or more, $n=1,014$). Scores for all items on the FIM and the total score for the motor items of the Stroke Impairment Assessment Set (SIAS-M) were compared between those on admission and those at discharge in the 3 groups using a scattergram. All medical records for the L group were carefully examined for information on why they achieved such a large recovery in BL-FIM. *Results:* The patterns of the change from admission to discharge were similar in the scattergram of FIM-communication items and SIAS-M in all groups. L group scores for the other items were located in the left-upper direction in the scattergram in comparison with the other 2 groups. There were 14 men and 5 women (mean age 58 years, range 41–74) in the L group. Fourteen had cerebral hemorrhage and 5 cerebral infarction. Sixteen patients had a left hemispheric lesion and 15 patients displayed aphasia, with complete catheter management ($n=3$), disturbance of consciousness ($n=2$), and reason not clear ($n=1$) as other causes for a score of 1. *Implications/Impact on Rehabilitation:* From these results, improvements in non-verbal communication in aphasia patients seemed to be the major determinant of a large recovery of BL-FIM.

No. 138

EFFECTIVENESS OF HYBRID ASSISTIVE NEUROMUSCULAR DYNAMIC STIMULATION (HANDS) THERAPY IN PATIENTS WITH SUBACUTE STROKE – A RANDOMIZED CONTROLLED TRIAL

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Japan

Objective: Hybrid Assistive Neuromuscular Dynamic Stimulation (HANDS) therapy can be applied to patients with some voluntary

muscle activity of the affected finger extensor muscles. The purpose of the present study was to investigate whether the HANDS therapy may improve motor function of the paretic upper extremity in patients with subacute stroke. *Method:* Participants were 24 inpatients who had suffered hemiparetic stroke within 60 days of participation in the study. Patients were randomly assigned to two groups. The HANDS group ($n=12$) used integrated volitional electrical stimulator (IVES) combined with a wrist splint for 8 h a day for 3 weeks. The control group ($n=12$) used a wrist splint for 8 h a day for 3 weeks. All patients received the same daily dose and length of standard post-stroke multidisciplinary rehabilitation. Outcome measures were Fugl-Meyer Assessment (FMA) of upper extremity function, Action Research Arm Test (ARAT), and Motor Activity Log-14 (MAL-14). *Results:* Ten patients in each group completed the interventions. Compared with the control group, the HANDS group showed significantly greater gains in FMA score of distal (wrist / hand) portion ($p<0.01$) and improvement of ARAT ($p<0.05$). The gains in MAL did not reach statistical significance in favor of the HANDS group over the control group. No adverse effects occurred and the HANDS therapy was very well accepted. *Implications/Impact on Rehabilitation:* The HANDS therapy in addition to conventional rehabilitation was effective for the improvement of arm and hand function among patients with subacute stroke. It is applicable to patients with more severe hemiparesis compared with constraint induced movement therapy (CIMT), therefore it may be an effective adjunct to standard rehabilitation in patients with stroke.

No. 139

EFFECTS OF NEUROFEEDBACK TRAINING WITH AN ELECTROENCEPHALOGRAPH-BASED BRAIN COMPUTER INTERFACE FOR HAND PARALYSIS IN PATIENTS WITH CHRONIC STROKE

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Japan

Objective: The objective of this study was to explore the effectiveness of a method of neurorehabilitative training using an electroencephalogram (EEG)-based brain-computer interface (BCI) combined with a mechanical orthosis for paralytic upper extremities following stroke. *Method:* The participants were eight outpatients with chronic stroke demonstrating moderate to severe hemiparesis. We recorded the EEG from the primary motor cortex during motor imagery involving extending the affected fingers, and electromyogram (EMG) activities from the affected extensor digitorum communis (EDC). Based on analysis of volitionally decreased amplitudes of sensory motor rhythm (SMR), real-time visual feedback was provided as the direction of a moving cursor on a monitor. After successful motor imagery, the affected fingers were partially extended by a mechanical orthosis. BCI interventions were carried out once or twice a week over a period of 4-7 months. *Results:* Five participants exhibited improvement in finger function, as measured with the finger test of the Stroke Impairment Assessment Set. Voluntary EMG activities newly appeared in 4 patients who had little or no muscle activity before the training. Five patients exhibited increased daily usage of the paralyzed hand as assessed with the Motor Activity Log. Significantly greater suppression of the SMR over both hemispheres was also observed during motor imagery. Transcranial magnetic stimulation showed increased cortical excitability in the damaged hemisphere as evaluated by resting motor threshold in 4 patients, though it was too high to compare between pre and posttreatment in the other 4 patients. Success rates of BCI training tended to increase as the session progressed in 6 patients. *Implications/Impact on Rehabilitation:* Our BCI training appears to have yielded some improvement in motor function and brain plasticity. To clarify the role of BCI system in our protocol, we need to perform control trials in the future.

No. 140

MUSCLE STRENGTH AND GAIT FUNCTION IN POLIO SURVIVORS

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Japan

Objective: Increasing post-polio syndrome (PPS) patients has become a major health issue in Japan. We started a comprehensive management program for PPS (the BGraS Project) co-worked with a regional polio survivor's association from 2006. In this program, we are conducting periodical activity that consists of questionnaire survey, medical checkup, physical examination, and intervention including lifestyle guidance, exercise therapy and orthotic prescription. We discuss in this paper about muscle strength and gait function. **Method:** 112 polio survivors with a mean age of 60 (47–77) years evaluated during 2006 to 2008 were discussed. Patients were diagnosed as having PPS by Halstead criteria (1987). Manual muscle testing (MMT) was performed in 3 U/E and 7 L/E muscles. Usage of orthosis and gait speed were also evaluated. **Results:** 91 (81%) patients were diagnosed as PPS. 41 demonstrated new weakness in U/E, while 87 in L/E ($p < 0.001$). Mean of MMT-average (average of multiple targeted muscles) was 4.5 in U/E, and 2.9 in L/E ($p < 0.001$). Distal muscles were weaker than proximal muscles especially in L/E. The best fit line of scattergram of MMT-average in L/E (x) and gait speed (y; km/h) were $y = 1.017x + 0.111$ ($r = 0.810$) in cases without orthosis, and $y = 0.596x + 1.740$ ($r = 0.634$) in those with orthosis. In cases of gluteus maximus MMT = < 2, gait speed of cases without orthosis was 2.6 km/h and with orthosis was 3.2 km/h ($p < 0.05$). **Implications/Impact on Rehabilitation:** Paralysis was more severe in L/E than U/E, probably because L/E supporting body weight should cause overuse of motor units. The difference of the best fit line of scattergram of L/E MMT-average and gait speed suggested that orthosis users could walk faster than non-user, especially in cases with severe paralytic condition. Adequate usage of orthosis would be helpful for maintaining gait function in PPS patients.

No. 141

WHAT IS THE IMPORTANT FACTOR FOR THE STROKE PATIENTS TO RETURN HOME IN RECOVERY STAGE?

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Japan

Objective: A convalescence rehabilitation ward is a special ward to support early discharge to home with intensive rehabilitation after onset of disease. However, there are some cases which can not return to home from a convalescence rehabilitation ward. The aim of this study was to clarify what is important factor in the efficient rehabilitation for the stroke patients. **Method:** Seventy-five stroke patients (42 males and 33 females) with hemiplegia, who were hospitalized in the convalescence rehabilitation ward of our hospital, and had a functional ambulation categories score < 4 on admission. Mean age of the subjects were 70.0 ± 12.1 years old. There were 31 cases of cerebral hemorrhage, 33 cases of cerebral infarction, and 11 cases of subarachnoid hemorrhage. Age, gender, duration from the onset to admission in our hospital, length of stay in our hospital, functional independence measure (FIM) on admission/discharge, FIM gain, FIM efficiency, presence of motivation to return home, presence of caregiver were evaluated. Subjects were divided into home return group (59 patients) and hospitalization/transfer group (16 patients), and each outcome measure was compared between two groups. **Results:** Length of stay in home return group was shorter than in hospitalization/transfer group. FIM on admission, FIM on discharge, FIM gain, and FIM efficiency of home return group were higher than that of hospitalization/transfer group. There was no difference in age, gender, duration from the onset to admission between two groups. Patients in home return group had

higher motivation to return home with family members as caregiver. **Implications/Impact on Rehabilitation:** Good recovery is one of the most important factors to return home. Additionally, we supposed that family members take an important role in rehabilitation for stroke patients at recovery stage.

No. 142

EFFECTS OF VARYING INTENSITY EXERCISE ON COGNITIVE TASKS

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Japan

Objective: To determine the effects of a single bout of exercise on cognitive task performance. **Method:** Nineteen healthy university students (10 females and 9 males) provided written, informed consent to participate in this study. Study 1 comprised 20-min of cycling at 30% peak $\dot{V}O_2$ (low intensity) and 50% peak $\dot{V}O_2$ (moderate intensity) determined by the cycle ergometer. Study 2 comprised a 15-min bout of cycling at 50% peak $\dot{V}O_2$ (moderate intensity) and 70% peak $\dot{V}O_2$ (high intensity) determined by the cycle ergometer. The participants warmed up for 3 min before exercise and cooled down for 3 min after each bout of exercise. Measurements were obtained over a period of 2 days. The order of exercise intensity was randomly determined for each participant. The Paced Auditory Serial Addition Task (PASAT) and Modified Stroop Test (MST) were performed, and simple reaction time (RT) was tested before and after exercise. **Results:** The PASAT and RT were significantly affected by the time factor according to the ANOVA of study 1. The PASAT were significantly affected by the time factor according to the ANOVA of Study 2. Multiple comparisons of exercise intensity showed that the post-exercise PASAT and RT were significantly improved after moderate intensity exercise in Study 1. Post-exercise RT was significantly shorter than before low intensity exercise. The post-exercise correct answer rate and numbers of consecutive correct answers in the PASAT in Study 2 were significantly higher before moderate intensity exercise and the correct answer rate in the post-exercise PASAT was significantly higher than before high intensity exercise. **Implications/Impact on Rehabilitation:** Cognitive performance was most effectively improved by exercise at moderate intensity. A single bout of moderate exercise is sufficient for participants to realize a positive effect on cognitive task performance.

No. 143

EFFECTIVENESS OF ELECTRICAL STIMULATION WITH FINGER-EQUIPPED ELECTRODE IN SUBACUTE STROKE PATIENTS WITH UPPER LIMB PARALYSIS

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Japan

Objective: In this paper, we investigated the effect of electrical stimulation with newly developed Finger-Equipped Electrode (FEE) on motor recovery in subacute stroke patients with upper limb and finger paralysis. **Method:** FEE represent a newly developed electrode that is attached to the finger. The palmar FEE surface is made of a metal-coated fabric. By this characteristic, FEE can trigger functional electrical stimulation (FES) upon contact with the patient, while a therapist is capable of controlling the timing of electrical stimulation. The PAS system GD-601 (OG GIKEN, Japan) was used as an electrical stimulator. Ten subacute stroke patients with severe to moderate hemiplegia were included in the experimental group (age 63.7 ± 10.0 years, duration since disease onset 31 ± 15.8 days), and were matched with ten control patients (age 63.9 ± 12.1 years, duration since disease onset 32.7 ± 16.1 days). The experimental group received electric stimulation from the FEE on the flexor and extensor muscles of the shoulder, elbow, wrist, and finger. The control group received conventional training

including range-of-motion and activities of daily living (ADL) training. Both groups received 60 min of training 7 times per week over a four-week period. Subsequently, upper extremity functions were measured using Ueda's scale, grading the independence from synergy before and after treatment. *Results:* The experimental group exhibited a greater improvement in arm and hand function on Ueda's scale compared with the control group. *Implications/Impact on Rehabilitation:* These results suggest that FEE may represent an effective tool to improve upper extremity and finger paralysis in subacute stroke patients. More studies are needed to further establish the effectiveness of the FEE method.

No. 144

APHASIA CAUSED BY LEFT THALAMIC HEMORRHAGE

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Japan

Objective: Thalamic stroke are associated with a variety of cognitive disorders. Especially, aphasia caused by thalamic lesions in the dominant hemisphere has been reported to be similar to transcortical aphasia and to be different from the type of aphasia caused by classical cortical foci by others, which is a matter of controversy. In this study, we examined the association between symptoms of aphasia and foci observed in the acute phase of thalamic hemorrhage, and the mechanism of occurrence. *Method:* This study included 26 patients with left thalamic hemorrhage who visited our department for rehabilitation without serious disturbance of consciousness and were evaluable for speech symptoms. The patients were 47 to 82 years of age; 16 were men and 10 were women. They were all right-handed. The time from onset to the start of rehabilitation was 1.0 ± 1.2 days and the mean length of hospital stay was 21.1 ± 9.9 days. Aphasia was assessed using SLTA and an association between severity based on the SLTA total score and lesions was evaluated. Also patients underwent SPECT to evaluate functional lesions. *Results:* Eighteen patients had fluent aphasia and 4 had non-fluent aphasia. Four patients did not have aphasia. The mean hematoma volume was 7.5 ± 7.3 ml in those with fluent aphasia, 14.3 ± 9.0 mL in those with non-fluent aphasia, and 3.0 ± 2.5 ml in those without aphasia. The severity of aphasia significantly correlated with hematoma volume and highly correlated with local cerebral blood flow in the left thalamus and putamen. *Implications/Impact on Rehabilitation:* The symptoms of aphasia associated with left thalamic hemorrhage were related with hematoma volume and cerebral blood flow. In the acute phase of thalamic lesions in the dominant hemisphere, a detailed assessment of language function is important because even patients with a small hematoma volume may develop aphasia.

No. 145

STROKE-ASSOCIATED PNEUMONIA: A CLINICAL STUDY FOR INTERVENTION OF ACUTE STROKE REHABILITATION

Shinichiro Maeshima, MD; Aiko Osawa; Yasuhiro Miyazaki; Yu Tazawa; Fumitaka Yamane; Shoichiro Ishihawa; Hiroki Kurita; Akira Satoh; Hidetaka Takeda; Norio Tanahashi
Japan

Objective: Possible contributing factors for pneumonia in the acute phase of brain stroke were evaluated from the viewpoint of dysphagia rehabilitation. *Method:* Patient characteristics, swallowing function, lesions, and the presence or absence of intervention by dysphagia rehabilitation were assessed in 504 patients with acute

brain hemorrhage or infarction to determine their association with pneumonia. *Results:* Ninety-one patients (18.1%) experienced pneumonia. Of these, 38 developed pneumonia within 3 days of hospital admission and 53 developed the disease after 4 days or later. Thirty-nine patients developed pneumonia during fasting, 5 patients resumed oral food intake and developed the disease prior to intervention by dysphagia rehabilitation, and 9 following intervention by dysphagia rehabilitation. Pneumonia was frequently seen among elderly patients, those with severe neurological symptoms or cognitive disorders, or those with bilateral multiple lesions, and was associated with prolonged length of stay and decline in ADL at hospital discharge. *Implications/Impact on Rehabilitation:* Inappropriate intervention may also cause pneumonia, and it will affect lower functional prognosis of activity of daily living. Therefore adequate caution must be exercised in eating for the acute stroke patients.

No. 146

MICROBLEEDS ON T2*-WEIGHTED MR IMAGES IN DYSPHAGIA PATIENTS WITH ACUTE CEREBRAL HEMORRHAGE

Shinichiro Maeshima, MD; Aiko Osawa; Yasuhiro Miyazaki; Fumitaka Yamane; Shoichiro Ishihawa; Hiroki Kurita; Akira Satoh; Norio Tanahashi
Japan

Objective: Dysphagia affects up to half of stroke patients and promotes pneumonia and fatal outcome. There were not so much studies about the relationship between dysphagia and MRI lesions. We therefore explored whether microbleeds on T2*-weighted MR images influenced dysphagia in patients with acute cerebral hemorrhage. *Method:* A total of 119 patients with cerebral hemorrhage (32 putamen, 18 thalamus, 10 cerebellum, 11 pons, 34 subcortex) were included in this study. Their ages varied from 17 to 90 years old (65.2 ± 12.9 years old), and were 80 males and 39 females. We assessed swallowing function at bedside swallowing assessment and videofluorography. T2*-weighted MRI was performed to identify the region of microbleeds. We also assessed a presence of aspiration pneumonia and outcome at discharge. *Results:* Microbleeds on T2*-weighted MRI was found in 54 patients (45%) and it related to swallowing function. There was no relation between microbleeds and pneumonia or outcome. *Implications/Impact on Rehabilitation:* T2*-weighted MR images is useful to detect microbleeds and it related to dysphagia patients with acute cerebral hemorrhage.

No. 147

OUTCOME OF ACUTE PHASE IN PATIENTS WITH ACUTE CEREBELLAR HEMORRHAGE

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Japan

Objective: To evaluate the clinical features of the acute phase of cerebellar hemorrhage and the factors that influence functional improvement and outcomes. *Method:* Subjective symptoms such as nausea and vertigo, cognitive function, swallowing function, hematoma volume, activity of daily living (ADL) after hospital discharge, outcome as well as neurological symptoms at initial presentation were evaluated in 45 patients with cerebellar hemorrhage (28 men and 17 women). The mean length of hospital stay was 24.6 days. *Results:* Eleven patients had disturbance of consciousness, all of whom had an increase in hematoma volume and poor functional outcome and could not be discharged home. Among 34 patients without disturbance of consciousness, 14 nystagmus, 22 developed nausea and vertigo, 19 extremity ataxia, 16 truncal ataxia, 19 dysphagia, 8 dysarthria, and 24 cognitive impairment. Twelve patients could be discharged home and safely perform ADL,

and had good cognitive and swallowing functions. *Implications/Impact on Rehabilitation:* In patients with acute phase of cerebellar hemorrhage, not only disturbance of consciousness and ADL but also cognitive and swallowing functions are important factors that determine when those patients can be discharged.

No. 148

COGNITIVE IMPAIRMENT IN PATIENTS WITH PONTINE INFARCTION

Aiko Osawa, MD; Shinichiro Maeshima; Yasuhiro Miyazaki; Hiroshi Matsuda; Norio Tanahashi
Japan

Objective: Recently, neurobehavioral evidence began to suggest that the role of the infratentorial lesion that contributes to cognitive functions such as attention, memory, visuospatial cognition, planning and language. The aim of this study was to examine the clinical features of pontine infarction in acute stage and factors affecting cognitive dysfunction. *Method:* We studied 26 patients with acute pontine infarction. Their ages ranged from 39 to 94 years; 21 were male and 5 were female. In all patients we evaluated cognitive function using neuropsychological tests and in 12 patients we measured rCBF using single photon emission CT. The neuropsychological tests conducted included the Mini-mental state (MMSE), Raven's colored progressive matrices (RCPM), and the Frontal assessment battery (FAB). *Results:* Forty-six percent of patients had abnormality in MMSE, 53% in RCPM and 44% in FAB. There were no relation between cognitive decline and size and location of lesion. On the other hand, reduction of rCBF in cerebral cortex related to cognitive decline. *Implications/Impact on Rehabilitation:* Cognitive impairment in the patients with pontine infarction was not rare and it may be associated with subsequent later disability handicap. These results investigated remote perfusion changes after pontine infarction may influence cognitive function. Therefore it is very important to evaluate not only neurological but also the neuropsychological findings for patients with pontine infarction.

No. 149

CEREBRAL BLOOD FLOW IN ACUTE STROKE PATIENTS WITH SWALLOWING DISORDERS

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Japan

Objective: Dysphagia is a common problem and has been identified as an independent predictor of morbidity and mortality after stroke. Recent data indicate that dysphagia may occur following not only brainstem or bilateral subcortical lesions but also unilateral cortical lesions; however, yet its functional neuroanatomy remains undefined. The purpose of this study was to identify regions that may be related to clinically important dysphagia in acute stroke patients, focusing cerebral blood flow. *Method:* We studied 50 acute stroke patients who were suspected dysphagia. Their age was from 49 to 95 years old. Stroke was caused by cerebral infarction in 30 patients and cerebral hemorrhage in 20 patients. We assessed swallowing function at bedside with repetitive salva swallowing test and water swallowing test. And we also assessed a presence of aspiration with videofluorography (VF). Additionally single photon emission CT with ^{99m}Tc-ethylcysteinate dimmer was performed to identify the region of all patients. *Results:* Forty-one patients had swallowing abnormality at bedside and 35 patients had aspiration on VF. Swallowing function at bedside related to the cerebral blood flow (CBF) of insular cortex. And aspiration related to the low CBF of thalamus and cingulate cortex. *Implications/Impact on Rehabilitation:* These data suggest that the insular cortex may be an important cortical substrate in swallowing, because the anterior insula has connection to primary and supplementary motor cortices, the ventroposterior medial nucleus of thalamus and to the nucleus tractus solitaries. On

the other hand, the level of consciousness and motivation to eating and swallowing may more influence to aspiration.

No. 150

FRONTAL LOBE DYSFUNCTION AND CEREBRAL BLOOD FLOW IN PATIENTS WITH STENOSIS OF INTERNAL CAROTID ARTERY

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Japan

Objective: Stenosis of internal carotid artery is one of the risk factor of vascular dementia and vascular cognitive impairment. It is very important to find cognitive dysfunction and treat them earlier. However, because most patients can live independently in daily life, it is not so easy to find out the cognitive impairment for such patients. *Method:* We therefore performed simple neuropsychological tests to evaluate overall cognitive function and to clarify the relationships between cognitive function, especially frontal lobe function, and the white matter lesions or regional cerebral blood flow (rCBF) for patients who have symptomatic carotid artery stenosis. *Results:* Frontal assessment battery (FAB) was low significantly for the patients with bilateral severe stenosis. FAB had significant relations to the severity of periventricular hyperintensity, but not the of carotid artery stenosis. Additionally, there were significant correlation between FAB and rCBF of bilateral frontal lobe, thalamus and wide area of right hemisphere. *Implications/Impact on Rehabilitation:* These results investigated that assessment of frontal lobe function is effective to detect bilateral stenosis of carotid artery. And chronic hypoperfusion of wide area may be play a role in the deterioration of cognitive, especially frontal lobe, dysfunction in the patients with stenosis of internal carotid artery.

No. 151

ROLE OF LIAISON CLINICAL PATHWAY FOR STROKE PATIENTS IN REGIONAL NETWORKS

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Japan

Objective: We suggested a set of issues that were revealed in establishing the regional network with convalescence rehabilitation hospitals to access the functional prognosis of patients at discharge from the standpoint of dealing with rehabilitation in an acute hospital. *Method:* Out of 508 stroke patients who used the regional critical pathway were enrolled in this study. Collection and completeness of used regional critical pathways, physical and cognitive function at transfer, improvement in convalescence rehabilitation hospitals, and final outcome were investigated. *Results:* The return percentage of the pathways from rehabilitation hospital was 72.4%. Ninety-three (24.5%) and sixty-nine (18.8%) pathways were found to be incomplete in acute and convalescence rehabilitation hospitals, respectively. Time to transfer to a convalescence rehabilitation hospital was 31.1 ± 14.4 days. Mean length of stay in a convalescence rehabilitation hospital was 95.8 ± 59.5 days. After discharge, 283 patients (78.1%) returned home, 21 (5.8%) entered an other medical hospital, 50 (13.8%) went to a nursing care facility, and 8 (2.2%) had other outcomes. There was obvious difference in mean length of stay and ADL improvement per day (FIM efficiency) among the referred convalescence rehabilitation hospitals. *Implications/Impact on Rehabilitation:* All healthcare facilities using the regional critical pathway need to have a common recognition of stroke rehabilitation. By using the regional critical pathway network system, rehabilitation staff in acute hospital should proactively contribute to the qualitative improvement of rehabilitation in stroke patients during the recovery period.

No. 152

THE EFFECT OF GROUP TRAINING IN BRAIN-DAMAGED PATIENTS WITH SOCIAL BEHAVIOR DYSFUNCTIONS

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Japan

Objective: Subjects: 14 brain-damaged patients including 10 patients with head injury were investigated (average age: 28.2 years at training initiation, 19.8 years when they received injury). Neuropsychological tests revealed WAIS R/III: FIQ 70 to 99; WMS R General Memory: <50 to 101. Their dysfunctions included attention deficit, memory disorder, executive dysfunction, and social behavior disorder (in 9 patients with head injury). **Method:** Program: It included sharing the knowledge about higher brain dysfunction, cooking training, problem-solving training and tea serving for peer patients. Process: The patients could not cooperate with each other at first and sometimes fought. The irritable patients behaving violently were temporarily separated from the training. They could not consider solutions in the discussion about possible social problems at first, but became able to think about solutions by listening to others responses after the training. **Results:** The training enabled the patients to cooperate for planning and improved their behaviors. Ten patients obtained job or trial positions. **Implications/Impact on Rehabilitation:** Poor self-cognition is problematic for these patients during social activities. Observing behaviors of other patients objectively helped them monitor their own behaviors. They also improved their behaviors with advices and feedbacks from staff members about their failures in activities and interpersonal relationships. The therapists had a critical role. They needed to understand patients' dysfunction status for clear instructions for each patient. When the patients were upset, the therapists needed to calmly ask them the reasons for their anger and provided them with appropriate resolution and alternative perspective. Since large number of patients with social behavior disorder had injuries by traffic accidents in their teens, they have not learned moral sense or sociality well yet. The authors consider that through group training activities, they learned the importance of responsibility and consideration for others, and these led to their finding jobs.

No. 153

CEREBRAL BLOOD FLOW CHANGES DURING MOTOR IMAGERY AND EXECUTION ASSESSED WITH NEAR-INFRARED SPECTROSCOPY (NIRS) IN PATIENTS WITH STROKE

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Japan

Objective: Brain-computer interface (BCI) using motor imagery (MI) has been recently proposed as a neurorehabilitative tool for stroke patients. Few reports are available, however, studying the differences of neural activity during motor execution (ME) and MI. The objective is to examine cerebral blood flow changes associated with the tasks using NIRS. **Method:** We recruited six patients with hemiparesis at least 2 months after stroke who received standard rehabilitation at our rehabilitation hospital (mean age, 58.6 years; 3 with cerebral infarction and 3 with intracerebral hemorrhage; 2 right hemiparetics and 4 left hemiparetics). The degrees of finger voluntary control as assessed with the Stroke Impairment Assessment Set (SIAS) were 1b in one patient, 2 in two patients, and 4 in three patients. Changes in oxy- and deoxy-hemoglobin concentration were measured with NIRS during ME and MI of extending the fingers of each hand. Simultaneously, surface electromyogram was recorded from both finger extensors and biceps brachii. We also examined the Kinesthetic and Visual Imagery Questionnaire (KVIQ) to evaluate the quality of MI. **Results:** Unaffected hand ME and MI activated

bilateral primary motor areas (PMA) with contralateral predominance in 4 patients. Also, affected hand ME activated bilateral PMA without laterality in 4 patients. Affected hand MI activated bilateral PMA in 4 patients, and activated only contralateral PMA in one patient. The changes during MI were smaller than during those ME in all cases. **Implications/Impact on Rehabilitation:** Our NIRS study suggested that MI of the affected hand induced activations in both ipsilesional and contralesional hemispheres similar to ME. This information might be helpful to design NIRS-based BCI. Further study is needed to explore the influences of lesion site and severity of hemiparesis.

No. 154

STATIC AND DYNAMIC ASSESSMENT OF SWALLOWING BY USING 320-DETECTOR ROW COMPUTED TOMOGRAPHY

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Objective: To determine the feasibility of 320-detector row computed tomography (320 MSCT) for 1) morphologic analysis of pharynx and larynx and 2) kinematic analysis of swallowing in context of dysphagia rehabilitation. **Method:** After informed consent, 1) 50 healthy volunteers underwent single-phase volume scanning and 2) 10 healthy volunteers underwent multi-phase volume scanning while swallowing of a 10-ml honey-thick liquid (5% w/v) in a 45° reclining position on Aquilion One scanner (Toshiba, Japan). The scanning range was 160 mm from the skull base to the upper esophagus. The scan parameters were 0.5-mm thickness by 320 rows, 0.35 s/rotation, 120 kv and 60 mA. 1) Static 3D images were created. The volume of oropharyngeal and hypopharyngeal cavity, and the diameter of anteroposterior pharynx and the glottis were measured. The volume, depth and cross-sectional areas (CSA) of pyriform sinus (PS) were also calculated. The effects of gender, age, height and weight were investigated statistically. 2) Dynamic 3D images were created in 29 phases of 0.10-s interval over a 2.90-s duration. The timing of movements of hyoid bone, epiglottis, laryngeal vestibule, true vocal cords (TVCs), and pharyngoesophageal segment (PES) were measured. **Results:** 1) Gender, age, height and weight affected on the volume and the shape of pharynx and larynx. The diameters of glottis and the CSA of PS was affected by gender. The volume on oropharyngeal cavity was affected by age, height and weight, while hypopharyngeal cavity was only affected by height. 2) The sequence of swallowing was following: first, the hyoid started to elevate, s, the PES opened, third, TVCs closure and laryngeal vestibule closure occurred almost simultaneously during the hyoid elevation, and last, the epiglottic maximum inversion occurred. **Implications/Impact on Rehabilitation:** We achieved remarkable advances in static and dynamic biometry of swallowing by using 320-MSCT. 320-MSCT seemed to become an innovative evaluation tool for promoting dysphagia rehabilitation.

No. 155

IMPROVEMENT OF ARM AND HAND PERFORMANCE ON UN-AFFECTED SIDE IN HEMIPLEGIC PATIENTS DURING STANDING POSITION

Yusuke Sasaki, MD; Hidenori Tojo, PT; Nami Kanno, MD, PhD; Takeshi Nakamura, MD, PhD; Midori Yamanaka, MD; Fumihito Tajima, MD, PhD
Japan

Objective: The main objective of this study was to compare the hand and finger performance on un-affected side of stroke patients in standing and sitting positions. **Method:** The study subjects were 11 males and 3 females with history of stroke (age, 68.6 ± 6.3 years, mean \pm SD). Inclusion criteria were right-handedness before stroke, right hemiparesis due to left hemisphere lesion induced by stroke, at least 4 months between stroke and study enrollment, and ability to stand for more than 10 min. Tests of dexterity (peg board test), attention, unilateral spatial neglect, and cognition were conducted in comfortable sitting and standing positions. Seven subjects started in standing position, and the other seven subjects were tested first in sitting position. Tests in the first position were performed on one day, and repeated one week later but performed in a different position. **Results:** The mean performance time on the peg board test in standing position was significantly faster than in sitting position ($p=0.022$). However, the results of the Trail making test-part A, line cancellation test, line bition and Mini Mental State conducted in standing position were similar to those of sitting position. There were no differences between the first and s trial tests. **Implications/Impact on Rehabilitation:** Our results showed that standing position improved the functional performance of hand and arm on the un-affected side in stroke patients, but had no effects on consistent attention, unilateral spatial neglect, or cognition.

No. 156

IMPAIRED RECOVERY OF COGNITIVE FUNCTION AFTER STROKE PATIENTS WITH DIABETES IN ACUTE REHABILITATION

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Objective: To understand the impact of diabetes on recovery of cognitive function after stroke in acute rehabilitation and to suggest effective rehabilitation program for stroke patients with diabetes. **Method:** A retrospective comparative study design. Data of stroke patients registered with the Rehabilitation Patients Databank in Japan were used. Diabetic ($n=110$) and non-diabetic ($n=553$) stroke patients in 8 acute rehabilitation hospitals were selected and stratified according to Functional Independence Measure (FIM) scores on admission into severe, moderate and mild ($18 \leq \text{Severe} \leq 54$, $55 \leq \text{moderate} \leq 90$, $91 \leq \text{mild} \leq 126$) deficits groups. There were 345 patients with severe deficits (DM, $n=54$ vs. non DM, $n=291$), 151 with moderate deficits ($n=27$ vs. $n=124$) and 167 with mild deficits ($n=29$ vs. $n=138$). Cognitive FIM efficiency (CFE) scores were used to assess the patients' functional recovery. CFE was calculated by taking the difference between the admission and discharge score, and dividing that by the length of stay. Functional outcomes of diabetics and non-diabetics were analyzed by Mann-Whitney U test and Chi-square test, and hierarchical linear regression analysis. **Results:** The CFE in diabetic patients with severe deficits was significantly lower than non-diabetic patients (DM vs. non DM; 0.1 ± 0.2 vs. 0.2 ± 0.3 points/day, $p=0.035$). In severe patients, the presence of diabetes ($\beta=0.104$, $p<0.05$) and shorter rehabilitation time/day ($\beta=0.224$, $p<0.05$) were significantly associated with lower CFE scores (adjusted $R^2=0.103$, $p<0.01$). In moderate patients, after adjustment for cognitive FIM on admission, the presence of diabetes ($\beta=-0.183$, $p<0.05$) was associated with lower CFE scores (adjusted $R^2=0.348$, $p<0.01$). **Implications/Impact on Rehabilitation:** In severe and moderate patients, recovery in cognitive function after stroke may be impaired in patients with diabetes compared with non-diabetic patients. Diabetic stroke patients with severe deficits could improve higher cognitive function by receiving more rehabilitation time.

No. 157

THE EFFECT OF AN UNSTABLE SOLE PLATE ON POSTURAL BALANCE DURING A STAND-UP MOTION AND IN ERECT POSITION

Chizuko Umeki, PT; Kazu Amimoto
Japan

Objective: The purpose of this study was to investigate the effect of an exercise with an unstable sole plate on postural sway and the potential of such an exercise as therapeutic intervention in chronic stroke patients. **Relevance:** It is important to encourage the function of an affected leg in chronic hemiplegic patients. **Method:** Participants: Ten hemiplegic patients and four healthy elderly adults participated. All subjects were informed of the objectives and methods of the study and their consent to participation was obtained in writing. **Methods:** 1) Intervention: The intervention consisted of a sit-to-stand exercise and a walking exercise, both with an unstable sole plate. The intervention was carried out on the affected side after a week or longer, and then switched to the unaffected side. 2) Assessment tasks: Before and after the intervention, the following was measured: the load distribution and postural sway while standing up from a chair, the postural sway and the maximum lateral displacement of the center of pressure (COP) while standing upright. **Results:** In the patient group, in the stand-up motion, even though the load distribution showed no significant differences, a reduction in the root mean square (RMS) area of the COP path was observed after the intervention on the unaffected side. In the upright posture, the total sway path length decreased significantly (eyes opened $p=0.02$, eyes closed $p=0.05$) after the intervention on the unaffected side. In regards to the maximum COP displacement; however, a significant reduction in the total sway path length ($p=0.01$) was observed after the intervention on the affected side while a significant increase in the RMS area of the COP path ($p=0.03$) was observed after the intervention on the unaffected side. **Implications/Impact on Rehabilitation:** The unstable sole plate exercise may improve the leg function and standing balance.

No. 158

AN ATTEMPT OF SCREENING TEST FOR HIGHER BRAIN DYSFUNCTION IN VIETNAM

Miho Koike, OT; Naoki Nakazono; Rumi Tanemura
Japan

Objective: In Vietnam, traumatic brain injury is the worst cause of death, but rehabilitation of brain injury and cerebrovascular disease was still on process. So the evaluation and training against rehabilitation have not yet done. This study aims the creation of a screening test for higher brain dysfunction in collaboration with staff of the department of Rehabilitation in Cho Ray hospital, Ho Chi Minh City, Vietnam. **Method:** This screening test based on Tanemura's protocol is discussed and set by the staffs through several lectures and practical training with some modification in Vietnamese version. Under the training and practice in several times, we selected 4 staff. The four staffs were well trained and practiced. They evaluate the possibilities of higher brain dysfunction among 32 outpatients with brain injuries. **Results:** The screening test in Vietnamese version was slightly modified on their culture, traditions and life style of Vietnam. On the basis of this test, almost of all, except 2 cases, are suspected to have the higher brain dysfunction among 32 cases having conventional physiotherapy. To be diagnosed as higher brain dysfunction, some tests in more detail, such as memory and attention items, are required after screening. **Implications/Impact on Rehabilitation:** Now in Vietnam, one of serious public health issues is traffic accidents and industrial accidents. That is said to cause higher brain dysfunction, called "invisible disabilities". This screening test will be implemented to Vietnam, and modifying the Vietnamese version to detect early the suspected patients.

No. 159

SIX MIN WALKING TEST IN CEREBRAL PALSY SPASTIC PATIENTS IN GAIT REEDUCATION PROGRAMS WITH AND WITHOUT ROBOTIC EQUIPMENT

Russell René Arcila Novelo, MD; José Michelle Marín Rodríguez; Heidy Rocío Arrieta Díaz

Mexico

Objective: To compare the change in gait speed in spastic diplegia cerebral palsy patients treated with gait training with or without robotic assistance. **Method:** Applied the WeeFIM inventory and the six min walking test to two 10 patient groups, "A" group received a 10 sessions mechanic therapy and parallel bar assisted gait reeducation program, "B" group received the same program shifting the parallel bar for 11 robotic assisted gait training sessions (one session for equipment adjustment), to allow at least 20 min of assisted gait per session. Both groups were re-evaluated after 10 treatment sessions. **Results:** The speed increase was 0.1408 m/s and 0.2711 m/s to group A and B, respectively. ($p=0.017$). **Implications/Impact on Rehabilitation:** Both groups showed statistically significant differences in gait speed, these differences were bigger for the robotics group.

No. 160

EFFECTS OF CHEMODENERVATION OF THE RECTUS FEMORIS MUSCLE IN ADULTS WITH SPASTIC PARESIS WITH A STIFF KNEE GAIT: A SYSTEMATIC REVIEW

Martin J. B. Tenniglo; Marc J. Nederhand, MD, PhD; Karen Harmelink; Anand V. Nene; Hans J. Rietman; Jaap H. Buurke

Netherlands

Objective: To determine the effect of Motor Branch Block (MBB) and/or Botulin Toxin A (BTX-A) of the Rectus femoris on 1) peak swing knee flexion and 2) functional outcome in patients with spastic paresis. **Method:** A computerized literature search was conducted in Embase, PubMed, CINAHL and the Cochrane library, using MESH terms. Included were studies with adult patients, suffering from a central neurological disorder with a 'stiff knee' gait pattern, treated with MBB and/or BTX-A injections. Outcome measure included at least knee flexion during swing phase. Methodological quality was scored by criteria developed by Downs and Black. A Best Evidence Synthesis (BES) categorized evidence into 5 levels, based on the type of design, methodological quality and significant findings of outcome measures. **Results:** Literature search yielded 508 articles. The selection procedure led to the inclusion of 8 articles (4 BTX-A and 4 MBB), with a total of 112 subjects (95 Stroke, 17 other diagnosis). Methodological quality of 3 studies was scored as high (≥ 17) and five studies as low (< 17). Knee flexion during swing increased statistically significant in all 4 BTX-A studies (range 5–110), and in 2 MBB studies (10,8 and 15,40). BES showed that there are 'indicative findings' for the effect of BTX-A and 'no evidence' for the effect of MBB. Walking speed improved significantly in 1 out of 5 studies after BTX-A (0.61 to 0.74 m/s). In MBB studies there were no improvements of functional outcome. BES showed that there is 'no evidence' for the effect of BTX-A or MBB in functional outcome. **Implications/Impact on Rehabilitation:** The level of evidence is low, partly because of low methodological quality of the studies. However, other factors, e.g. hip flexor and plantar flexor weakness may also play a role in 'Stiff knee' gait. Adequate indication setting seems to be important for the effect of chemodenervation of the rectus femoris.

No. 161

REACH TRAINING USING AN ARM SUPPORT DEVICE TO IMPROVE UNSUPPORTED ARM MOVEMENTS IN CHRONIC STROKE

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The Netherlands

Objective: After stroke, involuntary coupling of shoulder abduction and elbow flexion is often observed. This can be reduced instantaneously by application of arm support, which increases range of motion. Along these lines, it is expected that application of arm support as training intervention improves unsupported reach. The purpose of this pilot study is to examine the influence of arm support training on reach performance. Such information gives insight into the way arm movements are affected by arm support in general, which is often applied in conventional practice and also in newly developed rehabilitation technologies, such as robotics. **Method:** Seven persons with chronic stroke received 6 weeks of reach training (18 30-min sessions per week) with arm support by the Freebal device, combined with a rehabilitation game. Arm function (Fugl-Meyer (FM) upper extremity assessment) and unsupported reach (involving work area, maximal reach distance and joint angles of shoulder and elbow) were assessed before and after training. **Results:** After training, FM scores and work area had improved in 6 of 7 persons (mean +3.3 points and +3.4%, respectively). Maximal reach distance increased in all persons but one (mean +3.6% of arm length). This increase was accompanied mainly by a larger elbow extension excursion (mean +9.2°) and shoulder elevation (mean +4.6°). **Implications/Impact on Rehabilitation:** Reach training with arm support has led to improvements in unsupported arm movements in persons with a range of mild to severe hemiparesis, and indicates that arm support has the potential to increase work area. Arm support seems a suitable way to provide independent, active and task-specific treatment, without the need for high-tech devices.

No. 162

OBJECTIVE CIRCLE METRICS TO QUANTIFY ARM FUNCTION FOLLOWING STROKE

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Objective: The majority of people suffering from stroke have to cope with involuntary coupling of shoulder and elbow muscles, resulting in synergistic movement patterns of the hemiparetic arm. Arm function following stroke is often evaluated with clinical scales which can be subjective and time consuming. The aim of this study is to examine whether circle drawing metrics are suitable outcome measures to objectively quantify arm function after stroke. **Method:** Twenty healthy elderly and sixteen persons who experienced a stroke performed a circle drawing task in a non-actuated robotic exoskeleton that recorded joint angles of the upper extremity. Circle area and roundness were calculated from the measured hand paths. Synergistic movement patterns were identified based on changes in shoulder ab-/adduction and elbow flexion angles. Hemiparetic arm function was also assessed with the upper extremity part of the Fugl-Meyer (FM) assessment. **Results:** Circle area, roundness and the occurrence of synergistic movement patterns differed significantly between both groups ($p < 0.005$). Also strong correlations between stroke severity, as indicated by the FM, and circle metrics ($\rho \geq 0.72$) were found. **Implications/Impact on Rehabilitation:** Objective circle metrics were able to discriminate between healthy elderly and people suffering from stroke. The use of objective outcome measures in stroke rehabilitation allows uniform comparison of different interventions, to study their efficacy in order to find the most beneficial ones. Circle area and roundness can be administered quickly and easily, with any measurement system that is capable of measuring hand position. Such simple and affordable equipment is suitable to be deployed in clinical settings.

No. 163

AN ARM SUPPORT TRAINING DEVICE FOR STROKE PATIENTS; FROM DEVELOPMENT TO IMPLEMENTATION

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Objective: After stroke almost half of the patients have a limited arm function which interferes with daily life activities. One of the causal mechanisms for the reduced arm function is the involuntary, abnormal coupling between shoulder abduction and elbow flexion. Active initiation and execution of arm movements in meaningful environments with a high intensity of practice are crucial elements for optimal motor relearning of the hemiparetic arm after stroke. A promising way to integrate these key elements of motor relearning into post stroke rehabilitation is the use of robotic systems. Application of rehabilitation robotics in clinical practice is up coming, but the extent to which robotics or other electromechanical devices are truly part of standard stroke rehabilitation is still limited. Previous research of our research group has led to the development of a relatively simple and cheap device for arm support (Freebal; now ArmeoBoom by Hocoma), which has shown potential to improve unsupported reaching after stroke while being easy to use. However, to attain actual use of arm support devices/robotics in clinical practice, such devices need to be (successfully) implemented in stroke rehabilitation on a large scale. The main objective of this presentation is to describe the process from development of the robotic device, the results of performed pilot studies to the ongoing implementation in several rehabilitation centers in the Netherlands. **Implications/Impact on Rehabilitation:** With the graying of the population, it is expected that the prevalence of stroke survivors will increase rapidly. These demographic changes will cause a substantial increase in pressure on the healthcare systems. The use of biomechanical technology like robotics in rehabilitation practice could be to some extent a solution for this problem.

No. 164

STABILOMETRIC APPRAISAL – ANALYSIS OF REPEATABILITY

Piotr Tederko, MD; Marek Krasuski, MD, PhD

Poland

Objective: Outcome of stabilometric appraisal may be biased by numerous internal and external factors that are frequently unobtainable. Purpose of the study is to analyze the repeatability of results of static stabilometry and preliminary determination of appraisal guidelines. The study was performed on the group of 100 healthy volunteers aged between 21–69 years. **Method:** Stabilometric evaluation in static standing with spontaneous feet position (S), closed basis (C) and open basis (W) with open and closed eyes. The test was repeated in consecutive days. **Results:** Evaluation of results obtained with open eyes revealed: repeatability fulfilling criteria of clinical usefulness (correlation coefficient $cc > 0.6$) in path length (PL; $cc = 0.7$), mean velocity of centre of feet pressure (CoP) displacement (V; $cc = 0.76$), mean CoP position in sagittal axis (Y; $cc = 0.75$) in position C; L ($cc = 0.71$), V ($cc = 0.7$) and Y ($cc = 0.6$) in position S; mean CoP position of in frontal axis (X; $cc = 0.71$) and Y ($cc = 0.69$) in position W. Evaluation with closed eyes resulted in identification of clinically useful repeatability of PL ($cc = 0.83$); V ($cc = 0.86$), Y ($cc = 0.76$), areas covering 100% of data points: circular (ACir) ($cc = 0.77$), rectangular (ARec) ($cc = 0.77$), elliptic 95% (E) ($cc = 0.78$) and effective covering 66% of data points (AEf) ($cc = 0.77$), in position C; ACir ($cc = 0.78$), ARec ($cc = 0.64$), L ($cc = 0.9$), V ($cc = 0.92$) i Y ($cc = 0.77$) in position S; AEF ($cc = 0.64$), V ($cc = 0.92$), X ($cc = 0.73$) i Y ($cc = 0.72$) in position W. **Implications/Impact on Rehabilitation:** Appraisal of area outlined by CoP

should be based of measurement of ACir, ARec, AEF i E in position C with closed eyes. Appraisal of L should be conducted in positions C or S with closed eyes. Symmetry of weight bearing should be evaluated in position W.

No. 165

ROMBERG INDEX IN STABILOMETRIC EVALUATION

Piotr Tederko, MD; Marek Krasuski, MD, PhD
Poland

Objective: Romberg index (RI) is a quotient of result of stabilometric measurements conducted with eyes closed (EC) and opened (EO). Purpose of the study is to determine trends and repeatability of stabilometric RIs. The study was conducted on the group of 100 healthy volunteers aged between 21–69 years. **Method:** Stabilometric evaluation performed in spontaneous feet position (S), closed basis (C) and open basis (W) with EO and EC. Retest was conducted in a consecutive day. **Results:** In all analysed positions correlation coefficients (cc) defining repeatability were higher with EC compared to EO. Analysis of parameters describing area outlined by centre of feet pressure (CoP) revealed that closure of eyes resulted in: significant increase of areas covering 100% of data points: circular (ACir), rectangular (ARec), elliptic 95% (E) and effective area covering 66% of data points in position C; decrease of ARec, ACir, E in position W, lack of significant changes in position S. Path length (L) and velocity of CoP displacement (V) rised in all positions; quotient L/ACir decreased in position C, increased in positions S and W. Closure of eyes resulted in significant displacement of CoP backwards in position C but not in positions S and W. Index V in position C was the only analysed RIs characterized by clinically usefull repeatability ($cc = 0.63$). **Implications/Impact on Rehabilitation:** Closure of eyes decreases scatter of stabilometric results. Path length and mean velocity of centre of foot pressure displacement increase with eyes closed. Remaining parameters undergo diverse changes after closure of eyes and character of these tendencies depends on feet position. Romberg index is repeatable for velocity of centre of foot pressure displacement only.

No. 166

SYMPTOMATIC MANAGEMENT OF MULTIPLE SCLEROSIS – PRM PERSPECTIVE

Sabrina Pimentel; Teresa Toste

Portugal

Objective: To review the main rehabilitation approaches for MS in order to present a summary of practical recommendations related to symptomatic management of MS that can be given to patients. **Method:** The Cochrane Library, Cochrane Database of Systematic Reviews and MEDLINE database were searched for relevant original articles, systematic reviews and meta-analysis using multiple sclerosis and rehabilitation as MeSH terms. Seven original articles and two systematic reviews were included in the literature review as well as three books. **Results:** In MS, rehabilitation prevents physical deconditioning and disuse atrophy and contributes to maintaining and maximizing functional independence. In the literature, some practical recommendations related to rehabilitation for patients with MS have been described, focusing strategies to more easily manage patients with weakness, balance problems (ataxia and tremor), spasticity, mobility problems, bladder or bowel dysfunction, heat intolerance, speech and swallowing disorders, cognitive dysfunction and fatigue, one of the most studied aspects. Frequent periods of rest along the day, scheduled rest periods, more activities in the morning than in the afternoon, techniques for energy conservation or work simplification, techniques for body cooling and aerobic training are some examples of practical rehabilitation strategies. **Implications/Impact on Rehabilitation:** These practical recommendations related to symptomatic management of MS are simple but effective and can significantly contribute to patients' functional improvement.

No. 167

MIRROR MOVEMENTS – CASE REPORT***Sabrina Pimentel; Isabel Lopes; Teresa Toste; Fernando Parada****Portugal*

Objective: To present a clinical case of acquired mirror movements of the hand which resulted from an acute brain lesion. **Method:** Case report of a 18-year-old female patient with a history of acute lymphoblastic leukemia and multiple cerebral lesions, who underwent a central nervous system stereotactic biopsy which was complicated by intra-parenchymatous hemorrhages and who, as a result, developed acquired mirror movements in left hand. **Results:** After specific rehabilitation treatment (Occupational Therapy), patient's mirror movements gradually disappeared. **Implications/Impact on Rehabilitation:** The case report highlights the fact that mirror movements can present after acute brain lesions. In consonance to latest studies, it shows that mirror movements appear to reflect an increased activation of the undamaged ipsilateral motor cortex. It also shows that mirror movements are usually relatively subtle, so that patients can find them inconvenient and embarrassing but not disabling.

No. 168

MANUAL OF EXERCISES FOR THE PATIENT INJECTED WITH BOTULINUM TOXIN***Énio Pestana¹; Irina Peixoto²; Anabela Pereira, Psychiatrist³; Jorge Lains⁴****¹CHLN – HSM, Lisboa, ²Hospital de São Teotónio, Viseu, ³CMRRC – Rovisco Pais, Tocha, ⁴CMRRC – Rovisco Pais, Tocha, Portugal*

Objective: Botulinum toxin (BT) is used to treat focal spasticity in muscles, due to lesions in the central nervous system. The injection of BT must be part of the Rehabilitation program of the injected muscles that include stretching exercises, strengthening of the non-spastic antagonist muscles and orthoses or casts to enhance the clinical effect of the BT. There is few international published protocols of rehabilitation after BT injection so the authors decided to include the information from international literature with the experience of the staff of the Centro de Medicina de Reabilitação da Região Centro – Hospital Rovisco Pais (CMRRC-RP) to create the Manual of exercises for the patient injected with BT. **Method:** Research of the articles and international guidelines published in PubMed between 2000 and 2010 with the MeSH terms: botulinum toxins and muscle spasticity and exercise therapy and physical therapy modalities. We found 10 papers that gathered the characteristics and information desired. **Results:** After injection with BT the patient must be instructed to watch for potential side effects of the BT (pain, muscle weakness, flu-like syndrome). The exercises must begin in the very next days after injection and the patient must repeat them in a quiet place, several times each day (if needed, with the help of another person) and in a more intensive way on the first month. These exercises are directed to the injected muscles (upper and lower limb) with the aim of improving their function. Done in the context of functionally relevant activities, these home-made exercises can complement the treatment ordered by the physiatrist. **Implications/Impact on Rehabilitation:** The information and education of the patient (and caregivers) are essential for the success of the treatment with BT. The manual of exercises for the patient injected with botulinum toxin is a useful and practical tool that increases the clinical efficiency of the BT and tries to fill a gap in the Rehabilitation program of a patient with spasticity.

No. 169

GOAL ATTAINMENT ANALYSIS IN A BONTA SPASTICITY CLINICS***Luis Jacinto, MD; L. Gonçalves; S. Paradinha; J. Morais***
Portugal

Objective: Defining treatment goals and evaluating results in PM&R, are challenges often faced in clinical practice. The role of BoNT-A as a key element in the management of spasticity must be evaluated through the use of tools, which make it possible to gather data from different centers, different types of patients, aetiologies, impairments, needs and expectations. Goal Attainment Scaling (GAS) has been used for the evaluation of the success at reaching person centered goals, which are scored in a standardized way. The purpose was to evaluate the team's capacity for customizing goals and estimate the results of treatment interventions. The authors present their experience and results, concerning person centered goals for spasticity treatment with BoNTA. **Method:** The results presented concern the first 36 patients included, and the GAS scores were calculated before and after 1 treatment cycle for 92 goals. Statistical analysis was performed with parametric (T test for paired and for independent samples) and non parametric tests (Wilcoxon signed ranks test and Mann-Whitney test). **Results:** The average final GAS scores were 49.8 for all goals, and 49.4 when only primary goals were looked at. In both cases the difference between before and after scores was statistically significant, $p < 0.001$, therefore the intervention had a measurable effect. There was no statistically significant difference between GAS score change for all goals and for primary goals only ($p = 0.101$, $p = 0.223$). **Implications/Impact on Rehabilitation:** The implementation of such tool in a neurorehabilitation setting helps the teams to focus and have a real perspective of their degree of accuracy when defining goals, as well as their success at reaching them. The results indicate that our group has a good capacity to define person centered goals and predict the expected results.

No. 170

WEST NILE NEUROINVASIVE DISEASE IN PUERTO RICO***Gerardo Miranda, MD; Gualberto Oquendo, MD; Myriam Crespo, MD; Michelle González, MD****Puerto Rico*

Objective: West Nile virus (WNV) is a flavivirus distributed worldwide, maintained in nature between birds and Culex species mosquitoes. Infection is transmitted to humans most commonly by mosquito bite, and rarely through transplanted organs and infected blood products. It was first detected in the United States (US) in 1999; from that point through 2008 a total of 28,961 confirmed and probable cases of WNV disease have been reported, none outside US mainland. We present the first case of WNV infection in Puerto Rico. **Method:** We are reporting a 67-year-old male admitted to an inpatient rehabilitation unit with quadriplegia. Two weeks prior to admission he was taken to an acute care hospital with altered mental status and progressive lower extremity weakness. Patient presented generalized weakness with lower extremity areflexia and flaccid paralysis. He was found with diffuse impaired sensation to soft touch and pinprick in all extremities. **Results:** Head computed tomography showed no acute changes, and magnetic resonance imaging of the lumbar spine revealed no evidence of spinal cord compression or other abnormalities. Evaluation of the cerebrospinal fluid showed elevated protein levels, presence of West Nile virus immunoglobulin M (IgM) and IgG. Electrodiagnostic studies were performed four weeks after initial presentation and revealed a severe sub-acute mixed (mostly axonal) sensorimotor polyneuropathy. **Implications/Impact on Rehabilitation:** The WNV is found worldwide; however, this is the first described case of human infection in Puerto Rico. An estimated 80% of cases are asymptomatic, and the usual symptomatic human infection is undistinguishable from dengue fever. Less than 1% of cases present West Nile neuroinvasive disease, presenting as encephalitis, meningitis, or flaccid paralysis or a mixed pattern of disease. Muscle weakness is attributed to a poliomyelitis-like syndrome or a Guillain-Barré-like syndrome (GBLS).

No. 171

RARE NEUROLOGIC SEQUELAE AFTER GUNSHOT WOUND TO THE HEAD

Gerardo Miranda, MD; Julio Vazquez, BA; Myriam Crespo, MD; Eduardo Ramos, MD
Puerto Rico

Objective: The main objective is to describe a rare combination of neurologic impairments after a gunshot to the head in an adult. Gerstmann syndrome is a neurologic disorder characterized by cognitive impairment. Primary symptoms include dysgraphia, dyscalculia, finger agnosia and left-right disorientation. Patients may also experience aphasia. In adults it is most commonly sary to stroke or localized damage to the dominant parietal lobe. **Method:** We present a case of a 47-year-old right-handed woman who suffered a gunshot wound to the left parietal lobe. She underwent emergency left parietal craniotomy, hematoma drainage, and dura mater repair with placement of external ventricular drainage. One week after episode she was evaluated for rehabilitation and was found active, alert, and oriented only to person and place, not to time. She was cooperative with exam and followed complex verbal commands. She had good sitting balance, but a wide base ataxic gait. Neurologic examination showed intact recent and remote memory, but had difficulty naming objects, performing simple mathematical calculations, and writing. She also had dexterity confusion. **Results:** She was admitted to our inpatient rehabilitation unit for intensive speech and occupational therapies for two weeks. She continued ambulatory rehabilitation after presenting marked progress in activities of daily living. However, cognitive impairments persisted after several months of continued rehabilitation. **Implications/Impact on Rehabilitation:** Traumatic brain injury is an uncommon cause for Gerstmann syndrome. Direct trauma to the head, such as a gunshot wound may cause diffuse neurologic damage that may be permanent and functionally disabling. However, in rare occasions injury may be localized and present with specific impairments. There is no treatment for this syndrome. Occupational and speech therapy play a very important role in the recovery of these patients. The functional prognosis in adults is usually good with symptoms diminishing overtime.

No. 172

CASE REPORT: BILATERAL THIRD CRANIAL NERVE PALSY AFTER TRAUMATIC BRAIN INJURY

Ki Jung Kim, MD; Dong Jin Kim, MD; Young Uhk Kim, MD; Dong-wook Rha, MD
Republic of Korea

Objective: Bilateral third nerve palsy caused by traumatic head injury has been rarely reported. **Method:** We describe a case with complete bilateral oculomotor palsy caused by traumatic midbrain hemorrhage after traffic accident. **Results:** An 8-year-old boy sustained a head trauma during pedestrian motor vehicle accident. On admission to emergency room, his mental status was coma as GCS score 7. Although hemorrhagic contusion and diffuse axonal injury were observed in both frontal lobe and pons on brain MRI, surgical treatment was not needed. Two months after accident, he awakened from coma. However, he presented with bilateral ptosis and limited bilateral upward, downward and medial motion of both eyes with dilated and poorly reactive pupils. Follow-up brain MRI showed old hemorrhagic residues on midbrain and pons. He got to be able to roll over and sit with moderate assistance but, showed features of ataxia. He scored 36 points in GMFM 88, 64 points in ICARS and 27.5 points in SARA. Eight months after accident, he showed significant improvements in cognition and motor function. (23 points in Korean MMSE, 125 points in GMFM 88) He was able to stand independently for a few s and walk with moderate assistance. But, bilateral oculomotor palsy and ataxia were not improved (64 points in ICARS and 27 points in SARA). **Implications/Impact on Rehabilitation:** Bilateral third nerve palsy caused by traumatic head injury is hard to improve.

No. 173

A CASE OF NASOGASTRIC TUBE INSERTED INTO GASTROCUTANEOUS FISTULA

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Republic of Korea

Objective: Clinicians generally auscultate bowel sounds and check chest X-ray films to make sure of precise location after insertion of nasogastric tube. We report a rare case of nasogastric tube inserted into gastrocutaneous fistula after removing a gastrostomy tube with soft tissue infections. **Method:** A 78-year-old man was performed two decompressive craniectomies two years ago, because of left thalamic, left frontal, and intraventricular hemorrhage. After one month, he underwent a ventriculoperitoneal shunt due to hydrocephalus. He was alimented via percutaneous endoscopic gastrostomy tube due to dysphagia after onset of cerebral hemorrhage. Three times of VFSS was performed during rehabilitation, but tracheal aspiration continued, so percutaneous endoscopic gastrostomy tube was maintained. After a year, bloody exudate, rubefaction, and ulceration of soft tissue around gastrostomy site was observed, and they were diagnosed as soft tissue infection. Then gastrostomy tube was removed, and antibiotic agents were infused immediately. The day after nasogastric tube was inserted for appropriate hydration and peroral medication, and intragastric location of tube was confirmed by auscultation. But, there was no significant improvement of soft tissue infection, moreover, amount of bloody exudate was increased in three days. **Results:** Abdominal computed tomography revealed nasogastric tube placed under skin via gastrocutaneous fistula. Nasogastric tube was removed, and antibiotic agent was kept, and his nutrition was maintained by total parenteral nutrition. After 3 weeks, the sign of infection was fully improved, and percutaneous endoscopic gastrostomy was operated again. **Implications/Impact on Rehabilitation:** Gastrostomy tubes are frequently removed due to infection or accidental cause, then nasogastric tubes are used for appropriate hydration and peroral medication. Generally, gastrocutaneous fistula is closed within hours or days, but sometimes persisted in 2–44% of patients. So, this case shows necessities of an appropriate interval between removal of gastrostomy and insertion of nasogastric tube, and suspicion of existence of gastrocutaneous fistula.

No. 174

EFFECT OF ELECTRIC CORTICAL STIMULATION AFTER FOCAL TRAUMATIC BRAIN INJURY IN RATS

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Objective: To evaluate the effects of the electric cortical stimulation in experimentally induced focal traumatic brain injury (TBI) rat model on the motor recovery and the plasticity of injured brain. **Method:** Twenty male Sprague-Dawley rats were pre-trained on a single pellet reaching task (SPRT) and Rotarod test (RRT) for 14 days, and then TBI model was induced by weight drop device (40g in weight, 25 cm in height) on dominant motor cortex, and the electrode implanted over the peri-lesional cortical surface after confirmation of lesion by magnetic resonance imaging (MRI). All rats divided into two groups as follows: Electrical stimulation group (ES), anodal continuous stimulation (50 Hz and 194 μ s duration) or Sham-operated control group (SOC), no electrical stimulation. The rats were trained SPRT and RRT for 14 days for rehabilitation and measured Garcia's neurologic examination. Histopathological and histoimmunostaining evaluations were performed after the experiment. **Results:** 1) There were no differences in slice number and total volume of injured area in histological analysis and MRI. 2) The Garcia's neurologic scores & SPRT were significantly increased in the ES but there was no difference in RRT in both group

($p < 0.05$). 3) The ES showed better expression of c-Fos around the brain injured area than the SOC ($p < 0.05$). *Implications/Impact on Rehabilitation:* Electric cortical stimulation with rehabilitation is considered to be one of the trial methods for motor recovery in TBI. However, more studies should be done for TBI model to establish better stimulation methods.

No. 175

THE CHARACTERISTICS OF DYSARTHRIA IN ISCHEMIC STROKE PATIENTS

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Objective: To investigate the characteristics of dysarthria in acute ischemic stroke patients using Korean articulation assessment tools. *Method:* Twenty-four patients (12 men, 12 women; age 71.3 ± 10.5 years; duration 5.8 ± 2.0 days; right hemisphere 15 patients, left hemisphere 9 patients) who developed dysarthria after acute ischemic cerebral infarction were included. Dysarthria was assessed by maximal phonation time (MPT), alternative motion rates (AMR)-Pa, AMR-Ta, AMR-Ka, and sequential motion rates (SMR)-PaTaKa. The parameters of error analysis were the percentage of consonants correct, the percentage of vowel correct, the types of error according to the type and the position of consonant using the Picture Consonant Articulation Test (PCAT). *Results:* 1) Each MPT, AMRs, SMRs was lower than the average of general population. 2) The percentage of correctly pronounced phonemes was over 90%, PCC was $92.0 \pm 6.1\%$, and PVC was $90.8 \pm 11.0\%$. 3) The mean frequency of omission was 0.83 times, substitution was 1.9 times, and distortion was 0.2 times per patient. 4) According to the position, there were frequently mispronounced specific phonemes. 5) ‘O (‘ㅏ’ in Korean)’ and ‘U (‘ㅜ’ in Korean)’ were frequently mispronounced vowels among 10 vowels ($p < 0.05$). *Implications/Impact on Rehabilitation:* Dysarthria in acute ischemic stroke patient has something in common, depending on the location and the type of phoneme according to PCAT. We think that our results can contribute to the development of more effective speech therapy program than routine syllable articulation practices in acute ischemic stroke patients.

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No. 176

SLEEP PATTERNS OF SUBACUTE STROKE PATIENTS

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Objective: To assess the pattern of sleep disturbances in subacute stroke patients and the association of the pattern of insomnia with functional recovery. *Method:* Twelve hemiplegic subacute stroke patients (7 men, 5 women; age 52.6 ± 17.1 years; duration 16.2 ± 7.1 days; 7 ischemic stroke, 5 hemorrhagic stroke) who can obey on 3-step command were recruited. The patients with previous history of sleep disturbances, psychosis or seizure or the patients who took antiepileptic medication were excluded. We checked the sleep patterns with Questionnaire of 12-item Medical Outcome Scale

for Sleep (MOS) on admission and at 1 month after admission. Depression and anxiety were measured by Beck Depression Inventory (BDI) and Hamilton Anxiety Scale (HAS). Functional status was checked with Korean-Modified Barthel Index (K-MBI) and Functional Independence Measure (FIM). Cognitive function was evaluated by Korean-Mini Mental Status Examination (K-MMSE) and Lowenstein Occupational Therapy Cognitive Assessment (LOTCA). *Results:* 1) The MOS score was 29.7 ± 11.6 on admission and 41.8 ± 10.4 at 1 month after admission. There was significant increase in MOS score after 1 month of admission ($p = 0.002$). 2) The increment of FIM was significantly correlated with MOS score on admission ($r = 0.650$, $p = 0.022$). 3) The changes of K-MMSE, LOTCA were significantly correlated with MOS score on admission, respectively ($r = 0.818$, $p = 0.001$; $r = 0.889$, $p = 0.000$). 4) Depression was presented in 16.7% and anxiety was presented in 33.3% of the patients. The comorbidity of depression or anxiety did not affect the change of MOS score, respectively ($p = 0.085$, $p = 0.496$). *Implications/Impact on Rehabilitation:* In the management of stroke patients, the assessment and control of sleep disturbances had limited attention and was difficult to evaluate due to communication and concentration limitations. However, it is important to assess the sleep disturbance objectively and to control the sleep disturbances of patients with stroke to enhance the functional prognosis.

This work was supported by the CNU Specialization Grant funded by Chonnam National University; a grant of the Korea Healthcare Technology R&D Project, Ministry for Health, Welfare & Family Affairs, Republic of Korea. (A084869); and the Brain Korea 21 Project, Center for Biomedical Human Resources at Chonnam National University in 2010.

No. 177

THE EFFECT OF EGCG ADMINISTRATION AFTER EXERCISE ON COGNITIVE FUNCTION IN CHRONIC CEREBRAL HYPOPERFUSION RAT MODEL

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Objective: To investigate the effect of epigallocatechin-3-gallate (EGCG) administration after exercise on cognitive function in chronic cerebral hypoperfusion rat model. *Method:* Thirty-four 8-week-old male Sprague-Dawley rats were used. Chronic cerebral hypoperfusion was induced by bilateral common carotid arteries occlusion (BCCAO). They were randomly assigned into 3 groups: group A (BCCAO, $n = 10$); group B (BCCAO+treadmill exercise+normal saline, $n = 12$); group C (BCCAO+treadmill exercise+EGCG, $n = 12$). All rats were acclimated to treadmill exercise for 1 week. Group B and group C were subjected to daily 30-min regular treadmill exercise and 10-min cool down, once a day, 5 days a week, for 4 weeks. EGCG (15 mg/kg) was intraperitoneally injected every day right after treadmill exercise in group C, while normal saline (15 ml/kg) was injected in group B. Morris water maze (MWM) test was performed after regular treadmill exercise. The activity of superoxide dismutase (SOD) and the level of malondialdehyde (MDA) were analyzed. Cresyl violet stain was conducted for the evaluation of the neuronal damage in the hippocampus. *Results:* After 4 weeks treadmill exercise, escape latencies of group B and group C were significantly shorter than that of group A ($p < 0.05$). The crossings number of group C was more than those of group B and group A ($p < 0.05$), respectively. The activity of SOD was significantly higher in group C than group A ($p < 0.05$). The level of MDA was significantly lower in group C than group A and group B ($p < 0.05$), respectively. The number of normal neurons was more in group C than group A and group B ($p < 0.05$), respectively. *Implications/Impact on Rehabilitation:* EGCG administration right after exercise would be helpful in improving the cognitive function in chronic cerebral hypoperfusion rat model.

This work was supported by the CNU Specialization Grant funded by Chonnam National University; a grant of the Korea Healthcare Technology R&D Project, Ministry for Health, Welfare & Family Affairs, Republic of Korea. (A084869); and the Brain Korea 21 Project, Center for Biomedical Human Resources at Chonnam National University in 2010.

No. 178

THE EFFECT OF COMBINED THERAPY OF EXERCISE AND NOOTROPIC AGENT ON COGNITIVE FUNCTION IN FOCAL CEREBRAL INFARCTION IN RATS

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Objective: To investigate the effect of combined therapy of exercise and nootropic agent on cognitive function in focal cerebral infarction in rats. **Method:** Forty 10-week-old male Sprague-Dawley rats were subjected to photothrombotic cerebral infarction. All rats were randomly divided into 4 groups: group A was control photothrombotic rats ($n=10$); group B was photothrombotic rats with swimming exercise (20 min per day, 5 times a week, for 4 weeks) ($n=10$); group C was photothrombotic rats with oral administration of acetyl-L-carnitine (Nicetile®, Seoul, Korea) 75 mg/kg for 5 days ($n=10$); group D was photothrombotic rats with swimming exercise and oral administration of acetyl-L-carnitine ($n=10$). Cognitive function was evaluated at 1st day, 1st, 2nd and 4th weeks after cerebral infarction using Morris water maze test. After 4 weeks, all rats were sacrificed. The activity of superoxide dismutase (SOD) and the level of malondialdehyde (MDA) were measured. The neuron cells of the hippocampus were microscopically analyzed. **Results:** 1) The escape latency was shorter in group B, C and D than in group A. However, the differences were not statistically significant at 1st, 2nd, and 4th week, respectively. 2) The activity of SOD was more elevated in group B, C and D than in group A. Group D was more elevated than group B, C ($p<0.05$). 3) The level of MDA was more decreased in group B, C and D than in group A. Group D was more elevated than group B ($p<0.05$). 4) More normal neuronal cells were found in group B, C and D than group A in CA3 lesion of hippocampus. **Implications/Impact on Rehabilitation:** The combined therapy of exercise and nootropic agent would reveal positive add-on effect on declined cognitive function compared with monotherapy in focal cerebral infarction.

This work was supported by the CNU Specialization Grant funded by Chonnam National University; a grant of the Korea Healthcare Technology R&D Project, Ministry for Health, Welfare & Family Affairs, Republic of Korea. (A084869); and the Brain Korea 21 Project, Center for Biomedical Human Resources at Chonnam National University in 2010.

No. 179

EFFECT OF STIMULATION POLARITY OF TRANSCRANIAL DIRECT CURRENT STIMULATION ON THE NON-DOMINANT HAND FUNCTION

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Republic of Korea

Objective: To evaluate the motor excitability and hand function in the non-dominant side according to the stimulation polarity of transcranial direct current stimulation (tDCS) on the motor cortex in healthy person. **Method:** tDCS was applied on the hand motor cortex for 15 min at strength of 1 mA in twenty-six healthy right-handed adults. Subjects were divided randomly into anodal tDCS of non-dominant hemisphere group, cathodal tDCS of non-dominant

hemisphere group, anodal tDCS of dominant hemisphere group and sham group. Motor evoked potential (MEP) in the abductor pollicis brevis and Jabsen-Taylor Hand Function Test (JTT) in the non-dominant hand were measured before and after tDCS. JTT was practiced six times in advance, and all this studies were done by blind method. **Results:** There were significantly increased of MEP amplitude and improved JTT in the non-dominant hand after anodal tDCS on the non-dominant hemisphere ($p<0.05$). However, MEP amplitude was significantly reduced and JTT was not changed in the non-dominant hand after cathodal tDCS on the non-dominant hemisphere and anodal tDCS on the dominant motor cortex. **Implications/Impact on Rehabilitation:** Non-dominant hand function was improved by the increased excitability of motor cortex. However non-dominant hand function was maintained even though motor cortex excitability was decreased in a healthy person. Therefore homeostatic mechanism in the brain might be present to preserve function, further functional study of brain might be required to investigate this mechanism.

No. 180

QUANTITATIVE MEASUREMENT OF THE EFFECT OF FUNCTIONAL ELECTRICAL STIMULATION THERAPY IN STROKE PATIENTS WITH DYSPHAGIA

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Objective: To analyze the effect of functional electrical stimulation for dysphagia in stroke patients by quantitatively measuring residue of pyriform sinus and vallecular fossa. **Method:** Patients with early stage of stroke who are able to follow commands and to communicate were included in this study. After initial evaluation, the patients spent 2 weeks of natural recovery period, and then functional electric stimulation therapy was initiated and maintained for 4 weeks (1 h/day, 5 days/week). Evaluation was done with Video Fluoroscopic swallowing study every 2 weeks for a total 4 times. Image analysis program, Ulead Videostudio (Copyright 2003, Ulead systems, Inc.), was used to compute area of residue, sinus or fossa. Material/total area (M/T) ratio of pyriform sinus and vallecular fossa was calculated with area of residue by total area of sinus or fossa for solid, soft and liquid diets. To find spontaneous recovery of dysphagia, M/T ratio was compared between initial and 2 weeks follow up data. To verify the effectiveness and appropriate therapeutic period of electric stimulation therapy, M/T ratio was compared among before, 2 and 4 weeks after the therapy. **Results:** Mean age of 18 subjects (11 males, 7 females) was 67.2 ± 8.57 year-old, and mean post-stroke time was 44.3 ± 15.7 days. There was no statistically significant difference in M/T ratio of vallecular and pyriform sinus between initial evaluation and 2 weeks natural recovery phase. M/T ratio gradually decreased from initial to 4 weeks therapy in all types of diets including solid, soft and fluid diets for both vallecular and pyriform fossa. **Implications/Impact on Rehabilitation:** Functional electrical stimulation therapy for more than 2 weeks improves early stage dysphagia after stroke. Measurement of residue on pyriform sinus and vallecular fossa from Video Fluoroscopic Swallowing Study using image analysis program is valuable for quantitative analysis for follow up of dysphagia.

No. 181

THE EFFECT OF ANKLE FOOT ORTHOSIS ON POSTURAL CONTROL IN PATIENTS WITH POST-STROKE HEMIPLEGIA

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Republic of Korea

Objective: Ankle foot orthosis (AFO) is a useful orthosis to improve gait pattern, but lack of study on the static balance in hemiplegic

patients. This study was to investigate the changes of postural control and the effect of AFO on the static balance in patients with post-stroke hemiplegia. *Method:* Fourteen hemiplegic stroke patients with independent ambulation more than 10 m were included. The patients with severe cognitive impairment, severe visual spatial disturbance and musculoskeletal problems unrelated to stroke were excluded. The movement of center of gravity (COG) during static postural control was measured with Biodex Balance System SD® (Biodex Medical System, New York, USA) at three different conditions (barefoot, shoes and AFO) randomly for three times on same condition. Percent time in quadrant (anterior, posterior, left and right), overall, anterior-posterior and medio-lateral movement index were measured. *Results:* COG were distributed to the right and posterior quadrant during static standing for maintaining postural stability in patients with post-stroke hemiplegia, and this patterns were not changed with shoes or AFO application. There was tendency of weight shift to the sound side for maintaining postural stability in hemiplegic patients, but not statistically significant. Overall, anterior-posterior and medio-lateral movement index were increased in hemiplegic patients compared to control ($p < 0.05$), and decreased by application of AFO ($p < 0.05$). *Implications/Impact on Rehabilitation:* The impaired static postural control in patients with post-stroke hemiplegia was improved with AFO application.

No. 182

THE EFFECT OF EXPERIMENTAL ACUTE LOW BACK PAIN ON THE POSTURAL CONTROL

Hyun-Tak Song, MD; Min Kyun Sohn; Bong Ok Kim
Republic of Korea

Objective: Back pain patients have decreased functional balance and the tendency to place less weight on the painful side. This study aimed to evaluate the changes in static and dynamic postural control after developing acute low back pain. *Method:* Thirty healthy right-handed subjects were distributed into three groups; right back pain, left back pain and control groups. 0.5 ml of 5% hypertonic saline was injected into L4–5 paravertebral muscles over 5 s to evoke back pain. Maximal pain was developed at 3–5 min after injection with 4.25 VAS score. Normal saline was injected in control group. The movement of center of gravity (COG) during static and dynamic postural control with eyes opened and closed was measured using Biodex Balance System SD® (Biodex Medical System, New York, USA) before and 3 min after injection. Percent time in quadrant (anterior, posterior, left and right), overall, anterior-posterior and medio-lateral movement index were measured. *Results:* Before the injection, the COG distributed to the right (about 8:2) and posterior (about 3:7) side during static postural control with eyes opened and closed, and dynamic postural control with eyes opened ($p < 0.05$). However there was no statistical difference in COG distribution during dynamic postural control with eyes closed. Overall, anterior-posterior and medio-lateral stability decreased after back pain induced ($p < 0.05$). The deviation of COG to the right side was decreased in both right and left pain groups during static postural control. During dynamic balance evaluation, right back pain group showed increased deviation to the right side and left back pain group showed increased deviation to the left side. *Implications/Impact on Rehabilitation:* The body weight was distributed to the right and posterior quadrant for maintaining postural stability in healthy right-handed person. During acute back pain, the postural stability was impaired and different strategy was used for maintaining static and dynamic balance.

No. 183

A CASE OF HYPONATREMIA FOLLOWING THE USE OF PAROXETINE

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Republic of Korea

Objective: Paroxetine hydrochloride is a selective SSRI widely used for depression, panic disorder and anxiety disorders, and is favored for depressive symptoms in brain damage patients as it is known for their few affects on cognition or psychomotor function. Major side effects observed for Paroxetine are vertigo, headache, tremor, somnolence, anxiety, and gastrointestinal symptoms. It is reported that hyponatremia is also rarely observed. *Method:* A 69-year-old male with left hemiplegia due to cerebral infarction of right MCA was admitted and began rehabilitation treatment from January 7, 2010. Independent ambulation was possible under the supervision. In February 12, 2010, 20 mg of Paroxetine hydrochloride was prescribed with findings of depression symptoms and decreased motivation for treatment. *Results:* Next day the patient could not stand up and showed severe generalized weakness and decreased consciousness. Laboratory tests showed blood sodium at 109 mEq/l and Paroxetine administration was stopped. Total urine volume decreased and its dark color was consistent with concentrated urine. Urine osmolality was at 650 mOsm/kg, serum osmolality at 230 mOsm/kg and urine sodium at 99 mEq/l. 3% sodium was administered under the diagnosis of SIADH. The infusion rate was adjusted not to raise blood sodium over 12 mEq/l during first 24 h. After the first 6 h, furosemide was dosed orally as serum sodium was constantly low at 109 mEq/l. After 24 h of treatment, blood sodium increased to 119 mEq/l and patient regained consciousness although disoriented. Diuretics was discontinued and blood sodium was 131 mEq/l at 5 days and rehabilitation treatment was able to recommence. *Implications/Impact on Rehabilitation:* We report a patient with hyponatremia after use of Paroxetine.

No. 184

POSTURAL BALANCE AND LOW BACK PAIN: STABILOMETRIC STUDY

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Russia

Objective: To perform a stabilometric study in patients admitted to the hospital for management of low back pain and to compare the data describing postural balance and pain. *Method:* We examined 36 adult in-patients suffering from low back pain who consented for this study (age 20–78 years). Clinical balance and pain tests and inventories, including painDETECT (Freyenhagen et al., 2006), and computerized stabilometric tests using a Russian made force plate (“MBN” company, Moscow) were the main instruments. Three types of positions were suggested to our patients: “European” (with the opening angle between the feet), “American” (feet stand parallel) and “Feet together”. All patients did all three tests with eyes open and eyes closed for 60 s each. The study was supported by Contract #P1256 from the Russian Ministry of Science and Education. *Results:* No significant correlations were found when comparing stability in the above mentioned 3 positions in terms of Romberg coefficient and sway measurements. The self-reported intensity of pain at the moment of examination did not correlate with the stabilometric balance characteristics. Neither the age nor the sex of the subject had any demonstrable effect on the results. The most correlated stability metric related to painDETECT score is the stability measured with European stance with open eyes: stability is less for patients with neuropathic pain and better for those with nociceptive pain. The correlation was significant on the level $p < 0.002$, $t > 3.73$, $F > 13$. *Implications/Impact on Rehabilitation:* Posture and balance were rarely studied in patients who had to follow rehabilitation programs for low back pain management. The data we started to collect will help to add knowledge to the basic mechanisms of pain and to physical background of posture regulation. More studies are planned to compare the results of rehabilitation on stability and pain relief.

No. 185

THE CLINICAL EFFECT OF BIOFREEZE GEL AND LOW LEVEL LASER THERAPY (LLLT) IN THE PATIENTS WITH ACUTE LOW BACK PAIN AFTER ACUTE ISHEMIC STROKE

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Objective: Back pain is a frequent complication which affects patients after the stroke. According to some studies it occurs in 50% cases after the stroke. No adequate studies can be found to explain origine of this problem. The aim of our study was to determine effects of topic application of BIOFREEZE GEL and LOW LASER THERAPY in patients with acute low back pain i early rehabilitation after acute ischemic stroke. **Method:** Prospective study included 60 patients who did not have back pain at least 6 months before the stroke. Patients were divided in the three groups. Group A: 20 patients (9 females and 11 males, mean age 60±8 years) treated with Biofreeze gel, XIV treatments. Group B: 20 patients (11 females and 9 males, mean age 59±7.4 years) treated by LLLT (GaAlA Laser, 808 nm, intensity 20mW/cm², 100 Hz, 4 points 2 J/cm on each), XIV treatments. Group C 20 patients (10 females and 10 males, mean age 64±8) treated by the combination of LLLT and Biofreeze gel, XIV treatments. All patients had individually designed kinesiotherapy programme. The outcome measures were amount of pain (assessed by VAS 0–10), and FIM score. Assessments were made at baseline and 7 and 14 days after the beginning of the therapy. **Results:** 1) There were high significant improvement in parameters of pain intensity and FIM score in each group after 7 and 14 days of therapy (Repeated measures ANOVA test $p < 0.01$). 2) There were high significant improvement in parameters of pain intensity and FIM score between group C and groups A and B, with pain significantly faster eliminated and higher FIM score in group C (One way ANOVA test $p < 0.01$). **Implications/Impact on Rehabilitation:** Combination of application of Biofreeze gel and LLLT has better effectiveness in early rehabilitation of the patients with acute low back pain after acute ischemic stroke than monotherapy.

No. 186

THE RELATIONSHIP BETWEEN VOCAL CORD PALSY AND DYSPHAGIA IN STROKE PATIENTS

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South Korea

Objective: Unilateral vocal cord palsy (VCP) often results in significant problems with dysphonia, dysphagia and decreased cough strength. We performed this prospective study to investigate the incidence of VCP in acute ischemic stroke patients and its influence on aspiration. **Method:** Forty patients with first-ever acute stroke were enrolled. The mean age was 69.3 years and there were 16 men and 24 women. Based on clinical and neuroimaging findings, their stroke subtype was categorized into cortical/subcortical (Group A), lateral medulla (Group B) and other brainstem (Group C). We examined them by using flexible fiberoptic rhinolaryngoscope and Videofluoroscopic Swallowing Study (VFSS) within 2 weeks after stroke onset. The Penetration – Aspiration Scale (PAS) was used to score each VFSS. **Results:** Among the 40 patients, VCP was found in 10(25%): 7.7% of group A, 100% of group B and 25% of group C. VCP was contralateral to the brain lesion in group A and ipsilateral in 75% of group B. Aspiration was found in 35% of the all patients

and 60% of VCP had aspiration. No differences in the incidence of penetration or aspiration were noted according to VCP ($p > 0.05$). **Implications/Impact on Rehabilitation:** There was no relationship between VCP and dysphagia in stroke patients. Although VCP is a known risk factor for aspiration, other factors are important in determining an effective swallowing.

No. 187

RELATION BETWEEN RETURNING TO ORAL FEEDING AFTER FEEDING TUBE PLACEMENT AND BRAIN LESION IN ACUTE STROKE PATIENTS

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Objective: Dysphagia is common in acute stroke patients and many patients are fed by nasogastric tubes. The purpose of this study is to define the relation between returning to oral feeding after feeding tube placement and the location of brain lesion in acute stroke patients. **Method:** Medical records of thirty one acute stroke patients were identified. These records included VFSS findings and success or failure of returning to oral feeding after VFSS. Brain lesions were classified by cortical, subcortical, or brainstem groups and by the involved hemisphere and by ischemic or hemorrhagic lesions. Other parameters were gender, age, past medical history of diabetes mellitus or hypertension or previous stroke. We also identified the relation between VFSS aspiration and brain lesion, gender, age, past medical history. **Results:** Of thirty-one patients, thirteen patients had cortical brain lesions and ten patients had subcortical brain lesions and eight patients had brainstem lesions. After VFSS, thirteen patients succeeded in returning to oral feeding and eighteen patients failed. In patients who succeeded in returning to oral feeding, cortical brain lesion was exclusively found and in patients who failed in returning to oral feeding, subcortical, brainstem lesion were exclusively found ($p < 0.05$). But, there was no difference of returning to oral feeding between right and left brain lesion and between ischemic and hemorrhagic brain lesions. Between success group and failure group, there was no significant difference in gender, age, past medical history of diabetes or hypertension or previous stroke. Between VFSS aspiration group and non-aspiration group, there was no significant difference in brain lesion, gender, age, past medical history. **Implications/Impact on Rehabilitation:** Cortical brain lesion was exclusively found in acute stroke patients who succeeded in returning to oral feeding after feeding tube placement but, there was no significant differences in involved hemisphere, gender, age, past history of diabetes mellitus or hypertension or previous stroke.

No. 188

THE IMMEDIATE CHANGES OF MOTOR PERFORMANCE AND FUNCTIONAL REORGANIZATION AFTER EFFECTS OF 1HZ REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) ON POST-STROKE CONTRALESIONAL M1 ON MOTOR PERFORMANCE AND FUNCTIONAL REORGANIZATION

Deog Young Kim, PhD; Hae Jeong Park, PhD; Chang-il Park, MD, PhD; Su Jin Yoo, MD; Eun Seong Kim, OTR; Sung Hyon Kyeong, MS

South Korea

Objective: The aim of this study was to investigate the motor performance and the activation pattern using fMRI of affected hand just after virtual disruption of contralesional primary motor cortex (M1) using low frequency rTMS. The object of this study is to investigate the immediate changes of motor performance and activation pattern using fMRI of affected hand just after virtual disruption of

contralateral primary motor cortex using 1 Hz subthreshold rTMS. *Method:* 20 chronic subcortical stroke hemiplegic patients (16 males and 4 females, aged 45–70 years) were recruited. Their mean age was 53.8 years, and the mean duration from stroke onset was 39.9 months. They could grasp and release independently with affected hand. Contralateral M1 was virtually disrupted with 1 Hz 90% MT repetitive transcranial magnetic stimulation on hot spot of unaffected abductor digiti minimi ADM. Subjects underwent functional MRI and behavioral motor test before stimulation, after sham stimulation, after real stimulation on separate day, and compared them. Functional MRI scanning at 3 T was undertaken during active grip movement tasks, with blocked trial design. Data were motion corrected, coregistered, normalized, and statistically analyzed using SPM8 software. The Nine Hole Peg test, grip strength, execution time and error rate during the sequential motor task using Superlab Pro 4.0 software with MP100 were obtained on another day. *Results:* After 1 Hz stimulation, the execution time of nine hole peg test, the response execution time during sequential motor tasks after stimulation were significantly decreased, and grip strength after stimulation was also significantly increased compared to before stimulation, ($p < 0.01$) and did not after sham stimulation. The activation of unaffected primary motor cortex (BA 4) and premotor cortex (BA 6), both culmen were significantly decreased during active grip activation patterns during active grip movement tasks after real stimulation compared to before stimulation. *Implications/Impact on Rehabilitation:* Virtual disruption on contralateral primary motor area can enhance immediate motor performance including dexterity and strength of affected hand. Our findings results may support the modulation of functional reorganization as a mechanism of positive effects of contralateral repetitive transcranial magnetic stimulation.

This work was supported by National Research Foundation of Korea Grant funded by the Korean Government (2008-0400).

No. 189

FUNCTIONAL REORGANIZATION DURING WALKING IN SUBCORTICAL STROKE

Deog Young Kim, MD, PhD; Jong Doo Lee, MD, PhD; Chang-il Park, MD, PhD; Su Jin Yu, MD; Eun Seong Kim, OTR, MS; Hae Jeong Park, PhD

South Korea

Objective: The object of this study was to identify the brain activation during walking in chronic subcortical stroke hemiplegic patients using positron emission tomography (PET) compared with that in healthy person. *Method:* 15 subcortical stroke hemiplegic patients, aged 50–70 years, who are able to walk independently for at least 45 min without the walking aids. The mean duration from stroke onset was 47.5 months. They were compared with age and sex matched healthy subjects. The gait parameters were obtained using 3 dimensional gait analyzer (VICON, UK). During the walking session, subjects walked on treadmill for 15 min before 18F-FDG injection. And after 18F-FDG injection, they walked for 30 min and underwent PET (GE, USA). During the resting session, they rested for 40 min and underwent PET. In the subcortical stroke and control group, the activated and deactivated brain area during walking was determined by subtracting PET images obtained at rest, using the SPM8 program. The difference between the walking and resting was analyzed by paired t-test in each group, and The difference between the groups by repeated ANOVA. Correlation between gait parameters and FDG uptakes was analyzed by regression analysis. *Results:* The unaffected premotor cortex, parahippocampal gyrus, cerebellar culmen, and affected paracentral lobule, insula and prefrontal cortex were significantly more activated in subcortical stroke group compared with healthy control group. The asymmetrical step length ratio was significantly correlated with affected parahippocampal gyrus, paracentral lobule, precuneus, cuneus, unaffected culmen. *Implications/Impact on Rehabilitation:* The activated brain region with walking in subcortical stroke patients showed the different brain area from the controls.

This study will help to understand the functional reorganization of hemiplegic gait. This work was supported by National Research Foundation of Korea Grant funded by the Korean Government (2009-0392).

No. 190

ANATOMICAL STRUCTURE ASSOCIATED WITH CRICOPHARYNGEAL DYSFUNCTION IN INFRATENTORIAL STROKE PATIENTS

Jin Kyu Yang, MD; Deog Young Kim, MD, PhD; Hyun-Joung Lee, PhD; Hyang Hee Kim, PhD; Eun Sook Park, MD, PhD

South Korea

Objective: In coordination or hypertonus of the cricopharyngeal muscle may lead to a range of symptoms including dysphagia and aspiration. However, the anatomical structures related to cricopharyngeal dysfunction (CPD) have not been still clear. This study was to investigate the anatomical structure related to cricopharyngeal dysfunction in infratentorial stroke patients using overlaying MRI. *Method:* 47 infratentorial stroke patients (30 men, 17 women) were enrolled. The types of stroke were 44 infarction and 3 hemorrhage patient. The lesion of stroke was confirmed by MRI. The cricopharyngeal dysfunction group and non-cricopharyngeal dysfunction group was classified based on the video-fluoroscopic swallowing study. The consecutive images extracted from the patient's T2 Brain MRI used to identify the involved anatomical structures. Each patient's lesion areas were marked using MRIcro 1.40 (Chris Rorden, UK) and then, their images were normalized using the SPM8 program. Using the MRIcro, lesions in each group were determined by overlaying. The degree of overlap was expressed as a percentage. The reiterations of cricopharyngeal dysfunction group by subtracting reiterations of the non-cricopharyngeal dysfunction group was determined the location of the lesion. *Results:* The patients with cricopharyngeal dysfunction were seven patients among the forty-seven infratentorial stroke patients (14.9%). The reiterations of brain MRI related to cricopharyngeal dysfunction were as follows; more than 50% overlap area were cerebellar hemisphere, dorsolateral lower medulla including nucleus tractus solitarius and nucleus ambiguus, and around 10% overlap area were lateral lower pons including corticobulbar tract, trigeminal nucleus and facial nucleus, and dorsal medulla. *Implications/Impact on Rehabilitation:* The anatomical structures related to cricopharyngeal dysfunction may be cerebellar hemisphere, dorsolateral lower medulla. This findings may be helpful to understand the pathogenesis of cricopharyngeal dysfunction, and also to diagnosis and manage earlier.

No. 191

IMMEDIATE CHANGES OF MOTOR PERFORMANCE AND FUNCTIONAL REORGANIZATION AFTER 1HZ REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) ON POST-STROKE CONTRALATERAL M1

Deog Young Kim, MD, PhD; Hae Jeong Park, PhD; Chang-il Park, MD, PhD; Su Jin Yoo, MD; Eun Seong Kim, OTR; Sung Hyon Kyeong, MS

South Korea

Objective: The aims of this study was to investigate the motor performance and the activation pattern using fMRI of affected hand just after virtual disruption of contralateral primary motor cortex (M1) using low frequency rTMS. *Method:* 20 chronic subcortical stroke hemiplegic patients (16 males and 4 females, aged 45–70 years) were recruited. Their mean age was 53.8 years, and the mean duration from stroke onset was 39.9 months. They could grasp and release independently with affected hand. Contralateral M1 was virtually disrupted with 1 Hz 90% MT repetitive transcranial magnetic stimulation on hot spot of unaffected abductor digiti minimi.

Subjects underwent functional MRI and behavioral motor test before stimulation, after sham stimulation, after real stimulation on separate day. Functional MRI scanning at 3 T underwent during active grip movement tasks, with blocked trial design. Data were motion corrected, coregistered, normalized, and statistically analyzed using SPM8 software. The Nine Hole Peg test, grip strength, execution time and error rate during the sequential motor task using Superlab Pro 4.0 software with MP100 were obtained. *Results:* After 1Hz stimulation, the time of nine hole peg test, the response time during sequential motor tasks after stimulation were significantly decreased, and grip strength after stimulation was also significantly increased compared to before stimulation. ($p < 0.01$) and did not after sham stimulation. The activation of unaffected primary motor cortex (BA 4) and premotor cortex (BA 6), both culmen were significantly decreased during active grip movement tasks after real stimulation compared to before stimulation. *Implications/Impact on Rehabilitation:* Virtual disruption on contralesional primary motor area can enhance immediate motor performance including dexterity and strength of affected hand. Our findings may support the modulation of functional reorganization as a mechanism of positive effects of contralesional repetitive transcranial magnetic stimulation.

This work was supported by National Research Foundation of Korea Grant funded by the Korean Government (2008-0400).

No. 192

EVALUATION OF QUIET STANDING BALANCE DEPEND ON FEET WIDTH IN NORMAL PERSON

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Objective: The risk of fall down increases when quiet standing balance is impaired. Thus, quiet standing balance should be evaluated for expectation of risk of fall down. We studied the effect of feet width, sex, age and height when measuring quiet standing balance on force plate in normal person. *Method:* A hundred healthy subjects (50 males, 50 females) were measured. The mean moment of velocity (mm^2/s) and movement distance (mm) of center of pressure (COP) were obtained by using Good Balance (Metitur Ltd, Finland). Participants were standing on the force plate in three different feet stances – shoulder width, half of shoulder width and comfortable width. Measurement was done twice with eyes open and closed for each stance and the recording proceeded for 30 s. Participants were well-informed about the method of measurement before starting measurement to minimize bias from subjects. *Results:* Horizontal distance of COP movement was significantly longer at shoulder width than half of shoulder and comfortable width ($p < 0.05$). Between half of shoulder width and comfortable width, distance of COP movement was longer at comfortable width ($p > 0.05$). The ratio of comfortable width to shoulder width was $55.4 \pm 15.9\%$. There was relatively wide deviation and scores had no significant correlation with th ratio ($p > 0.05$). As the participant's age increases, distance of COP movement, especially vertical distance, and mean moment of velocity increased. There was no significant difference depend on sex and height ($p > 0.05$). *Implications/Impact on Rehabilitation:* Our evaluation of quiet standing balance in normal person could be used as a basic reference. The appropriate position for measurement of quiet standing balance is standing on force plate with feet width to half of shoulder.

No. 193

NEUROPSYCHIATRIC CONSEQUENCES OF TRAUMATIC BRAIN INJURY

Antje Buettner(-Teleaga), PhD

South Korea

Objective: Traumatic Brain Injury (TBI (lesions of the central nervous system) caused by brain traumas, brain tumors, strokes, cer-

ebrovascular diseases etc. lead to physical problems (like plegia and spasticity) and mostly to neuropsychiatric consequences (like HOPS, PTSD, mood disorders, anxiety, psychotic disorders), both of which are targeted in neurological and neurosurgical rehabilitation. TBI determinate/influence even the quality of life of patients. Considering the poor knowledge of reliable facts of etiology in neuropsychiatric diseases, traumatism could show unusually clean-cut conditions of interference with the mechanism of mental and sensory-motor plasticity. *Method:* In our study we used neuropsychological and neuropsychiatric methods in different patient groups in neurological rehabilitation, combining it with physiotherapeutical exercises. Over the past years we treated more than 2,000 patients with special neuropsychological methods, accumulating clinical experience and highly encouraging results. During admission to the clinic, all patients were selected according to their clinical diagnosis (ICD-10) and all patients were examined neurologically, neuropsychologically and psychiatrically. All test persons must not suffer from any severe psychiatric disorders. The study was carried out involving all groups of randomly selected patients with brain traumas, after brain tumor surgeries, strokes, cerebrovascular diseases etc. on a number of neuropsychiatric parameters. *Results:* Testing of neuropsychiatric diseases and difficulties, traumatism and quality of life revealed a highly significant difference between healthy persons and traumatic brain injured patients ($p < 0.05$). Examination of specific domains of neuropsychiatric diseases, traumatism and quality of life showed significant differences in patients with traumatic brain injuries. In all dimensions of neuropsychiatric diseases, traumatism and quality of life, untreated traumatic brain injured patients had inferiority scores than those who had undergone therapy. After 3 weeks of neurological rehabilitation, the traumatic brain injured patients' neuropsychiatric diseases, traumatism and quality of life improved to a significant degree ($p < 0.05$). The comparison between different clinical kinds of neurological disorders concerning quality of life is yet to be carried out. Analysis of the degree of severity showed for traumatic brain injured patients that on the whole, there is a significant difference concerning neuropsychiatric diseases, traumatism and quality of life. *Implications/Impact on Rehabilitation:* The study revealed that a lot of traumatic brain injured patients show neuropsychiatric problems and deficits, concerning their quality of life. The degree of severity of the traumatic brain injured disorders is relevant. In summary, based on our results, it is to be said that although continuous therapy improves the traumatic brain injured symptom complex; neuropsychiatric consequences and the quality of life require longer-term degeneration.

No. 194

NEUROPLASTICITY INDUCED BY VIRTUAL REALITY AND ROBOT-BASED THERAPIES USED FOR STROKE RECOVERY

Manuel Bayon, MD

Spain

Objective: To revise neuroplasticity mechanisms induced by virtual reality and robot-based therapies used in stroke rehabilitation. *Method:* Search of articles and abstracts published over the last five years in Medline-PubMed, Tripdatabase, and Cochrane Library databases. Mesh key words used were: neuroplasticity, rehabilitation, robotics, stroke, virtual reality. *Results:* Robot and virtual reality-based therapies could induce neuroplasticity through enhancing neurotransmitters levels as acetylcholine, dopamine, and noradrenaline. This could facilitate learning of relevant motor tasks and promote new neurological connections. Robot and virtual reality interventions based on motor learning may be associated to use-dependent plasticity mechanisms. Long term potentiation (LTP), GABAergic system inhibition, and NMDA receptors activation finally encourage dendritic spines proliferation, modifying horizontal synaptic connections in cortical motor areas. Virtual reality therapy augments intrahemispheric cortico-cortical connections and activates mirror neurons system. A transfer of function could occur from damaged motor area to adjacent mirror neurons that could take a new role

for planning and performing motor tasks. These kind of therapies increase laterality index with a shift in interhemispheric balance from contralesional sensorimotor cortical activation to ipsilesional sensorimotor cortex activation. Moreover Robot-based therapies could augment connectivity between motor areas (primary motor cortex, supplementary motor area, and cerebellum) to compensate primary motor cortex dysfunction after stroke. *Implications/Impact on Rehabilitation:* Knowledge about neuroplasticity mechanisms may help us to understand neural repair and restoring processes after stroke. Neuroplasticity may be facilitated by physical medicine interventions based on relearning motor as virtual reality and robot-based training. Prescription should be as early, intensive, and individualised, as possible to achieve the better outcomes. Future studies should be focused on neuroplastic changes underlying these therapies in order to improve recovery of sensorimotor functions after stroke.

No. 195

MOTOR RE-EDUCATION OF THE HAND IN MILD DYSTONIC HEMIPARESIS WITH BOTULINUM TOXIN

Agustí Giménez Torquebrada, MD; C. Giné Ibarz, M. Alcaine Boldó, R. Figuera Garreta
Spain

Objective: Botulinum toxin is recommended to improve the passive movement in the upper spastic extremity. There is limited evidence to support the effectiveness of botulinum toxin as treatment for mild motor hemiparesis with low spasticity and motor control disorder. *Method:* Case report 1: A 37-years-old male with incomplete medullar damage C5 ASIA D, sary at cervical meningioma surgery with paresis in interbone muscles and dystonic attitude type claw-hand during voluntary movement. The patient was treated 5 months after surgery. Case report 2: A 25-years-old female with mild paresis in a hand (2-years progression), sary to brain toxoplasmosis and HIV infection. The patient presented problems by opening the hand manifested by intrinsic plus attitude and thumb included and with co-contraction of the flexor carpi radialis and flexor digitorum superficialis during the active movement. Both patients undergoing low-dose botulinum toxin type A treatment. *Results:* Case report 1: Motor disorder improvement almost complete with whole-hand activity to develop daily and job activities. Case report 2: Improvement of the active range of hand extension and thumb abduction. The patient was eligible to participate in a re-education intensive occupational therapy program. *Implications/Impact on Rehabilitation:* Right-hand dystonic attitude sary to a cervical damage is very unusual and could be improved by botulinum toxin treatment. Brain toxoplasmosis in HIV patients could be associated with motor control disorders, and in this case botulinum toxin treatment makes the motor re-education easier.

No. 196

CRITICAL ILLNESS POLYNEUROPATHY: OUR EXPERIENCE

Leire Ortiz Fernández, MD; Esther Pacheco Boiso; Nora Cívicos Sánchez; Luisa Jauregui Abrisqueta; Ruben Natividad Andrés; Zulema Velerdas Martínez; Amaia Madariaga Zabala
Spain

Objective: To evaluate the functional outcome of intensive care patients with critical illness polyneuropathy (CIP). *Method:* Prospective observational study of CIP admitted in a tertiary referral Hospital from January to December 2010. We recorded gender, age, etiology, associated risk factors, length of stay in critical care unit, type and length of treatment, discharge planning, functional

outcomes measured by modified Barthel and Katz Index, and subjective health status. *Results:* A total of 17 patients were included with a mean age of 60.82 years (R: 35–81). The male/female ratio was about 1.43/1. We reported a previous modified Rankin Scale of 0 in 70.6%. Concerning to leading causes, 58.82% of the sample developed CIP after undergoing an operation and, above all abdominal surgery. Sepsis, prolonged mechanical ventilation, and neuromuscular blockers were the most common risk factors (94.11%). We found a mean length of stay in Critical Care Unit of 64.23 days and 33.3% were transferred to a long-stay rehabilitation center. All received early physical therapy (mean number of treatment sessions: 56.9 days), 82.35% respiratory and 20% occupational therapy. 17.64% of the patients died within study period. Functional outcome, need of assistive devices and subjective health status in survivors varied widely depending on the underlying disease. At discharge, all patients improved physical functioning and activities of daily living although decreased sensory function was restricted in more than one-third of the sample. *Implications/Impact on Rehabilitation:* There are an increasing number of intensive care patients who develop CIP as a consequence of new life-prolonging therapies such as mechanical ventilation, hemofiltration... However, specific course and long-term outcome remains unclear, there is a lack in the revised literature on type of treatment and functional outcomes with a minimal attention to the rehabilitation aspects and long-term outcome. In our experience, prolonged rehabilitation treatment is necessary in order to reduce handicaps and achieve optimal autonomy.

No. 197

COMPARISON BETWEEN THE SUNNYBROOK AND HOUSE-BRACKMANN FACIAL GRADING SYSTEMS TO ASSESS THE EFFECTIVENESS OF TREATMENT WITH BOTULINUM TOXIN IN FACIAL PARALYSIS

Susana Moraleda, MD; Eische Abdel-Muti; Inés Díaz; Mercedes Martínez
Spain

Objective: Our aim was to compare the results of botulinum toxin type A (Botox®) treatment in facial nerve paralysis (FNP), using two different scales: House-Brackmann (HB) and Sunnybrook Facial Grading System (SFGS). We wanted to know if both scales were similar for detecting small clinical changes. *Method:* We have reviewed 102 patients with FNP treated with botulinum toxin type A (BoNT A) at the Department of Physical Medicine and Rehabilitation. All of them had sequelae with great clinical variability: from hypotonia and important function deficit to abnormal facial nerve reinnervation (spasm and synkinesis). The SFGS and HB scales were applied by assessing the videos of patients before treatment and after the second session of BoNT injection. The results of SFGS pre and post-treatment were compared using t Student Paired Test. The results of H-B were expressed by Measurement of Agreement Kappa and McNemar symmetry test. *Results:* The overall score of SFGS scale improved after BoNT treatment (Mean Pre-treatment 44.65; Post-treatment 50.11). This improvement was statistically significant ($p < 0.001$). The improvement of the partial score referring to the symmetry at rest (Mean Pre-treatment 9.16; Post-treatment 6.18) and to synkinesis (Mean Pre-treatment 3.52; Post-treatment 1.44) was also statistically significant after BoNT treatment ($p < 0.001$). Using the HB scale, 79.2% of the patients remained in the same grade, with a concordance of 0.7. When patients changed their degree, the trend was toward improvement (Chi-squared test < 0.005). *Implications/Impact on Rehabilitation:* The Sunnybrook Facial Grading System is more useful than the House-Brackmann scale to demonstrate the efficacy of botulinum toxin type A treatment on facial paralysis, because is more sensitive in detecting small changes, mainly with respect to the symmetry at rest and synkinesis. This is useful in assessing the effectiveness of rehabilitation treatment in patients with facial paralysis.

No. 198

EVALUATION AND TREATMENT OF SEQUELAE OF FACIAL NERVE PARALYSIS WITH BOTULINUM TOXIN TYPE A

Susana Moraleda, MD; Eische Abdel-Muti; Sandra Espinosa; Mercedes Martínez
Spain

Objective: The aim of this study was to evaluate the efficacy of botulinum toxin type A (Botox®) in a series of patients with facial paralysis, and to quantify this improvement with the use of a reliable and valid objective scale as it has proven to be the Sunnybrook Facial Grading System (SFGS). **Method:** We have reviewed 102 patients with FNP who have been treated with BoNT A at the Department of Physical Medicine and Rehabilitation. All of them had sequelae with great clinical variability: from hypotonia and important function deficit to abnormal facial nerve reinnervation (spasm and synkinesis). SFGS scale measures the resting symmetry, degree of voluntary movement, and the presence and severity of synkinesis. It provides a numerical score ranging from 0 to 100. We have applied the scale SFGS by assessing the videos of patients before treatment and after the second session of BoNT injection. The results were compared using Paired *t* Student Test. **Results:** The overall score of SFGS scale improved after botulinum toxin treatment (Mean Pre-treatment 44.65; Post-treatment 50.11). This improvement was statistically significant ($p < 0.001$). The improvement of the partial score referring to the symmetry at rest (Mean Pre-treatment 9.16; Post-treatment 6.18) and to synkinesis (Mean Pre-treatment 3.52; Post-treatment 1.44) was also statistically significant after BoNT treatment ($p < 0.001$). **Implications/Impact on Rehabilitation:** Botulinum toxin type A is an effective treatment to mitigate the sequelae of facial paralysis, regardless of the etiology and the evolutionary stage. Their use should be extended to the treatment of FNP, mainly among specialists in Physical Medicine & Rehabilitation, as it facilitates the achievement of the prescribed kinesitherapy. The Sunnybrook Facial Grading System is a very useful scale to demonstrate the efficacy of the treatment of facial paralysis with botulinum toxin type A.

No. 199

TREATMENT OF SPASTICITY WITH BOTULINUM TOXIN A. A DESCRIPTIVE STUDY

Susana Moraleda, MD; Ana Borobia; Mónica González; Mercedes Martínez
Spain

Objective: Spasticity is a symptom of the upper motor neuron syndrome, and it affects a large number of patients. The estimated prevalence in Spain is 1%. Our aim has been assessing patients treated with botulinum toxin type A (BoNT-A) in our Spasticity Unit. **Method:** A descriptive and retrospective study of patients treated between 2002 and 2010 with BoNT-A (Botox® and Dysport®). The data collected, among others, were: etiology, therapeutic goals and doses of BoNT-A used. Multiple statistics studies were conducted: Chi-square and Fisher test (qualitative variables), T-student and ANOVA (quantitative variables), and post-hoc Bonferroni analysis of ANOVA. The confidence level of statistical significance was $p < 0.05$. **Results:** The total number of patients was 111. The majority (70%), with different causes of brain damage. The average time from diagnosis to starting treatment was superior to 5 years (higher in tetraparesis). The injected muscles were statistically related to the etiology and therapeutic goal, but not with the type of BoNT-A used. When the objectives were to reduce pain and to improve hygiene, the initial BoNT-A dose was higher. The total doses had increased significantly a year and two years after the first session of injection (Botox® and Dysport®). The BoNT-A total doses varied depending on the sequelae, but it was not related to the diagnosis. There were no serious adverse effects. **Implications/Impact on Rehabilitation:** The patients more frequently injected had been suffering from

stroke, brain hemorrhage, or cerebral palsy. The choice of muscle injection was done according to the diagnosis, the sequelae and the goal we wanted to achieve. The initial dose of BoNT-A was higher in patients whose goal treatment was to improve pain. The BoNT-A dose gradually increased without significant side effects.

No. 200

DO PATIENTS AND DOCTORS PERCEIVE THE SAME RESULTS OF INTRATHECAL BACLOFEN THERAPY?

Mercedes Martínez Moreno, MD; Florencio Jimenez Martín; Camen Vilas Villa; Susana Moraleda Pérez
Spain

Objective: Intrathecal baclofen therapy (ITB) has been proven a very useful tool in the spasticity management in recent years. In the present study, we report the results of a survey on the outcome of the therapy evaluated by patients or caregivers with the global satisfaction scale. We compared the results with those given by the attending physicians. **Method:** From the database of the Department of Physical Medicine and Rehabilitation of our institution we selected all patients on ITB therapy who are currently under follow-up in the outpatients clinic. Pediatric and adults patients with different neurological illness were enrolled. The clinical records were reviewed and data referring to patient's clinical characteristics, time from implant and individual goals with the therapy were collected. We developed a questionnaire in order to assess the patients'/caregiver's satisfaction with the results of the therapy in correlation with the goals. We asked to measure the efficacy of the therapy between 0 to 100 (no effect and maximum effect respectively). On the other side two doctors blinded to the answers of the patients were asked to analyze the results of the therapy in each patient. **Results:** A total of 32 patients, 20 with cerebral injury (cerebral palsy, traumatic brain injury, stroke), 12 with medullar disease and 5 multiple sclerosis were analyzed. The average follow-up after ITB therapy was 53 months. Patients or caregivers rated the efficacy of the therapy above 50 points in 78.1% of the cases. When we asked if they would use the therapy again, 84.4% responded affirmatively. Doctors answers about the appropriateness of the therapy match those given by patients or caregivers in 28 out of 32, Kappa index of agreement is 0.434 indicating a fair agreement. **Implications/Impact on Rehabilitation:** Information on expected results of the therapy are essential to ensure patients satisfaction.

No. 201

EARLY VERSUS DELAYED VIRTUAL REALITY BASED TRAINING (REHABILITATION GAMING SYSTEM) ON UPPER LIMB RECOVERY AFTER STROKE

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Objective: Novel interventions based on Virtual Reality (VR) and robots have been developed for upper limb treatment of stroke induced hemiparesis. The Rehabilitation Gaming System (RGS) applies VR in order to combine action observation and execution in interactive game scenarios. RGS has been proven effective in both acute and chronic stroke patients. However, there is no clear consensus on the best time after stroke in which VR technologies

are more effective and the retention effects better. *Objective:* to assess motor and functional upper limb time course of gains with RGS therapy in subacute (<2 weeks), first-year or chronic (>1 year) stage after stroke. *Method:* Between February 2010 and December 2010, 45 volunteer stroke patients with hemiparesis were recruited for this study. Patient groups: 9 subacute (<2 weeks post-stroke), 22 <1 year post-stroke and 14 chronic (>1 year) underwent RGS therapy. Intervention: RGS therapy (20 min/day for 3 weeks or 12 weeks) + standard rehabilitation therapy. Assessment was conducted at baseline, post-treatment and 6-months follow-up using a set of standard clinical scales: depression (Hamilton test), motor function (grip force dynamometer, MRC prox / dist, Fugl Meyer upper limb, Aschworth prox/dist), disability (Barthel Index, CAHAI), shoulder passive ROM, pain (VAS), neglect (Cancellation Test). *Results:* Significant improvements in motor function (grip force, MRC prox/dist, Fugl Meyer upper limb) and upper limb disability (CAHAI) were seen at week 3 and 12 in subacute and <1 year post-stroke groups. This improvement is sustained until month-6 follow-up. The chronic (>1 year) group showed only significant improvement from baseline to end of treatment at MRC and CAHAI scales. Depression improvement was seen in subacute and <1 year groups during RGS training. No changes in upper limb spasticity or shoulder pain were observed. *Implications/Impact on Rehabilitation:* Subacute, <1 year post-stroke and chronic stroke patients benefit from RGS based VR therapy, but the different recovery pattern suggests that is favorable to start RGS therapy early after stroke.

No. 202

CRITICAL ILLNESS POLYNEUROPATHY: OUR EXPERIENCE

Leire Ortiz Fernández, MD; Esther Pacheco Boiso; Nora Cívicos Sánchez; Luisa Jauregui Abrisqueta; Ruben Natividad Andrés; Zulema Velerdas Martínez; Amaia Madariaga Zabala
Spain

Objective: To evaluate the functional outcome of intensive care patients with critical illness polyneuropathy (CIP). *Method:* Prospective observational study of CIP admitted in a tertiary referral Hospital from January to December 2010. We recorded gender, age, etiology, associated risk factors, length of stay in critical care unit, type and length of treatment, discharge planning, functional outcomes measured by modified Barthel and Katz Index, and subjective health status. *Results:* A total of 17 patients were included with a mean age of 60.82 years (R: 35–81). The male/female ratio was about 1.43/1. We reported a previous modified Rankin Scale of 0 in 70.6%. Concerning to leading causes, 58.82% of the sample developed CIP after undergoing an operation and, above all abdominal surgery. Sepsis, prolonged mechanical ventilation, and neuromuscular blockers were the most common risk factors (94.11%). We found a mean length of stay in Critical Care Unit of 64.23 days and 33.3% were transferred to a long-stay rehabilitation center. All received early physical therapy (mean number of treatment sessions: 56.9 days), 82.35% respiratory and 20% occupational therapy. 17.64% of the patients died within study period. Functional outcome, need of assistive devices and subjective health status in survivors varied widely depending on the underlying disease. At discharge, all patients improved physical functioning and activities of daily living although decreased sensory function was restricted in more than one-third of the sample. *Implications/Impact on Rehabilitation:* There are an increasing number of intensive care patients who develop CIP as a consequence of new life-prolonging therapies such as mechanical ventilation, hemofiltration. However, specific course and long-term outcome remains unclear, there is a lack in the revised literature on type of treatment and functional outcomes with a minimal attention to the rehabilitation aspects and long-term outcome. In our experience, prolonged rehabilitation treatment is necessary in order to reduce handicaps and achieve optimal autonomy.

No. 203

ORAL TO OCULAR SYNKINESIS TREATMENT IN PERIPHERIC FACIAL PARALYSIS WITH BOTULINUM TOXIN TYPE A

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Spain

Objective: To assess the effect of botulinum toxin type A (BTX-A) treatment on patients with severe oral to ocular synkinesis, following peripheric facial paralysis. *Method:* 37 patients affected by chronic peripheric facial paralysis (51% right, 34% left, 8% bilateral) and severe oral to ocular synkinesis were prospectively studied. The origins of the facial paralysis were diverse, but prevailing Bell's palsy (67%). All patients were previously treated with neuromuscular retraining. The patient's affected muscles were infiltrated with BTX-A (Botox), analyzing the effect after a month by the Sunnybrook Facial Grading System (FGS) and the Visual Analog Scale (VAS), also facial images were taken at rest, smiling and lip puckering. *Results:* The patients experienced improvement in facial function, as the mean FGS increased from 39.9% to 81.3%. In subjective perception of the disorder the mean VAS decreased from 7.58 to 2.35. The facial images also showed the improvement of the synkinesis. The results from FGS and VAS were statistically significant (analyzed by SPSS 15.0 software). *Implications/Impact on Rehabilitation:* The oral to ocular synkinesis, which appears following peripheric facial paralysis, can be treated by BTX-A infiltrations in the affected muscles, with satisfactory results verified by FGS, VAS and facial images.

No. 204

EFFECTS OF TYPE A BOTULINUM TOXIN AND NEUROMUSCULAR ELECTRICAL STIMULATION ON DISTAL UPPER LIMB SPASTICITY IN STROKE PATIENTS: A DOUBLE BLIND RANDOMIZED CLINICAL TRIAL

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Objective: To determine the effectiveness of neuromuscular electrical stimulation (NMES) and type A botulinum toxin (BT) on motor impairment, upper limb function and hand and wrist spasticity of the hemiplegic side in stroke patients. *Method:* Double-blind randomized clinical trial in 24 chronic stroke patients (more than 6 months after stroke). After infiltration of 200 unit of type A-BT in hand and wrist flexor muscles, participants were randomly assigned to 2 treatment groups: NMES in hand extensor muscles and placebo-NMES. Patients were assessed at 4 and 16 weeks after by the use of different scales of motor function (Fugl-Meyer Motor Assessment (FMA), Medical Research Council Scale (MRC), Motricity Index for Motor Impairment after stroke and dynamometry), upper limb functional capacity (Chedoke Arm and Hand Activity Inventory (CAHAI), Box and Block Test (BBT) and modified Ashworth scale (MAS)). *Results:* Significant improvements at 4 weeks after injections are as follows: 2.43 (SD 4.08) in the upper limb component of the FMA; 0.22 (SD 0.42) in the MRC; 4.21 in the CAHAI; 1.47 (SD 3.3) in the BBT; and a decrease in the MAS of 0.96 (SD 0.88) in the wrist and 1.17 (SD 1.37) in the fingers. The improvement in motor function was maintained at 16 weeks. No significant differences were observed for the motor function and functional capacity measures in NMES-treated patients. *Implications/Impact on Rehabilitation:* The infiltration of Type-A BT in stroke patients with upper limb flexor spasticity is useful to improve motor function, functional capacity and spasticity. Nevertheless, the NMES is not a useful adjunct treatment for these patients.

No. 205

HOW COMMON ARE PITUITARY INSUFFICIENCIES IN PATIENTS AFTER MODERATE-SEVERE TRAUMATIC BRAIN INJURY?

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Objective: Data on the prevalence of pituitary insufficiencies after traumatic brain injury (TBI) are inconsistent and the clinical impact is far from clear. The purpose of this ongoing study is to explore 1. The prevalence and course of pituitary insufficiencies until one year post injury, 2. The relation between pituitary insufficiencies and long term outcome, 3. If routine control of pituitary function is relevant after moderate-severe TBI. **Method:** Patients aged >17 years and managed at one regional neurointensive care unit after moderate or severe TBI are included. Ten days post injury, a Synacthene test is performed and thyroid function (fT3, fT4 and TSH) examined. Data collected at 3 months comprise S-TSH, S-fT4, S-fT3 and S-Cortisol; at 6 and 12 months: S-TSH, S-fT4, S-fT3, S-IGF-I, P-GH, S-Prolactin and S-Cortisol. In addition, S-Estradiol, S-FSH and S-LH are examined in women and S-Testosterone and S-SHBG in men. **Results:** Until now, observations show frequent disturbances of thyroidal function at day 10 ($n=52$), but not at 3 ($n=35$), 6 ($n=26$) or 12 months ($n=16$); no cortisol disturbances at 10 days ($n=52$) or at 3 ($n=35$), 6 ($n=26$) and 12 months ($n=16$) post injury (although data collected at 10 days may be influenced by steroid treatment in some patients) and no GH or Prolactin disturbances; low levels of gonadotropins in 2 patients (out of 16) at 12 months (1 with low testosterone and 1 with low estradiol). Substitution therapy has not been clinically indicated in any patient until now. **Implications/Impact on Rehabilitation:** Data from this ongoing study indicate that persisting pituitary hormone deficiencies are not frequent. Continued data collection is needed to allow firm conclusions in this area where evidence-based guidelines concerning evaluation of pituitary function and hormonal replacement are lacking.

No. 206

INTERDISCIPLINARY REHABILITATION IN POST-POLIO SYNDROME

Jan Lexell, MD
Sweden

Objective: Post-polio syndrome (PPS) affects a majority of those who have acquired paralytic poliomyelitis. There is an overall understanding that persons with PPS can benefit from being admitted to a team specialized in the condition. The objective of this presentation is to present the results from a PPS rehabilitation programme running over 7 years. **Method:** The study comprises people with clinically verified PPS who have participated in an individualized, goal-oriented, comprehensive interdisciplinary rehabilitation programme. The focus of the programme is to reduce self-perceived disability by providing a variety of interventions and thereby maximize each individual's physical, mental and social potential. Qualitative interviews as well as quantitative measures of disability and life satisfaction have been used to evaluate the effects of the programme and the participants' own experiences. **Results:** There was an overall reduction in disability as assessed by The Reintegration Into Normal Living (RNL) Index and an improvement in life satisfaction as assessed by the Life Satisfaction Questionnaire (LiSat-11). The programme was experienced as a turning-point in the participant's life. Rehabilitation was the start of a process of change whereby they acquired new skills which, over time, contributed to a different but good life. After about a year, they had a sense of control, had accepted life with PPS, had established new habits and taken on a changed valued self, and could thereby look

at their future with confidence. **Implications/Impact on Rehabilitation:** The results indicate that persons with PPS can benefit from an individualized, goal-oriented, comprehensive interdisciplinary rehabilitation programme and experience improved functioning and life satisfaction. Specifically, the programme leads to positive changes in the management of daily activities and in the persons' view of their PPS and disability, their future and their self.

No. 207

USING A GOAL ATTAINMENT SCALE IN PATIENTS WITH POST-STROKE SPASTICITY (PSS): AN ANALYSIS OF GOALS SET FROM THE BOTOX® ECONOMIC SPASTICITY TRIAL (BEST)

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Objective: The aim of this analysis was to identify priorities of PSS patients with respect to improving their functional capabilities, using goal attainment scaling. **Method:** In the prospective BEST study, adults with focal PSS were randomised to BOTOX® (BoNT-A)+standard care (SC) or placebo+SC for up to 2 treatment cycles, followed by an open-label phase up to 52 weeks. Eligible patients were BoNT-A-naïve, demonstrated preserved function in the limb to be treated, and were considered likely to benefit from intervention. Those with fixed contractures and causes of spasticity other than stroke were excluded. The primary outcome measure was the percentage of patients achieving their principal active functional goal. Patients also set sary active or passive functional goals. **Results:** The intent-to-treat study population comprised 273 patients. For the principal active functional goal, the majority of patients (53%) chose goals associated with walking/mobility (including improvements in speed, distance, gait and climbing stairs). The other most commonly selected principal active functional goals concerned grasping and reaching for objects (23%), the ability to manipulate objects, e.g. cutlery (11%), and dressing/washing (10%). A similar pattern was observed for selection of sary active functional goals ($n=114$): walking/mobility (48%), dressing/washing (11%), hand/finger/arm extension and flexion (30%) and object manipulation (8%). For patients selecting sary passive functional goals ($n=158$), the most common were relief of spasms (11%) or pain (29%), improved limb positioning/posture and self-image (23%) and opportunities to benefit from orthoses (5%). Goals were generally a function of several factors such as time and/or speed to perform a given activity, quality, assistance required, etc. Defining adequate goals for functional improvement had to be sufficiently challenging but appropriate and achievable within patient's rehabilitation programme. **Implications/Impact on Rehabilitation:** Multiple types of functional goals were set in BEST. Patients often prioritise goals that enhance their independence and self-esteem.

No. 208

EFFECTS OF WHOLE BODY VIBRATION TRAINING AFTER STROKE

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Sweden

Objective: To evaluate the effects of whole-body vibration (WBV) training on balance, muscle function, gait performance and perceived participation in chronic stroke, and if different amplitudes on the vibration machines have any impact on the results. **Method:** 25 men and 6 women (mean age 62 years, 6–101 months post-stroke) participated. Before training the subjects were randomized into two groups. One group trained on a vibrating platform with an amplitude of 3.75 mm; frequency 25 Hz and the other group on a platform with an amplitude of 0.2 mm; frequency 25 Hz. The participants and the examiners were blinded to the amplitudes of the machines. All participants underwent 12 sessions of supervised WBV training (twice weekly during six weeks). Before and after training, balance (Bergs balance test), muscle tone (modified Ashworth scale), isokinetic and isometric knee muscle strength (Biodex dynamometer), gait performance (Timed “Up & Go”, 10 metres Gait Speed and 6-Minute Walk tests) and perceived participation (Stroke Impact Scale) were assessed. **Results:** Significant between group differences were found in balance ($p=0.002$) and in knee muscle strength in the paretic leg (isokinetic and isometric extension; $p<0.05$). The improved balance was found in the group that trained on the machine with the high amplitude, whereas a small but significant improvement was found in isometric knee extension (+12%) in the group trained on the machine with the low amplitude. Both groups improved in gait performance (TUG and 6-Minute Walk; $p<0.05$), with no significant differences between the groups. No significant changes were found in muscle tone or perceived participation. **Implications/Impact on Rehabilitation:** This study indicates that six weeks of WBV training in patients after stroke has a positive, although small effect, on balance, muscle strength and gait performance. The amplitude of the vibrations seems to be an important parameter for the results.

No. 209

EFFECTS OF FOOT AND ARM POSITION ON THE ASYMMETRY OF VERTICAL FORCES DURING SIT-TO-STAND TASKS IN STROKE

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Taiwan

Objective: Rising from the chair is a common activity in daily life. For strokes, it becomes a challenging movement. Asymmetrical weight bearing pattern in sit-to-stand was often seen for those with poor motor control. This phenomenon could be improved by placing feet or arms posture. The purpose of this study was to investigate the leg load and time expenditure and peak force on stroke patients during sit-to-stand movement with different postural configurations. **Method:** 18 stroke patients (3 females) were recruited from the rehabilitation department. They were 60.8 ± 5.2 years in age, 13.9 ± 11.2 months since from lesion, 1.65 ± 0.08 m and 71 ± 10.7 kg, in height and body weight respectively. Three force plates were implemented in this study, two were under each leg and one was placed under the chair. Optotrak motion capture system was used to record the 3D kinematic data. The height of the stool was adjusted at knees of anterior/posterior leg flexed $80^\circ/100^\circ$. Combinations of three arm: spontaneous (Asp, hands on knees), symmetry (As), grasped (Ag) and four foot placements: spontaneous (Fsp), symmetry (Fs), affected forward (Faf), affected backward (Fab) were tested randomly. Four events during the sit-to-stand task were identified (onset, seat-off, peak vertical force, end of task). Mean and standard deviation were calculated for peak force, time to rise of task and asymmetrical index of vertical ground reaction force for all postural condition and at each event. Two-way repeated measures ANOVA were applied to test the difference between configurations. **Results:** At onset, As is less symmetrical than Asp with unaffected foot forward. At t2, if Arm-grasped, foot affected forward is more stable than foot symmetry. If foot spontaneous, arm symmetry is more asymmetrical than arm-spontaneous. At t3, while foot symmetry with arm grasped, it is more symmetrical than foot affected backward with arm-symmetry. No matter foot placed symmetry or affected backward, arm-grasp provides more symmetry than arm-symmetry at the end of task. For foot symmetry, arm-grasped has reached less peak force and rise time

than Arm-spontaneous and Arm-Symmetry. **Implications/Impact on Rehabilitation:** Arm extended with hands grasped in front is common practice in stroke rehabilitation. In general, this combination facilitates subject to stand up more easily and symmetry. If Non-affected arms extended and hands grasped not only reduce the effects of spasticity, it also improves the motor controls while subject prepare to rising up from the chair.

No. 210

THE EFFECTS OF DIFFERENT POSTURAL CONFIGURATIONS ON THE ASYMMETRY OF VERTICAL FORCES DURING SIT-STAND-SIT TASKS IN STROKE PATIENTS

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Objective: Asymmetrical weight-bearing pattern in sit-stand-sit task was commonly seen in stroke patients with poor motor control. The aim of this study was to investigate the asymmetry of leg loads during sit-stand-sit movement in stroke patients with different arm and foot positions. **Method:** 18 stroke patients (3 females) were recruited from the rehabilitation department of a tertiary medical center. They were 60.8 ± 10.6 years in age, 13.9 ± 11.2 months from lesion, 1.65 ± 0.08 meters in height, 71.1 ± 10.7 kilograms in body weight, and 108.6 ± 17.3 in functional independent measure (FIM). Optotrak 3D motion capture system was used to record the kinematic and kinetic data. Two force plates were placed under each leg and one was under the chair. Postural combinations of three arm positions (placed on thighs (AT), symmetrical (AS), extended with grasped (AG)) and four foot placements (spontaneous (FSP), symmetric (FS), affected forward (FAF), affected backward (FAB)) were tested randomly. Five events during the sit-stand-sit task were identified: 3 (onset, seat-off, and end of task) in sit-to-stand phase, and 2 (start-to-sit and near sit-on) in stand-to-sit phase. Asymmetrical index of vertical ground reaction force for all postural conditions and at each event was calculated. Two-way repeated measures ANOVA was used to determine whether there was a significant difference between configurations. **Results:** At onset event, AS is more asymmetric than AT while affected foot backward ($p=0.03$). At seat-off, FS reveals more asymmetric than FAF while arm extended with grasped ($p=0.01$), and AS was more asymmetry than AT while foot spontaneous ($p=0.04$). At end of task, AS provides more asymmetry than AG, while foot placed symmetry ($p=0.03$). AS is more asymmetry than AT while foot affected forward ($p=0.01$). At start-to-sit, FAB and FSP are more asymmetry than FS while Arm symmetry ($p=0.01$, $p=0.04$). At near sit-on, FS is more asymmetry than FAF while arms on thighs ($p=0.04$). AT and AS are more asymmetry than AG while foot spontaneous ($p=0.02$, $p=0.04$). **Implications/Impact on Rehabilitation:** Arms placed on thighs for rising from chair and arms extended with grasped for sitting down provide more symmetry during tasks in stroke patient with high functional ability. The condition with affected foot forward reveals more symmetrical leg loads during sit-to-stand and also stand-to-sit tasks. The results give good information for stroke patients to have safe transfer and to decrease risk of falling.

No. 211

EVALUATION OF THE RELATIONSHIP BETWEEN EXPANDED DISABILITY STATUS SCALE (EDSS) SCORES AND HAND FUNCTIONS AND ABILITIES IN MULTIPLE SCLEROSIS PATIENTS

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Turkey

Objective: We aimed to evaluate the relationship between EDSS scores and hand functions and abilities in multiple sclerosis (MS) patients. **Method:** Twenty-three right hand dominant MS patients were included in this study. Patients' demographic features, disease duration and MS type were recorded. Hand's motor function were examined with power grip strength and pinch (lateral and tip) strengths; sensorial functions were evaluated with superficial sense, 2 point discrimination test, position and vibration senses. Hands dexterity evaluation were performed with nine hole peg test and manual ability measure (MAM 36). Finger flexor spasticity was recorded as positive or negative. EDSS was used in disability evaluation. Patients were divided into 3 groups according to their EDSS score as group 1 (EDSS: 4), group 2 (EDSS: 5–6) and group 3 (EDSS: 7–8.5), respectively. Comparisons were made to ensure homogeneity in terms of demographic and disease characteristics of patients between the groups and to determine the relationship between EDSS scores and hand functions and abilities. In terms of motor and sensory functions, hand dexterity levels and the presence of spasticity were compared. **Results:** Twenty-three patients were included into the study, 13 patients (56.5%) were female and 10 (43.5%) were male, mean age was 43 years. The patients' mean EDSS score was 6.02 ± 1.79 and mean disease duration was 12.47 ± 7.17 years. We have no patient whose EDSS score was below 4. The groups were similar of demographic and disease characteristics. We found correlation only between EDSS scores and MAM 36 levels. There was no significant difference between the other parameters and EDSS scores. **Implications/Impact on Rehabilitation:** Hand assessment methods which were used traditionally to examine hand functions and abilities are not always correlated with disease disability in patients with MS. MAM 36 shows better correlation with disease disability than these traditional methods.

No. 212

MIRROR THERAPY

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Turkey

Objective: Stroke is the leading cause of adult disability and inpatient rehabilitation admissions. It has been reported that up to 85% of stroke survivors experience hemiparesis and that 55% to 75% of stroke survivors have continued to have limitations in upper-extremity functioning. A number of interventions have been published evaluating the effect of various rehabilitation methods in improving upper-extremity motor control and functioning, such as exercise training of the paretic arm, impairment-oriented training of the arm, functional electric stimulation, robotic-assisted rehabilitation, and bilateral arm training. It has been suggested that mirror therapy is a simple, inexpensive and most importantly, patient-directed treatment that may improve upper-extremity function. During this therapy, the reflection of the uninvolved arm is visually superimposed on the involved arm, creating an illusion of normal movement of the involved arm. Several studies have shown positive effects of mirror therapy on upper limb functioning in stroke patients. **Method:** In our previous studies we have shown that mirror therapy was more beneficial in a group of stroke patients for both upper and lower extremity motor recovery and activity level than a similar treatment without mirroring. Currently we are trying to define some subgroups of stroke patients whom would benefit more from mirror therapy in terms of hand related activity level. **Results:** Our preliminary results showed that right-side hemiparetic, young, women with hemorrhagic, late stroke who had impaired proprioception in the wrist joint benefits more from mirror therapy in terms of hand related activity level. Our next question will be the duration of the treatment. In our protocol patients received mirror therapy for one 30-min of session per day. Most of them complained about their neck pain after looking into one direction for such a long time. Future studies will focus on the effects of modified mirror therapies such as two 15-min of sessions per day. **Implications/Impact on Rehabilitation:** Mirror therapy was more beneficial in a group of stroke patients for both upper and lower extremity motor

recovery and activity level than a similar treatment without mirroring. Our preliminary results showed that right-side hemiparetic, young, women with hemorrhagic, late stroke who had impaired proprioception in the wrist joint benefits more from mirror therapy in terms of hand-related activity level.

No. 213

VIDEOURODYNAMIC FINDINGS IN MULTIPLE SCLEROSIS

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Turkey

Objective: Neurologic bladder dysfunction is common among patients with multiple sclerosis (MS) which has a negative effect on their quality of life. The purpose of this study is to evaluate the videourodynamic findings in MS patients have been rehabilitated in our clinic. **Method:** Fifty-six MS patients with disease duration of more than 6 months who were rehabilitated in our clinic were admitted to the study. Demographic features, disease duration, urologic symptoms, blood urea and creatinin levels and videourodynamic findings were evaluated. **Results:** Mean age of the patients was 42.6 ± 9.5 years; median disease duration was 8 (1–28) years. Thirty patients had frequency and/or urgency and 12 have obstructive symptoms; 33 patients had urinary incontinence. Only 4 patients did not have any symptoms related to urinary dysfunction. Serum urea and creatinin levels were in the normal range in all the patients. In videourodynamic evaluation only 2 patients had normal findings. Detrusor overactivity was found in 31, detrusor overactivity with detrusor sphincter dysfunction were found in 10 and detrusor areflexia were found in 3 patients. Hypocompliance was found in 9 and sphincter insufficiency in 6 patients. **Implications/Impact on Rehabilitation:** Urodynamic pathology was found in 96.5% of the this study population. Urinary dysfunction should not be overlooked in MS patients. Patients should all be evaluated in terms of neurogenic bladder and a thorough urodynamic evaluation is mandatory for precise diagnosis.

No. 214

DEVELOPING A TOOL FOR THE AUDIT OF SPASTICITY MANAGEMENT

Rhoda Allison, PT

United Kingdom

Objective: To develop and evaluate an audit tool for spasticity management with botulinum toxin. **Method:** Services in the UK Peninsula region which provide adult spasticity management with botulinum toxin were identified by a survey of acute and community trusts. Audit tools to assess the organisation of services and process of care were developed with a consensus process with account of clinicians and service users' views. The Service Organisation tool included aspects of team working, learning and development of staff, access to specialist equipment, and links with other services. The Process of Care tool reviewed clinical records and consisted of seventeen items related to assessment, consent, goal-planning, treatment, information provision and aftercare. The tools were piloted using a retrospective case note audit. Inter-rater reliability of the tools was assessed, and percentage agreement and kappa statistics were calculated. Clinicians involved in the pilot were surveyed and qualitative feedback was analysed. **Results:** In total 100 sets of clinical records were audited, with 34 used to assess inter-rater reliability. Eleven items on the process of care tool demonstrated a high degree of inter-rater agreement with kappa scores between 0.4 and 1, but six require further development. In the qualitative analysis clinicians stated that the tools captured indicators of quality, that they found them easy to use and would use them again. A number commented that quality assurance needed to include user satisfaction. **Implications/Impact on Rehabilitation:** The project has developed tools to assess the organisation and process of care. The majority of the audit

questions showed good reliability, and face validity. Some aspects of the tools need further development prior to a larger pilot, and the process highlighted to the need for service user feedback as well as clinical audit as a component of a quality assurance.

No. 215

CAN WE PREDICT WHICH PATIENTS WILL HAVE DIFFICULTY CARING FOR THE PROFOUNDLY-AFFECTED ARM AFTER STROKE?

Rhoda Allison, PT

United Kingdom

Objective: Forty percent of people with stroke will not recover any useful movement of their arm. Some of these will go on to develop severe difficulty caring for the arm and have problems with pain, spasticity and contracture. The aim of this project was to systematically review the literature which examines people who do not regain the use of their arm to identify a) the natural course of impairments in the profoundly-affected arm, and b) potential predictors for difficulty caring for the arm. **Method:** Searches were completed of MEDLINE, EMBASE, AMED, CINAHL, and Cochrane databases in October 2010. We included studies which either modelled changes in the arm over time or which investigated at least one predictive variable and its relationship with impairments or difficulty providing passive care. Data were extracted, and the quality of studies was assessed by identification of areas of potential bias. **Results:** Our search identified 534 titles from which 27 full papers met the inclusion criteria. Modelling studies indicated that spasticity, pain and contracture all start developing within a few weeks of stroke. There have been no studies that have evaluated predictors of difficulty caring for the arm, but early absence of movement, spasticity, pain, sensory loss, global disability, and inattention have been linked with increased incidence of impairments in the arm in the longer-term. **Implications/Impact on Rehabilitation:** Improved predicting of disability and knowledge of how the profoundly-affected arm changes over time will enable clinicians to adopt appropriately-timed and targeted preventative measures, and will enable people with stroke to receive care with a more evidence based approach. Knowledge gained from this review will now be used to test potential predictors in a prospective longitudinal study.

No. 216

BOTULINUM TOXIN (BT) THERAPY FOR ADULT SPASTICITY- THE 1ST COMPLETED AUDIT CYCLE

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United Kingdom

Objective: Royal College of Physicians (RCP) (UK) produced Guidelines (2003 & 2009) detailing the Standards of multidisciplinary (MDT) rehabilitation of adult spasticity (AS) using BT. In 2006, an audit was conducted ($n=100$) against that Standard 1 which identified certain action points and were implemented. This re-audit analyses the process, outcome and risk of this complex peripatetic service. This comprehensive data focussed on the gaps in the local context as well as the RCP Standards. **Method:** Retrospective case notes review of data of 70 consecutive patients (2006–9) were analysed, led by a University hospital based Neurorehab Unit. **Results:** Demography and case mix remains similar to 1st audit. We noted substantial improvements in defining treatment goals with patients and carers 94% (Cf 68% in the 1st audit). The follow up of patients by therapists 2 weeks & 6 weeks were 54% & 46%. Standardised outcome measurement tools used in 49% cases. Written communication between community physiotherapists and hospital team showed no improvements. Specific gaps identified in the initial audit showed improvement eg documentation of aggravating factors (100%), dilution of BT improved (62%), named therapist was identified pre-injection in 96% (cf 26% in 1st audit). **Implications/Impact on Rehabilitation:** Such complex service

requires co-ordinated care plan by MDT from different organisation. The local context needs to be considered whilst trying to implement the RCP Standards. The key gap in such service anywhere in the world is co-ordinating the timely post-injection physiotherapy (PT). Identifying a named PT, a major action plan, was implemented. Poor communication by community & the hospital team may underestimate the actual post-injection PT provided. This project highlights the value of the iterative process of re-auditing to improve services since more gaps will be identified requiring different action plans.

Reference:

1. Sakel M. An audit of Botulinum toxin therapy services for adult spasticity. *Int J Ther Rehabil* 2008; 15:15–21.

No. 217

EXPERIENCE OF PATIENTS HAVING BOTULINUM TOXIN(BT) THERAPY FOR ADULT SPASTICITY – A QUALITATIVE STUDY

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Objective: Despite the increasing use of BT in adult spasticity treatment, only one published satisfaction survey is available. That hinted at lack of correlation with objective rehabilitation outcomes and patient reported satisfactions. Unlike satisfaction survey, a qualitative study may provide the nuances and a rounded appraisal of the context of treatment settings and the impact on patients. **Method:** We formed a research team and a Steering committee, with members from the Local Stroke Association. Research Ethics Committee (10/H1101/13) and Institutional approval (2010/NEURO/01) were obtained. Eligible and consented patients were invited to participate in the group discussion of 3 carers and 3 patients in each session. We used an open-ended interview to enable respondents to provide flexible responses which reflected their own opinions and expectations without being influenced by assumptions. Further prompting or questioning by the interviewer was based on the responses seeking clarification and probing for details. The group discussion was then transcribed electronically and reflected upon to derived themes. 5 interviews ($n=20$) over a 6 months period in 2010 produced data saturation and themes. **Results:** 7 themes emerged: Treated as an individual; Access: to car park & speed of appointment; Co-ordinated continuity of care; Logistics: splints; Clarity of information exchange between lay and experts; Equitable follow-up; Information resources for carers. **Implications/Impact on Rehabilitation:** The patient experience constitutes a major plank of the quality appraisal of a service. We sought to transform the service by getting the service users involved in the creation of knowledge which will facilitate better designing of the service. A better insight into what aspects of processes contributes to patients' and carers' experience of the service will facilitate that.

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No. 218

THE BOTOX[®] ECONOMIC SPASTICITY TRIAL (BEST) POPULATION: DIFFERENCES BETWEEN COUNTRIES AND COMPARED TO POST-STROKE SPASTICITY (PSS) PATIENTS IN THE PUBLISHED LITERATURE

Anthony B. Ward, MD; Joerg Wissel; Jörgen Borg; Christian Dohle; Patric Säterö; Robert Prempeh; Kristina Lindgren; Nicola Wright; & The BEST Study Group

United Kingdom

Objective: The aim of this analysis was to compare the BOTOX® Economic Spasticity Trial (BEST) population across countries and to PSS patients in the published literature. **Method:** Adults with focal PSS were randomised to botulinum toxin A (BoNT-A)+standard care (SC) or placebo+SC for up to 2 treatment cycles, followed by an open-label phase up to 52 weeks. Eligible patients were BoNT-A-naïve, had preserved function in the limb to be treated, and were considered likely to benefit from intervention. Fixed contractures and causes of spasticity other than stroke were exclusion criteria. Baseline patient characteristics from each study country (Canada, Germany, Sweden, UK) were compared qualitatively with those described in non-interventional, observational studies published between 2000–2010. **Results:** In BEST ($n=274$; median age 60–66 years), there were fewer men in the Canadian cohort than in the other countries, but a larger proportion of patients aged <65 years. In Canada and Sweden, 0% and 5% of patients, respectively, had suffered a severe stroke, compared with 32–39% in Germany and the UK. Median time since stroke was 23 months range (2.9–402.4) and was similar for all countries. The total proportion of patients in BEST with severe spasticity was slightly higher than those reported in the literature (1–5). **Implications/Impact on Rehabilitation:** Although demographic differences do exist in the BEST population between countries, the BEST population overall is largely representative of the PSS population in the published literature. However, it should be remembered that the BEST cohort was a selected population based on their functional goals and need for antispasticity treatment, and many were managed at specialist centres.

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No. 219

FACTORS INFLUENCING FUNCTIONAL GOAL ACHIEVEMENT IN POST-STROKE SPASTICITY (PSS) PATIENTS: FINDINGS FROM THE BOTOX® ECONOMIC SPASTICITY TRIAL (BEST)

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United Kingdom

Objective: The aim of this analysis was to identify the proportion of PSS patients achieving their functional goals according to the types of goal set and interventions received (BOTOX® [BoNT-A]+standard care [SC] or placebo+SC). **Method:** Adults with focal PSS were randomised in a double-blind manner to BoNT-A+SC or placebo+SC for 1 or 2 treatment cycles, followed by an open-label phase up to 52 weeks. The primary outcome measure was the percentage of patients achieving their principal active functional goal (Outcome 1), which focused on an area of priority for the patient, e.g. an increased walking distance. Sary active (Outcome 2) and passive (Outcome 3) functional goals were also set for each patient. Goal attainment was scaled between -3 (deterioration) and +2 (over-achievement). **Results:** The study population comprised 273 patients (mean age: 61.5 years, 59% male). A total of 40.9% of patients receiving BoNT-A+SC achieved Outcome 1, versus 33.3% of patients receiving placebo+SC (odds ratio [OR]=1.36; 95% CI=0.81, 2.29). Outcome 1 (principal active functional goal) was achieved by 97.5% of patients receiving 31 session of physiotherapy during the study, compared with 90.0% of patients receiving no physiotherapy. Outcome 2 (sary active functional goal) was achieved by 39.2% of patients in the BoNT-A+SC group versus 42.9% of patients in the placebo+SC group (OR=0.86; 95% CI=0.39, 1.91) and Outcome 3 (sary passive functional goal) was achieved by 60.6% of patients in the BoNT-A+SC group versus 38.6% of patients in the placebo+SC group (OR=2.42; 95% CI=1.22, 4.78). **Implications/**

Impact on Rehabilitation: BoNT-A may facilitate goal attainment as an adjunct to SC and the availability of adequate SC is associated with the achievement of functional goals in PSS patients.

No. 220

BOTULINUM TOXIN (BT) THERAPY FOR ADULT SPASTICITY – THE 1ST COMPLETED AUDIT CYCLE

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Objective: Royal College of Physicians (RCP) (UK) produced Guidelines (2003 & 2009) detailing the Standards of multidisciplinary (MDT) rehabilitation of adult spasticity (AS) using BT. In 2006, an audit was conducted ($n=100$) against that Standard 1 which identified certain action points and were implemented. This re-audit analyses the process, outcome and risk of this complex peripatetic service. This comprehensive data focussed on the gaps in the local context as well as the RCP Standards. **Method:** Retrospective case notes review of data of 70 consecutive patients (2006–9) were analysed, led by a University hospital based Neurorehab Unit. **Results:** Demography and case mix remains similar to 1st audit. We noted substantial improvements in defining treatment goals with patients and carers 94% (Cf 68% in the 1st audit). The follow up of patients by therapists 2 weeks & 6 weeks were 54% & 46%. Standardised outcome measurement tools used in 49% cases. Written communication between community physiotherapists and hospital team showed no improvements. Specific gaps identified in the initial audit showed improvement eg documentation of aggravating factors (100%), dilution of BT improved (62%), named therapist was identified pre-injection in 96% (cf 26% in 1st audit). **Implications/Impact on Rehabilitation:** Such complex service requires co-ordinated care plan by MDT from different organisation. The local context needs to be considered whilst trying to implement the RCP Standards. The key gap in such service anywhere in the world is co-ordinating the timely post-injection physiotherapy (PT). Identifying a named PT, a major action plan, was implemented. Poor communication by community & the hospital team may underestimate the actual post-injection PT provided. This project highlights the value of the iterative process of re-auditing to improve services since more gaps will be identified requiring different action plans.

Reference:

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No. 221

AN UNUSUAL CASE OF A BB GUN-RELATED TRAUMATIC BRAIN INJURY MANIFESTED AS RIGHT MEDIAL LONGITUDINAL FASCICULUS INJURY- CASE REPORT

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Objective: BB (Ball-Bearing) guns are commonly used for sporting entertainment in the United States and are often purchased for children and teenagers. These guns can be purchased without permit in most states in the USA, now even in states with restrictive laws sary to exponential growth in commerce. Accidental BB and pellet gun injuries contribute significantly to firearm-related morbidity in children between the ages of 10 and 14. We present a case of accidental BB gun injury leading to traumatic brain injury manifested as medial longitudinal fasciculus injury. **Method:** A 13-year-old boy had been playing with his 15 year-old neighbor, when the weapon inadvertently discharged, striking him in the left forehead.

The patient's parents monitored him closely over the course of the morning and reported no abnormal behavior. Later in the evening upon returning home, the child began complaining of double vision, headache and began vomiting by evening. He was then urgently transported to a local Emergency Department (ED). Examination performed at the time of admission to the ED demonstrated a small oval entry wound just above the left brow. Further examination revealed minimal left facial droop and right eye lateral gaze palsy. CT Head without contrast showed a projectile tract traversing the left frontal lobe, crossing the midline and terminating in multiple metal fragments in the right posterior fossa. *Results:* After an acute inpatient hospital course of 10 days, he was transferred to our acute rehabilitation facility sary to poor balance, visual deficit and functional decline. Functionally, the patient improved significantly with inpatient rehabilitation. *Implications/Impact on Rehabilitation:* BB guns, although considered toys by the companies that mass produce them and consumers alike, can potentially cause catastrophic injury including TBI. The type and severity depends largely on the type of BB gun used, range at which it is fired and the anatomical site at which the pellet penetrates the skin. Rehabilitation physicians should be aware of this potential and realize the impact of a similar injury on the recovery of such a patient.

No. 222

TESTOSTERONE LEVELS OF PATIENTS WITH MULTIPLE SCLEROSIS ADMITTED FOR REHABILITATION

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Objective: To evaluate the testosterone levels of patients with multiple sclerosis (MS) admitted to a rehabilitation center in the Midwestern United States. *Method:* A retrospective chart review was conducted for 46 patients with MS who were admitted for rehabilitation from 2006 through 2010. Hormone levels were measured upon admission. *Results:* Among male patients with MS, nine of 16 (55%) had subnormal total testosterone (laboratory normal 241–827 ng/dl) and 12 of 16 (75%) had testosterone less than 300 ng/dl. The mean testosterone level in male patients with MS and mean age of 57 years was 270 ng/dl. Among female patients, eight of 30 (27%) had subnormal testosterone (laboratory normal 14–76 ng/dl). The mean testosterone level in female patients with mean age of 51 years was 27 ng/dl. *Implications/Impact on Rehabilitation:* Low testosterone has been associated with decreased muscle strength, fatigue, and depressed mood. All of these factors can impede progress during rehabilitation and all are frequently reported by patients with MS. Because of the prevalence of subnormal to low testosterone in patients with MS, screening for testosterone level should be conducted upon admission for rehabilitation. Testosterone replacement therapy should be considered for patients with MS who have hypogonadism.

No. 223

PATIENT REGISTRY OF OUTCOMES IN SPASTICITY (PROS) CARE

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Objective: To provide real-world data characterizing clinical and patient-reported outcomes associated with the diagnosis and treatment of spasticity with chemodenervation or neurolysis in patients

with traumatic brain injury or post-stroke. *Method:* Design: Prospective, observational study design. Setting: Multicenter with 17 physicians. Participants: 487 stroke and TBI patients. Interventions: Clinically appropriate OnabotulinumtoxinA or phenol. Main Outcome Measures: Ashworth score, pain, global assessment and satisfaction. *Results:* The most commonly treated pattern of dysfunction in the upper limb was the flexed wrist (25.7%) with the flexor carpi radialis (FCR) (32.7%) being the most frequently treated muscle. The mean total dose of the 1,963 injections for the upper limb was 57.7±34.1units. The mean phenol volume was 3.9±0.7cc. The total OnabotulinumtoxinA dose used per patient in the upper limb was 318.4±156.2units and for phenol 6.4±3.2cc. The most commonly treated pattern of dysfunction in the lower limb was the equinovarus/equinus foot (63.0%) with the medial/ lateral gastrocnemius (24.2%) being the most frequently treated muscles in the foot. The mean total dose of the 703 injections for the lower limb was 93.8±63.5units. The mean phenol volume was 4.1±1.3cc. The total Onabotulinumtoxin A dose used per patient in the lower limb was 258.0±134.6units and for phenol 5.3±2.2. There was a significant improvement in the Ashworth score ($p<0.0001$). The foot showed the largest reduction in pain score -4.2 ± 3.4 . Patients reported they were satisfied (78.0%) with their overall treatment. Based on patients' goals, 74.1% of patients reported "made some progress towards primary goal" and 67.6% reported "made some progress towards sary goal". No significant related adverse effects were reported. *Implications/Impact on Rehabilitation:* Findings suggest dosing differences for commonly treated patterns of UMN dysfunction and muscles improved Ashworth and pain scores. This robust database can help guide clinicians in the management of patients with spasticity.

No. 224

CATAGORICAL VS. CONTINUOUS VARIABLES IN ASSESSING PHYSICIAN CERTAINTY ABOUT DIAGNOSIS AND SEVERITY

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Objective: Diagnostic certainty is an important variable in research on musculoskeletal disorders, for which there is not always a pathological gold standard. Analog scales may be more precise about certainty, but their relationship to the bottom-line diagnosis needs to be established. This study compares physician level of certainty about diagnosis of claudication using a 0 to 10 cm visual analog scale vs. a categorical multiple choice question. *Method:* At an academic medical center subjects recruited from vascular and spine clinics and community volunteers underwent a comprehensive masked physical examination by a vascular and a neurosurgeon. Physicians rated their 0–10 certainty about the disease (neurogenic claudication, vascular claudication, and asymptomatic) and marked diagnosis from one of the four categories (neurogenic claudication, vascular claudication, both, and neither). *Results:* Averaging 64.3±8.1 years old, 88 subjects participated. Neurosurgeon's certainty of diagnosis as neurogenic claudication was 5.60±1.94 for persons diagnosed as neurogenic, 1.63±2.13 for those diagnosed as vascular, and 0.36±0.84 for asymptomatic subjects ($F=112.237$, $df=84$, $p<0.001$). Vascular surgeon's certainty of diagnosis as neurogenic claudication was 5.08±1.57 for persons diagnosed as neurogenic, 0.82±0.78 for those diagnosed as vascular, 5.22±1.97 for those diagnosed as both, and 0.26±0.64 for asymptomatic subjects ($F=116.278$, $df=87$, $p<0.001$). Analysis of Variance and Post Hoc testings found that analog certainty about a specific diagnosis related significantly to multiple choice of diagnosis. Physicians' rating of certainty of neurogenic claudication was found associated with subjects' response to pain measures (McGill Pain Scale, Average Visual Analog Scale, Pain Disability Index, and Quebec Back Pain Disability Scale), $p<0.001$. *Implications/Impact on Rehabilitation:*

tion: For neurogenic and vascular claudication, increased severity relates to increased physician confidence in the diagnosis. The significant relationship between physicians' analog certainty about the disease and their forced-choice final diagnosis allows more flexibility in research methods.

No. 225

ENHANCEMENT OF CHOLINERGIC FUNCTION ACCELERATES COGNITIVE AND MOTOR RECOVERY FROM TRAUMATIC BRAIN INJURY

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Objective: To determine if recovery from cognitive and motor deficits in cortical impact injury (TBI) can be accelerated by acetylcholinesterase (AChE) inhibition with physostigmine (PHY). **Method:** Three groups of Sprague-Dawley rats were used: TBI treated with physostigmine (TBI-PHY) or saline (TBI-SAL) continuously by a subcutaneous minipump, and no injury controls (CO). Learning and recall were assessed with the Morris water maze (WM) between 7 and 14 days post-TBI and motor function by accelerating rotarod treadmill (ART), errors crossing an horizontal ladder, home cage activity and rearing at 1, 2, 7, 14 and 21 days post-TBI. Brain AChE was measured by the method of Ellman. Data were analyzed by analysis of variance and multiple contrasts (Dunnett's test) with significance (* vs TBI-SAL) at $p < 0.05$. **Results:** TBI induced significant deficits in all motor functions. A dose response study of ART performance (most persistent TBI deficit) indicated significant endurance improvement at 1.6 and 3.2 $\mu\text{moles/kg/min}$ PHY (Mean \pm SE, s): TBI-SAL 22.4 ± 1.5 , $n=9$; TBI-PHY(1.6) $= 28.7 \pm 2.8$, (*) $n=6$ (Brain AChE = 95% of control); TBI-PHY(3.2) $= 31.5 \pm 1.3$ (*) $n=6$ (Brain AChE = 78% of control), but deterioration at higher doses: TBI-PHY(6.4) $= 20.2 \pm 2.3$ $n=7$ (Brain AChE = 54% of control); TBI-PHY(12.8) $= 20.5 \pm 1.5$ $n=7$ (Brain AChE = 39% of control). WM indicated significantly better performance of TBI rats treated with PHY at 3.2 $\mu\text{moles/kg/min}$ for within sessions learning (Mean latency to target \pm SE, s): CO $= 17.2 \pm 4.2$ $n=8$; TBI-SAL $= 53.6 \pm 4.9$ $n=8$; TBI-PHY $= 24.1 \pm 4.6$ (*) $n=9$, but not for between sessions recall: CO $= 29.6 \pm 6.0$; TBI-SAL $= 51.7 \pm 7.2$; TBI-PHY $= 61.4 \pm 6.8$. **Implications/Impact on Rehabilitation:** Recovery from cognitive and motor deficits is accelerated by PHY. The fact that learning of a spatial task, but not retrieval of information is improved by PHY may help define the goals of clinical treatment with acetylcholinesterase inhibitors. Careful dosing is needed to avoid deterioration of function.

No. 226

DEPRESSION IN INDIVIDUALS INJURED IN MOTOR VEHICLE ACCIDENTS: A LONGITUDINAL STUDY

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Objective: 1) To determine the prevalence of minor (mD) and major depression (MD) in individuals who were injured in motor vehicle accidents (comparing individuals with traumatic brain injury vs. individuals with other injuries) in Medellín, Colombia and 2) to compare rates of depression over one year within and between groups. **Method:** A sample of 177 individuals (45 TBI

survivors and 122 with other injuries) involved motor vehicle accidents occurring between 2008 and 2010 were recruited from nine different hospitals in Medellín, Colombia. The Patient Health Questionnaire-9 (PHQ-9) was used to measure depression at one month, three months, and one year post-injury. **Results:** At one month post-injury, 11.5% of individuals with TBI and 21.3% of individuals with other types of injuries met diagnostic criteria for mD while rates for MD were 73.3% and 63.1%, respectively. At three months post-injury, 20.0% of participants with TBI met criteria for mD and 51.1% MD, while 27.0% of persons without TBI met criteria for mD and 41.0% for MD. At one year post-injury, 17.8% of individuals with TBI met criteria for mD and 44.4% for MD, while 25.4% and 27.0% of persons with other injuries reported mD and MD, respectively. Results of a 2 x 2 within and between factor ANOVA on total PHQ indicated a main effect for group ($p < 0.01$) and time ($p < 0.001$) such that individuals with TBI had higher depression scores than individuals with other injuries regardless of time ($p < 0.05$), and depression scores significantly decreased over time irrespective of group ($p < 0.05$). **Implications/Impact on Rehabilitation:** Individuals who sustain injuries in motor vehicle accidents commonly experience mD and/or MD and the prevalence decreases over one year after accident. Rehabilitation professionals should implement treatment interventions to identify, prevent, and reduce the prevalence of mD and MD in these individuals.

No. 227

LONGITUDINAL CHANGES IN QUALITY OF LIFE OF INDIVIDUALS WITH TRAUMATIC BRAIN INJURY FROM MEDELLIN, COLOMBIA

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Objective: To determine changes in quality of life in individuals with Traumatic Brain Injury from Medellín, Colombia. **Method:** A sample of 109 TBI survivors with initial injuries occurring between 2008 and 2010 were recruited from nine different hospitals in Medellín, Colombia. The SF-36 was administered at one month, three months, and one year post-injury to measure quality of life. The SF-36 is composed of eight component areas (physical health problems, pain, role limitations due to physical problems, role limitations due to emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions). **Results:** A within-group repeated measure ANOVA of 44 participants with data available at one month, three months, and one year post-injury showed that there were significant changes across time for five of the eight SF-36 sub-scales: physical health problems ($p < 0.001$), pain ($p < 0.001$), role limitations due to physical problems ($p < 0.001$), role limitations due to emotional problems ($p < 0.05$), and social functioning ($p < 0.001$). Analysis of simple effects showed that physical health problems, pain, role limitations due to physical problems, and social functioning sub-scales all had significant improvements in scores from each time point to the next ($p < 0.05$). For the role limitations due to emotional problems, there was a significant improvement in scores from one month to one year post-injury ($p < 0.05$), but not from one month to three months post-injury. There were no significant differences in energy/fatigue, general health perceptions, and mental health sub-scales over time for individuals with TBI. **Implications/Impact on Rehabilitation:** Rehabilitation professionals should develop and implement culturally-appropriate interventions to improve quality of life in Colombian individuals with TBI in the first year post-injury. It appears especially important to emphasize and enhance general health, mental health, and energy/fatigue in these individuals.

No. 228

A GROUP ACUPUNCTURE TREATMENT PARADIGM FOR VETERANS WITH TRAUMATIC BRAIN INJURY (TBI) AND PERSISTENT HEADACHES

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United States of America

Objective: To describe the development and organization of a group acupuncture practice for TBI patients with headaches within a VA Medical Center (VAMC) setting, and to explore the acceptance of such practice by veterans. **Method:** This Atlanta VAMC TBI project to improve quality of care was reviewed and approved by the Emory University IRB. Clinical protocols were set by an interdisciplinary team and incorporated education (targeting lifestyle change and proper use of pain medications) as first-line treatment. TBI veterans with persistent headaches despite previous treatments were offered a trial of acupuncture therapy. Those with cluster headaches or unwilling to taper off opioid medication were excluded. Infection control practices for group acupuncture visits were reviewed with appropriate personnel, and consisted of a hand sanitation station, a portable sharps disposal container, and a mobile treatment cart. Up to four patients could be treated at a single time. Nearby, a room with an examining table and emergency equipment were available all the time. Disposable metal acupuncture needles were used, and universal precautions were taken during the procedures. A random month (July 2010) was selected for analysis in this preliminary report. **Results:** Of 108 TBI veterans evaluated for treatment, 89 (82.41%) presented with headaches. Six (6.7%) improved with educational intervention, and 17 were referred for group acupuncture. Fifteen veterans (88.24%) accepted; two declined citing fear of needles. Eleven of these patients completed some or all of their prescribed acupuncture treatments by December 2010, while the other 4 on wait-list. The overall response rate to acupuncture reached 72.7%. **Implications/Impact on Rehabilitation:** The integration of acupuncture for persistent headaches among veterans with TBI and the use of group practice to increase the number of patients cared for at a single time are feasible and well accepted.

No. 229

OUTCOMES OF GROUP ACUPUNCTURE THERAPY FOR TRAUMATIC BRAIN INJURY (TBI) VETERANS WITH HEADACHES

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Objective: To evaluate patient-reported treatment outcomes for headaches in group acupuncture setting. **Method:** In a group acupuncture setting at a VAMC, individualized acupuncture treatments were conducted for headaches, employing Traditional Chinese Medicine and meridian theories. A range of 4–26 needles were applied and left in for 30 min per session. Each patient was treated for a maximum of 10 sessions at about twice per month. Veterans expressing no improvement after 4–5 treatments or not showing to scheduled appointments twice were discharged. Pain levels were assessed before and after each treatment session on a numeric scale (0–10; with 0 as no pain; and 10 as excruciating pain). **Results:** Veterans receiving care during July 2010 (a randomly selected month) had their medical charts selected for outcome assessment. Eleven out of the fifteen veterans who were referred to group acupuncture clinic received some or all of the prescribed 10 treatments by the end of December 2010, with four awaiting treatment. Of the eleven, nine were men. The average age was 38.3 (SD 9.0, range: 26–53). All eleven had received prior medical treatments but reported persistent baseline mean headache level of 9.6 (SD 0.82) with a median of 6 years of duration (range 4–19). Two veterans finished 10 treatments, four finished 9 treatments, one finished 2 treatments, and four finished less than 5 treatments but were discharged. The mean headache level was down to 4.1 (SD 3.8) with overall 72.7% response rate, including 2 veterans (18.2%) with complete resolution, 6 (54.6%) with improvements in pain scores, 2 (18.2%) with no change, and 1 (9.1%) reported “worse”. **Implications/Impact on Rehabilitation:** These data represent a convenience clinical sample at a single site with short-term outcomes, yet several veterans plagued by persistent headaches appeared to derive benefit from acupuncture in group setting.

OTHER

No. 230

CLINICAL – ISOKINETIC DINAMOMETRIC CORRELATION IN TOTAL KNEE REPLACEMENT PATIENTS

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Objective: To assess the association between the WOMAC questionnaire, the HSS score and isokinetic dynamometry in TKR (Total Knee Replacement) patients 2–5 years post-surgery; and to validate the reliability of dynamometry in this population. **Method:** Cross-sectional study of the 66 patients who underwent TKR (performed by the same traumatologist) between years 2004 and 2007 in the Hospital Nostra Sra. de Meritxell. 30 patients met the inclusion/exclusion criteria, and 15 of them had bilateral TKR. Mean age was 72 years. Subjects were assessed with: the self-administered WOMAC questionnaire (Spanish version), the HSS Score and an isokinetic test (Biodex 3 Pro) measuring peak torque (PT) and total work (TW) at 120°/sec and 180°/sec in concentric flexion/extension. Assessment was repeated 7 days later. We assessed test-retest reliability using intraclass correlation rate; HSS and WOMAC (and their dimensions') internal consistency with Cronbach's alpha; questionnaire validity with Spearman's correlation matrix (multi-trait, multi-method matrix); and their correlation with dynamometry. **Results:** HSS and WOMAC's reproducibility was found to be excellent (ICC 0.72–0.94), as well as that of PT and TW (CCI > 0.85) in flexion and extension at 120°/sec and 180°/sec. Function (WOMAC) is the dimension that best correlates with better HSS score results (Spearman: 0.74, $p=0.0011$). Joint balance does not correlate with good results for pain and function (Spearman 0.24, $p=0.10$). Function (HSS and WOMAC) was most correlated with high PT and TW, with the most significant results for extension (Spearman 0.50, $p=0.0004$). Function (HSS) worsened with age ($p=0.0107$), as well as isokinetic values. **Implications/Impact on Rehabilitation:** HSS and WOMAC are reproducible, validating the dynamometric correlation. Isokinetic dynamometry is a useful, objective and quantitative method to assess TKR patients, with a statistically significant association with the patient's subjective functionality, especially for extension (quadriceps strength). No correlation between pain (subjective) and dynamometry was found.

No. 231

CAUSES OF TRAUMATIC BRAIN INJURY IN PATIENTS ADMITTED TO REHABILITATION IN THE CIR APREPA

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Argentina

Objective: To describe the demography of population with brain injury that is admitted to our Center to carry out rehabilitation. **Method:** 59 patients admitted to CIR APREPA from January 2005 to August 2010 diagnosed severe TBI were studied. Information was obtained from medical records, descriptive-transversal study. **Results:** 59 patients, 78% males, 22% females. Age average was 32 years old (6–96 years). Severe TBI etiology was: 34% motorcycle (without wearing helmet), 26% car accidents, 16% fall from heights, 8% bicycle-car collision (without wearing helmet), 8% car turned over, 2% fall from running car, 2% cranial crush, 2% car-pedestrian collision, 2% beating. Patients' education was: elementary school

45%, high school : 44%, Junior College: 11%. According to personal history: 34% smokers, 11% alcoholics, 2% presented previous TBI and 4% had a history of previous seizures. **Implications/Impact on Rehabilitation:** There is no reliable epidemiologic data in Argentina at national level regarding the incidence of this phenomenon, but what is known is that the most frequent causes of TBI are car accidents, in our population 80% belonged to this group. The most vulnerable victims are pedestrians, cyclists, young people and public transport systems users. In spite of the awareness campaigns carried out in our country, there was no appreciable decrease in the rate of road accidents that cause TBI, severe in most cases, that result in a high morbidity and mortality, and high economic costs both for State and family. We consider that it is fundamental to know the incidence and vulnerable groups in order to educate the population on this subject. These patients present a challenge to caregivers in the emotional, behavioral and quality of life span of the patient, since the latter is severely modified, radically, due to the fact that this pathology affects directly on the patient's peak of life.

No. 232

IS REHABILITATION MEDICINE THE END OF THE JOURNEY FOR OUR PATIENTS?

Anupam Datta Gupta, MD; David Wilson, PhD
Australia

Objective: This paper highlights the importance of diagnosis in rehabilitation medicine. Three patients were referred to rehabilitation unit—the first patient had neck pain on the back ground of post polio paralysis of right upper limb and was diagnosed with post polio syndrome. The second patient was operated for repair of ruptured abdominal aortic aneurysm (AAA) on the background of Ankylosing Spondylitis. The third patient underwent conservative management for a compression fracture of the L1 following a fall at home. **Method:** The first patient had restricted neck movement – the open mouth view of the cervical spine revealed atlantoaxial subluxation. Subtle upper motor signs in the lower limbs and the MRI confirmed the diagnosis of Arnold Chiari malformation. The second patient was complaining of persisted back pain who had the history of collapse and a fall. The X-ray and the CT scan revealed unstable T10 fracture with spinal canal stenosis. Third patient developed lower motor weakness of the lower limbs along with up going plantar response and bladder symptoms which was eventually diagnosed with conus medullaris syndrome. **Results:** All these patients were referred to the spinal surgical unit. The first patient had foramen magnum decompression. The second patient underwent open reduction and internal fixation of the T10 fracture dislocation. The third patient underwent decompression and internal fixation of L1. They were all referred back to the rehabilitation unit eventually recovered well and went home. **Implications/Impact on Rehabilitation:** The patients are usually referred the rehabilitation medicine after the diagnosis has been made and primarily for overcoming the effects of disability and increasing functional ability. The rehabilitation physicians should not be anchored in assumptions and follow the same medical model of diagnosis i.e. detailed history, careful clinical examination, laboratory tests and radiological investigations. Rehabilitation can be beginning of the journey for some of our patients as described in this series contrary to the popular notion that it is the end.

No. 233

EARLY NEUROMUSCULAR ELECTRICAL STIMULATION FOR INTENSIVE CARE UNIT PATIENTS: EFFECT ON MUSCLE STRENGTH AND URINARY NITROGEN EXCRETION

Tatjana Paternostro-Sluga, MD; Dominik Janda, MD; Stefan Senekowitsch, MD; Michael Hiesmayr, MD
Austria

Objective: Critical illness frequently results in both short and long-term muscle wasting and weakness. One major problem is post aggression catabolism combined with complete immobility due to illness, sedation and/or critical ill polymyoneuropathy. It is known that intensive care unit (ICU) patients lose up to 50% of their muscle mass during the ICU stay. The aim of the present study was to examine if early neuromuscular electrical stimulation (NMES) of quadriceps femoris muscle can counteract catabolism and enhance muscle strength. **Method:** This prospective, randomized, controlled trial included 40 ICU patients after cardiac and thoracic surgery, who were randomized to a stimulation and a sham stimulation group. Stimulation (60 Hz 3.6 s On/4.6 s Off) was performed daily for maximum of two weeks, until discharge of the ICU, two times for 30 min with surface electrodes and maximally tolerable stimulation intensity. In all patients nitrogen excretion in urine and manual muscle strength testing according to Medical Research Council grading were measured daily. **Results:** During the ICU stay, patients in the intervention group showed a lower increase in urinary nitrogen excretion (+56%) compared to the control group (+97%), this was a positive trend in favour of the stimulation group but not statistically significant ($p > 0.05$). Loss of muscle strength was significantly ($p = 0.015$) less in the stimulation group. **Implications/Impact on Rehabilitation:** Early NMES can reduce loss of muscle strength in postsurgical ICU patients and shows a trend towards reducing post aggression catabolism as measured by urinary nitrogen excretion.

No. 234

EFFECT OF AEROBIC EXERCISE ON QUALITY OF LIFE IN STABLE ANGINA

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Objective: This study was carried out to see the effect of a comprehensive Cardiac Rehabilitation (CR) program comprising of aerobic exercise, counseling and education on quality of life among patients of stable angina. **Method:** This study carried out in the department of Physical Medicine & Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from May 08 to August 08. 80 patients enrolled in the study; of which analyzable data was obtained from 71 patients. In Group B (control) patients were treated with counseling, education & usual drug treatment. Group A (study subjects) were given aerobic exercise in the form of brisk walking in addition of counseling and education and usual drug treatment. Each individual was observed at first visit, thereafter was assessed in succession for three more occasions at 14 days intervals each for quality of life using 'Cardiac Quality of Life Index' (QOL) that consists of 5 domains namely psychological wellbeing, physiological wellbeing, nutrition and worry than the control Group-B. **Results:** The highest numbers of patients were in the 41–50 years age group with male was predominating (ratio was 4:1). The comparative study between Group-A & Group-B revealed a significant improvement in four of the five domains among Group-A; namely psychological wellbeing, physiological wellbeing, nutrition and worry than the control Group-B. **Implications/Impact on Rehabilitation:** Conclusion: Aerobic exercise program as a component of CR has been found effective in patients with stable angina. Recommendations: Comprehensive Cardiac Rehabilitation (CR) should be necessary part of the treatment modality for stable angina patient in order to improve health and quality of life.

No. 235

TELEREHAB IN COMMUNITY-BASED BANGLADESH: AN INITIAL REPORT

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Objective: Bangladesh is one of the most densely populated countries of the world. About 150 million people living within 144,000 sq. km of land (1055 person/km²). There are only 765 Government hospitals in district head-quarters and upazila (sub-town) areas. Total number of beds available in both public and private hospitals and clinics is 51,648. So the ratio of one hospital bed to citizen of Bangladesh is around 1:2571. So, the scope of telerehab is enormous. **Method:** Director General of Health services (DGHS) of Bangladesh started a pilot project titled "Telemedicine Management Information System" under the leadership Prof. Abul Kalam Azad. Rehabilitation of stroke patients has been incorporated as an extension of the project because of the individual interest of few physiatrists. Hence the extended project has been termed "Telerehab in community based Bangladesh". 8 specialized hospitals and community hospitals have been selected so far. They are 2 specialized Hospitals: BSMMU, NICVD, 3 District Hospitals: Gopalganj, Satkhira, Nilfamari and 3 Upazila Hospitals: Debhata, Daakop in Khulna, Pirgonj in Rangpur. Accessories are: Tanberg webcam for picture, Boundary microphone for sounds with 1,000 Mbps speed internet and Video conferencing. We included stroke patients for physiotherapy and occupational therapy at the beginning. **Results:** Initial Pilot project. **Implications/Impact on Rehabilitation:** Telerehab adds a new paradigm in Rehabilitation care, where the patient is monitored between physician office visits even. This ultimately expected to reduce hospitalizations and physicians office visits, while improving patient's quality of life. This also benefits patients where traditional delivery of health services is affected by distance and lack of local specialist clinicians to deliver services especially in Bangladesh where resources are scanty.

No. 236

SOCIAL WORKERS AS AGENTS IN THE PROCESS OF RECRUITMENT, PRE-TRIAL AND TRIAL OF SUBJECTS IN CLINICAL RESEARCH – SÃO PAULO, BRAZIL

Arlete Salimene, PhD; Maria Angelica Hayar, SP; Marta Imamura; Rosa Targino
Brazil

Objective: To develop techniques for recruitment and pre-trial of patients with the purpose of providing the Institution's researchers with demographic data, thus favoring the humanization of research as in the study "Variation of IL-6, IL-8, IL-10 and TNF interleucines post fibromyalgia treatment with acupuncture." **Method:** Recruiting patients for clinical research is one of the tasks undertaken by social workers and the methodology comprised the selection of patients at the Institute of Physical Medicine and Rehabilitation in São Paulo. Fifty fibromyalgia patient records were analyzed with the purpose of identifying those who met the criteria of the study i.e. age between 30 and 65 years old, females, moderate to severe pains (VAS > 4), according to the standards adopted by the 1990 study of the American College of Rheumatology. The research also sought to analyze those patients who did not meet the criteria of the study i.e. severe psychiatric or neurological alterations, cardiopathy, glaucoma, acupuncture treatment up to one year before commencement of the study, heart bypass patients, coagulopathy, self-immune inflammatory disease, and pregnancy. **Results:** Out of the 50 pre-trial patients, 31 were considered eligible and 19 ineligible. The eligible patients were contacted by telephone and agreed to be interviewed at the Re-

search Center, 3 did not agree, 12 had the wrong phone number, 2 were not found, and 6 experienced no fibromyalgia pains. *Implications/Impact on Rehabilitation:* The patient recruitment method comprises pre-trial through consultation of patient records and telephone contact before face to face trials. This procedure minimizes negative impacts as it avoids building unnecessary expectations about patients who do not conform to the eligibility criteria as defined by the clinical researcher. This methodology adds value to patients who are subjects of research and favors their adherence to the trial protocol, thus abiding by the Brazilian National Health System policies.

No. 237

REHABILITATION MOBILE UNIT OF LUCY MONTORO NETWORK: AN EXAMPLE OF PUBLIC POLICY

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Objective: To analyse the Rehabilitation Unit Mobile Unit visits, evaluating the frequency of the equipment provided to patients with disabilities within the State of São Paulo (SP). *Method:* The Rehab Unit Mobile went through cities in the state of São Paulo to make medical evaluations and provide wheelchairs, orthoses, prostheses, among others items. Since January 2009, a multiprofessional team, consisting of physiatrists, orthopedic technicians, physiotherapists, occupational therapists, nurses and administrative assistants, for a treatment of approx. 80 patients per day, toured the clusters comprising the Metropolitan Region of São Paulo and 7 others cities in the countryside of SP. *Results:* 1,614 patients were attended by the Health's System mainly to the following diagnosis: Amputations (34.8%), Cerebral Palsy (24.4%) and others with Spinal Cord, Brain Injuries (trauma, stroke etc) and Mobility Restrictions. 3,411 equipments were provided, whichever: wheelchairs (22.3%), lower limbs orthoses (33.0%) and prostheses (17.4%), with an average of 2.1 devices per patient. *Implications/Impact on Rehabilitation:* The purpose of the Rehab Mobile Unit was able to provide physically disabled people to actually be inserted in society through the development of their skills and capabilities, giving them autonomy from demanding their rights to equal access to goods, products and services available, considering the reality around them. Specialized treatment, multidisciplinary team and the latest equipments are some of the points that make the Mobile Unity a differential recovery of people with disabilities.

No. 238

SOCIOECONOMIC AND DEMOGRAPHIC STUDY ADDS VALUE TO CLINICAL RESEARCH ON FIBROMYALGIA – SÃO PAULO, BRAZIL

Maria Angélica Pereira Schlickmann, MD; Arlete de Melo Salimene; Marta Imamura; Rosa Targino
Brazil

Objective: To learn about the socioeconomic and sociodemographic profile of the subjects in the study “Variation of IL-6, IL-8, IL-10 and TNF interleucines post fibromyalgia treatment with acupuncture”. *Method:* Application of sociodemographic study tools on patients at HC FMUSP Hospital in São Paulo as devised by Gazetta et al. (2005). Thirty-min interviews with 29 patients diagnosed with fibromyalgia were conducted. *Results:* The subjects were female, average 57 years old, residents of São Paulo. Regarding their

educational level, 69% had incomplete primary education, 17% had high school education, 3.5% had university degree and 7% are illiterate. Regarding religious beliefs, 52% were Catholic, 39% were Evangelical, 7% were Spiritualists and 3% had no religion. Regarding their occupation, 37% were housewives, 14% were unemployed, 13% worked as maids, 14% were retired and 17% had different occupations. 50% paid tax on or received some form of social security benefits and 50% did not. Their average monthly household income was US\$808.00. According to the Brazilian Social Status Ranking, 55% of patients belonged to Class “C”, 24% belonged to Class “B”, and 21% to Class “D”. Patients from lower income classes experienced financial difficulties to commute to the Research Center or to the hospital to receive medical treatment, and 3% of patients gave up on the treatment. Patients living too far from the Research Center were not interviewed. *Implications/Impact on Rehabilitation:* Learning about the sociodemographic profile of the subjects in this clinical research proved to be important as it was possible to assess the social and economic hindrances that interfere with medical treatment and research. Learning about the characteristics of the subjects has led to crossing of information that evidenced relevant socioeconomic data, resulting in action on the part of social workers as supporters and providers of added social value to rehabilitation research.

No. 239

DEVELOPMENT OF AN ICF BASED INSTRUMENT FOR THE EVALUATION OF CANDIDATES TO PUBLIC TRANSPORTATION FARE EXEMPTION

Marcelo Riberto, PhD, MD; Regina Helena Morganti Fornari Chueire
Brazil

Objective: The International Classification of Functioning, disability and health (ICF) presents a framework to describe human functioning in an integrative model. On one hand it considers ‘functioning’ as a biomedical description of human physiology, anatomy, activities and participations. On the other hand, contextual factors including both personal and environmental factors also play a relevant role in modeling ones experience. Besides the model, the ICF also brings a hierarchically structured classification considering these components. In some Brazilian cities public transportation fares are free for people with disabilities, however, the definition of the amount of disability and the specific aspects of functioning that must be considered to consider these people eligible to such social benefit are not well-defined. The objective of this study was to define which aspects of functioning must be considered during expert assessment for public transportation fare exemption. *Method:* A group of 40 police-makers and experts with variable professional background was trained in the concepts of ICF and ICF-base instruments in a 12-hour course. Then, a comprehensive list of body functions, structures, activities, participation and contextual factors was developed and further refined in order to obtain the shortest and most comprehensive list possible. These characteristics were linked to ICF categories and rewritten in easily understandable questions, with standardized answers associated to the generic qualifiers of ICF. The expert team divided the categories to be assessed according to professional background and there were simulations of cases in order to identify possible problems in the use of the tool. Finally, a group of 50 candidates to public transportation fare exemption were evaluated independently both by expert team and by a single physician in order to test the reproductibility of results. *Results:* Both expert evaluations, either by the multiprofessional team or by the physician assured that people with disabilities received their rights, but the ICF-based tool was more sensible and allowed more people to receive such social benefit. *Implications/Impact on Rehabilitation:* This was the first time an ICF-based instrument was developed and a multidisciplinary team participated in the assessment for a social policy in public transportation in Brazil. Data will be systematically collected and organized according to ICF structure to point the main reasons for such benefit and possible ecological interventions.

No. 240

EPIDEMIOLOGICAL FEATURES OF PATIENTS WITH LOWER LIMB AMPUTATION IN SOUTHERN BRAZILIAN HOSPITAL

Gabriel Marantes, MD; Lucas Gelatti; Gabriel Xavier Marantes; Patrícia Zambone da Silva; Luciana Schwan; Carlos Alberto Issa Musse

Brazil

Objective: Describe the epidemiology of the amputees patients treated at Sao Lucas Hospital in south of Brazil. **Method:** All amputees patients attended at Physical Medicine and Rehabilitation department were selected to enjoy this survey. We reviewed 40 amputees' medical records since February, 2008 until November 2010. The primary collected data were sex, age, level of amputation, etiology, gait independence, presence of stump pain, time to release for prosthesis, number of patients referred to it, comorbidities. **Results:** The mean age of patients were 61.1 years (SD±10.7 years). Twenty seven (67.5%) were male and thirteen (32.5%) female. Twenty two of amputations (55%) were transfemoral, seventeen (42.5%) were transtibial and only one (2.5%) was Syme. The etiologies were vascular (90%), tumoral (7.5%) and traumatic (2.5%). Concerning the degree of independence to ambulate twenty one (52.5%) patients needed canes or walkers. Eight (20%) were preferential wheelchair users and eleven (27.5%) were exclusive wheelchair users. Only seven (17.5%) patients had pain in the stump. Seventeen (42.5%) patients were released for the prosthesis after 11 months from the date of amputation and four months after beginning the rehabilitation treatment. Eight (47%) of these patients received the prosthesis effectively. The most common comorbidities among the patients were hypertension (70%), diabetes mellitus (55%), ischemic cardiopathy (40%) and smoking (40%). **Implications/Impact on Rehabilitation:** The majority of patients assessed had no traumatic amputations, because this hospital is not the referral center for trauma care. The time of referral for rehabilitation is prolonged. The mean age of the patients showed higher incidence of elderly due to chronic diseases. It suggests that the methods of secondary prevention should be improved. The rehabilitation process should be done together with the surgical team to shorten the time of treatment and to improve the quality of life of patients.

No. 241

CLINICAL RECOMENTATIONS IN PROSTHETIC PRESCRIPTION

Guido Espinoza, MD; Maria Jose Espinoza; Marceña Tello
Chile

Objective: Prosthetic prescription is a complex clinical act that involves medical knowledge and a complete understanding of the patient reality, including not only clinical factors, also environmental ones. There are not guidelines for prescription, but professionals working in this area have clues making it. The objective of this study is to provide criteria for prosthetic prescription, useful for the Chilean reality, that can be applied also in other developing countries. **Method:** Physical Medicine and Rehabilitation physicians (PMRP) working in the amputee area in different Chilean hospitals were selected. A survey was sent to them, to establish components and designs they were using and the relation of this prescriptions with clinical and environmental factors. Data were reviewed for two PMRP and clinical recommendations were made. **Results:** There were many differences in prosthetic prescription. Although physicians were informed about different kind of prosthetic designs, materials and components, the prescription was very limited due to the prosthetic costs (often very high to our population). Anyway, clinical recommendations could be made in base of the information collected. **Implications/Impact on Rehabilitation:** Clinical recommendations for prosthetic prescription were obtained; this information can be very useful in our country, for rehabilitation physicians and other professionals involved in this field. This information also can be used in other developing countries.

No. 242

OSSEOINTEGRATION

Jessica Castillo Cuadros

Fisiatra, Hospital del Trabajador de Santiago, Chile

Objective: Show the experience of our hospital for the treatment of transfemoral amputees using the technique of osseointegration. Chile is the first country in America to have this technique, which has more than 20 years developing in Europe. The main objective is to characterize the transfemoral amputee patients undergoing bone osseointegrated anchoring technique. **Method:** This is a descriptive study. The study population are patients with transfemoral amputations, subject to the technique of osseointegration. **Results:** Since August 2009, 18 patients with transfemoral amputations have joined the program of osseointegration. They are currently in different stages of the rehabilitation protocol. All patients have reported improvements in their quality of life, to solve the problems resulting from use of conventional socket. In November 2010, we made the first two surgeries on the transhumeral amputees. Postoperative complications have been minor and so far only 1 has failed to complete implant osseointegration with the femur. **Implications/Impact on Rehabilitation:** The osseointegration appears as an alternative solution to the problems with the conventional socket. This technique improves the quality of life of people and improves the gait's quality.

No. 243

STUDY OF THE CHINESE VERSION OF BRIEF ICF CORE SETS FOR DIABETES MELLITUS

Ninghua Wang, MD, PhD; Wei Li; Bin Xie; Rongli Wang
China

Objective: To identify the application Chinese version of brief International Classification of Functioning, disability and health (ICF) Core Sets for Diabetes Mellitus. **Method:** The 50 patients with DM were involved in study. Two questionnaires were used to record all the patients' information, using the ICF qualifier to assess the severity of each category. Frequency of each category was calculated and those categories which frequency ≥30% were selected as the clinical investigation results. These categories were integrated to form the questionnaire for specialist. The questionnaire was sent to 13 specialists of rehabilitation and 12 specialists of endocrine. This study had set the cut off point of specialist investigation to 50%, that meant the category which more than half of the specialists thought it significant concern with DM would be reserved in the final results. **Results:** We had identified 51 categories in the Chinese version of brief ICF Core Sets for DM with 43 categories of 1 level and 8 categories of third level. The 28 body function categories, 4 body structure categories, 5 activity and participation categories and 14 environmental factor categories were involved. **Implications/Impact on Rehabilitation:** The application Chinese version of brief International Classification of Functioning, Disability and Health (ICF) Core Sets for Diabetes Mellitus will guide professional staff including in their practice and reach the functional goals.

No. 244

STUDY OF THE PATIENTS WITH ARTERY INSUFFICIENCY SYNDROME BY USE OF EXTERNAL COUNTERPULSATION AND TRACTION THERAPY

Jirong Zhang, MD

China

Objective: To investigate the value of external counterpulsation and traction therapy on patients with vertebral artery insufficiency syndrome. **Method:** Based on the criteria of clinical diagnosis, 90 patients with vertebral artery insufficiency syndrome were randomly into three groups. The group A of medicine treatment (30 cases).

The group B of cervical traction (30 cases). The group C of cervical traction and external counterpulsation (30 cases). *Results:* After treatment the healing power in group C was higher than of group A and B ($p < 0.01$). The healing power was as high in group A as in group B ($p > 0.05$). *Implications/Impact on Rehabilitation:* External counterpulsation and traction therapy are effective in the treatment of the vertebral artery insufficiency syndrome.

No. 245

PROTECTION OF ULTRAVIOLET BLOOD IRRADIATION AND OXYGENATION ON DAMAGE OF PEROXIDATION ON TYPE II DIABETES MELLITUS PATIENTS

Xiao Fu, MD; He Zengyi; Tu Xiaohua

China

Objective: To study the protection effect of ultraviolet blood irradiation and oxygenation (UBIO) on peroxidation damage on type II diabetes mellitus (DM). *Method:* 60 patients were recruited and divided into UBIO group and conventional group, 30 each, randomly. The control group includes 20 normal subjects. The UBIO group was treated with UBIO combined with routine therapy (2-Mercaptobenzothiazole and gliclazide). The conventional group was treated with routine therapy only. UBIO therapy was given 3 times per week, 10 times in total. Before and after 10 treatments, the levels of superoxide dismutase (SOD) and malondialdehyde (MDA) in serum were measured. *Results:* (1) Before treatment, SOD in patients (72.71 ± 11.53 nU/ml) is significantly lower than the controls (108.54 ± 10.15 nU/ml) ($p < 0.01$). (2) After treatment, the SOD in routine group increased from 73.21 ± 9.71 nU/ml to 83.43 ± 8.65 nU/ml, $p < 0.01$. The SOD in UBIO group increased even more from 71.68 ± 10.23 nU/ml to 98.81 ± 9.84 nU/ml, $p < 0.01$. (3) Before and after treatment, MDA in routine group lowered from 6.57 ± 0.85 nmol/ml to 5.21 ± 0.86 nmol/ml. In UBIO group, MDA lowered even more from 6.46 ± 0.86 nmol/ml to 4.48 ± 0.88 nmol/ml, $p < 0.01$. *Implications/Impact on Rehabilitation:* One of the pathogenesis of type II DM is damage of oxidation. This investigation suggests that UBIO has more protection effect on peroxidation damage on type II DM than the treatment with 2-Mercaptobenzothiazole and gliclazide only.

No. 246

AN EXPERIMENTAL STUDY OF DIFFERENT INTENSITIES PULSED ULTRASOUND ON TREATING RAT SKELETAL MUSCLE CONTUSION

Bin Shu, MD; Zhijin Yang; Wanling Jiang; Haoyue Deng; Xiangqin Fang

China

Objective: To evaluate the effects of different intensities pulsed ultrasound on the healing process in a standardized contusion injury animal model. *Method:* Forty-eight 3-month-old adult male SD rats received a reproducible contusion injury to the right gastrocnemius muscles. The animals were randomly divided into four groups ($n = 12$): 1) control group (muscle injury without treatment); 2) muscle injury and pulsed ultrasound (0.25 W/cm²); 3) muscle injury and pulsed ultrasound (0.5 W/cm²); 4) muscle injury and pulsed ultrasound (0.75 W/cm²). Pulsed ultrasound treatment (frequency, 3 MHz) was started 24 h postinjury and delivered for 5 min daily on the right injury hindlimb. At day 4, 7 and 14 after injury, muscle samples were analyzed through HE and immunohistochemistry for desmin. *Results:* It has shown an increase in average optical density (AOD) of desmin-positive mononucleated cells after ultrasound treatment at day 4, 7 and 14 ($p < 0.05$), there were no statistical differences among the 3 ultrasound treatment groups. *Implications/Impact on Rehabilitation:* The pulsed ultrasound treatment play a beneficial role in the skeletal muscle regeneration process after contusion injury. There have no significant dose-dependency effects among the intensity range of 0.25 – 0.75 W/cm².

No. 247

EFFECTS OF INFRASOUND ON THE PROLIFERATION AND BDNF IN HIPPOCAMPUS

Xiang Mou, PhD

China

Objective: In order to investigate the effects of low sound pressure level (SPL) infrasound on the memory function and neurogenesis in the rat hippocampus. *Method:* Ninety-five adult male Sprague-Dawley rats were randomized divided into experimental group ($n = 10$) and control group ($n = 10$). After exposure to infrasound of 8Hz, 130dB for 14 days, Morris water maze test was performed to assess the spatial learning and memory function. BDNF and BrdU-labeled neurons were investigated with immunohistochemical method. BrdU-labeling cells were counted and in situ hybridization was used to test BDNF in the hippocampus. *Results:* Infrasound exposure group showed the obviously extended latency of to find the platform, which suggested the destroyed the spatial memory by infrasound. It was also found that the number of BrdU-labeled cells and BDNF-positive staining in the hippocampus was reduced after infrasound exposure. *Implications/Impact on Rehabilitation:* These results indicated that infrasound may interfere the memory function in which the decrease of BDNF and neurogenesis cells in hippocampus might be involved.

No. 248

AN ANALYSIS OF THE MENTAL HEALTH LEVEL OF THE MAY 12 EARTHQUAKE RELIEF

He Chunyang, MD

China

Objective: To investigate and analyze the mental health level of the May 12 earthquake relief soldiers and the relation between their mental health level and the personality characteristics. *Method:* During the earthquake relief period, 130 earthquake relief soldiers were measured by using the Symptom Check List 90 (SCL-90) and Eysenck Personality Questionnaire (EPQ), and the SCL-90 results were compared with the norms. *Results:* The earthquake relief soldiers got significantly lower scores in all factors in the SCL-90 than the national norm referenced ones. The scores in the E dimension were negatively correlated with those in all factors in the SCL-90 on the whole. The scores in the P dimension were positively correlated with those in half factors in the SCL-90, and the scores in the neurotic dimension were significantly correlated with those in all factors in the SCL-90. *Implications/Impact on Rehabilitation:* During the earthquake relief period, the soldiers were in a good state of mental health, and neurotic personality had a significant impact on mental health.

No. 249

CLINICAL EVALUATION AND TREATMENT OF STUMPS AFTER WENCHUAN EARTHQUAKE

Hongliang Liu, MD; Wu Jixiang; Zhou Xianli; Wu Zongyao

China

Objective: To analyze the cause and feature of stumps after Wenchuan earthquake, and study the effect of rehabilitation treatment to stumps. *Method:* 52 cases of residual limbs were evaluated including skin status, limb shape, stump length, stump swelling, motion of joint and strength of the stump, and were treated with physical therapy, stump moulding and kinesiotherapy. For 20 cases of all 52 case, the myoelectric signal of upper limb stumps were detected and trained with electronic biofeedback software, including basic signal of biofeedback training and visual biofeedback training. *Results:* The percentage of stump ulcer, stump swelling, conical stump, short stump and limitation of joint motion of all 52 cases were 76%, 73%, 34%, 40% and 42%. The stump ulcer was healed and stump swelling was decreased through rehabilitation care. The stump shape, motion of joint and muscle strength were obviously

improved. All poor stumps can be fit with the prosthetic limb. The myoelectric signal of upper limb stumps were detected and trained with electronic biofeedback software, including basic signal of biofeedback training and visual biofeedback training. The amputee could control muscle contraction and grasp, pinch, rotate wrist, stretch or flex elbow joint according to the will. Twenty myoelectric prostheses were assembled. *Implications/Impact on Rehabilitation:* The rate of poor stump limb were high after earthquake. Rehabilitation care can improve the stump condition. Early rehabilitative intervention after amputation is important to prosthetic limb and myoelectric signal training of limb stumps is also important to assemble myoelectric prosthesis.

No. 250

EFFICACY AND TOLERABILITY OF LEVETIRACETAM IN CHILDREN WITH EPILEPSY

Nong Xiao, MD; Jiahui Li; Siyuan Chen

Department of rehabilitation center, Children's Hospital of Chongqing Medical University, Chongqing, China

Objective: To assess the efficacy and tolerability of levetiracetam in children with epilepsy. *Method:* Open-label observational and prospective study examining patients (≤ 14 years) with epilepsy, receiving therapy with levetiracetam. Levetiracetam was started at a dose of 10 mg/kg/day. The dose was titrated up with 10 mg/kg increments if seizures were poorly controlled but the maximum daily dose couldn't be more than 60 mg/kg/day. Documented were seizure type and frequency, levetiracetam dose and side effects. *Results:* 120 patients (39.3% females, mean age 4.5 ± 3.9 years) were enrolled. Average duration of follow-up was 10.3 ± 3.5 months. At study endpoint, 64.8% of patients got seizure free and 83.0% got a seizure reduction of $\geq 50\%$. Observed side effects were somnolence, dysphoria, nervousness, dystrophy, et al and the incidence rate in the study was 47.5%. Four (3.3%) of 120 patients withdrew because of intolerance of side effects. The estimated one year retention rate of levetiracetam was 73.3%. *Implications/Impact on Rehabilitation:* Levetiracetam is safe and effective for a wide range of epileptic seizures.

No. 251

THE EFFECTS OF PHYSIOLOGICAL ISCHEMIA TRAINING ON ENDOTHELIAL PROGENITOR CELL QUANTITY AND ACTIVITY

Chunxiao Wan, PhD; Jianan Li, MD

Nanjing Medical University, China

Objective: This study aims to investigate the effects of physiological ischemia training (PIT) on the quantity and activity of endothelial progenitor cells (EPCs) in rabbits with intermittent myocardial ischemia. *Method:* Eighteen male adult New Zealand rabbits were randomly divided into three groups ($n=6$): SO group (sham-operated group), MI group (with intermittent myocardial ischemia), and PT group (with both intermittent myocardial ischemia and physiological ischemia training). PIT was induced by electrical stimulation (40% maximum current strength, 1 ms, 40 Hz), 4 min a session, twice a day, 5 days a week, for 4 weeks. Intermittent myocardial ischemia was induced by left ventricular branch intermittent occlusion, 2 min a session, twice a day, also for 4 weeks. 20 mls blood was drawn from ear central artery before and post the 4-week experiment in all groups. The number of EPCs (CD34+/Flk-1+) in blood was counted by fluorescence-activated cell sorter. EPCs were isolated, cultured and identified by double-positive staining with 1,1'-dioctadecyl-3,3,3',3'-tetramethylindocarbocyanine-labeled Ac-LDL (DiI-Ac-LDL) and Ulex europaeus agglutinin-I (UEA-1). EPCs' migration and proliferation were detected with a modified Boyden chamber and the MTT assay, respectively. EPCs apoptosis was evaluated by flow cytometric analysis. *Results:* EPCs were characterized by

DiI-Ac-LDL and UEA-1 double staining. A increase of circulating EPCs in Group MI and PT post 4wk training were observed (Group PT: 0.046 ± 0.007 , Group MI 0.038 ± 0.016 , $p < 0.01$). Group PT significantly promoted EPCs migration to $196 \pm 22\%$ ($p < 0.05$), much more than those in Group MI and SO. However, there were no significant difference between EPCs proliferation and apoptosis founded in all groups. *Implications/Impact on Rehabilitation:* Our results indicate that PIT could enhance EPCs' numbers and functional activity, which will benefit for the angiogenesis process in cardiac rehabilitation.

No. 252

EFFECT OF ELECTRO-ACUPUNCTURE INTERVENTION ON COGNITION ATTENTION BIAS IN HEROIN ADDICTION ABSTINENCE - A DOT-PROBE BASED ERP STUDY

Ying Ping Jiang, MD; Hao Liu; Ping Xu; Yan Wang; Guanghua Lu
China

Objective: To study the changes of cognitive attention related brain function in heroin abstinence before and after electro-acupuncture (EA) intervention, for exploring the concerned neuro-mechanism of addictive relapse, and the central action role of EA intervention. *Method:* Adopting event-related potential (ERP) technique, the ERP at 64 electrode spots in 10 heroin addicts were recorded before and after EA intervention using dot-probe experimental form during implementing cognitive task on positive emotional clue (PEC), negative emotional clues (NEC) and heroin related clue (HRC). The P200 amplitude components on the selected observation points (Fz, Cz and Pz) were analyzed and compared with those obtained from 10 healthy subjects in the control group. *Results:* Before EA, the ERP of attention on HRC in the test group was higher than that on PEC and NEC ($p < 0.05$), and significantly higher than that in the control group ($p < 0.05$), while after EA, the P200 amplitude of attention on HRC at Cz and Pz were significantly lowered ($p < 0.05$), and that on PEC at Fz was significantly elevated ($p < 0.05$). While after EA, the P200 amplitude at Pz were ranked as NEC > PEC > HRC, but in the control group, it showed PEC > HRC at all the three observation points, and PEC > NEC at Pz. *Implications/Impact on Rehabilitation:* Heroin abstinence shows attention bias to HRC; which could be significantly reduced by EA intervention, illustrated that EA could effectively inhibit the attention bias to heroin, so, has potentiality for lowering the relapse rate.

No. 253

A STUDY ON DOSE-EFFECT RELATIONSHIP OF THE CRACKING SOUNDS AND THE BIGGEST PRESSURE BY THE MANIPULATION OF PALM-PRESSING ON THORACIC VERTEBRAE

Heping Zha, MD

China

Objective: To study dose-effect relationship between the cracking sounds and the biggest pressure by the manipulation of palm-pressing on thoracic vertebrae to provide a basis for quantitative analysis of manipulation strength. *Method:* The maximum stress of the palm-pressing against the patients, thoracic vertebrae was tested and recorded with a pressure sensor testing system. *Results:* The cracking sounds was a sign of successful manipulation of palm-pressing on thoracic vertebrae. There was no significant difference between the maximum stress (247.21 ± 8.02 mmHg) of palm-pressing with cracking sounds and the maximum stress (251.15 ± 2.87 mmHg) without sounds ($p > 0.05$). *Implications/Impact on Rehabilitation:* There was no direct relationship between manipulative strength and cracking sounds during palm-pressing on thoracic vertebrae.

No. 254

EFFECTS OF APIGENIN ON CAVEOLIN 1 OF CEREBRAL ISCHEMIA-REPERFUSION IN RATS**Xiang Chen, MD; Niu Wen-ze; Li Xue-mei; Wang Guo**
China

Objective: To investigate the effects of Apigenin (APG) on expression of caveolin1 of cerebral ischemia-reperfusion in rats. **Method:** Cerebral ischemia was induced by middle cerebral artery occlusion. The rats were randomly divided into four groups including sham-operated, model, dexamethasone and APG groups. All the rats were killed in 6 h and 1, 3 or 7 day after operation. Neurological behavior were assessed by 5 score method. Brain slices were observed by TTC stain, and the expressions of caveolin1 were measured by immunohistochemical staining. **Results:** APG could reduce obviously the deficit of nervous functions; neurological behavior scores of the rats in 3d APG group were significantly different from that in ischemia model group ($p < 0.05$). Typical cortical infarct lesions in model group were found by TTC stain. The expression of caveolin1 positive cells existed in normal brain, and caveolin1 were enhanced immediately after ischemia and reached to peak at 1 day or 3 day after ischemia respectively; APG could increase the expressions of caveolin1 positive cells at every time point after ischemia and treatment ($p < 0.01$). **Implications/Impact on Rehabilitation:** APG is capable of regulating expression of caveolin1 in ischemic brain and has the effects on prevention cerebral ischemia-reperfusion injury of rats which may be one of anti-ischemic mechanism of APG.

No. 255

EFFECT OF APIGENIN ON THE EXPRESSION OF VEGF IN TRANSIENT FOCAL CEREBRAL ISCHEMIA AND REPERFUSION MODEL OF RATS**Xiang Chen, MD; Li Xue-mei; Niu Wen-ze**
China

Objective: To investigate the expression of vascular endothelial growth factor (VEGF) in transient focal cerebral ischemia and reperfusion model of rats, which were treated by apigenin. **Method:** Ninety-one male SD rats were randomly divided into thirteen groups: sham operationed group (S), model groups (groupM6h, groupM24h, groupM72h, groupM7d), apigenin treated groups (groupA6h, groupA24h, groupA72h, groupA7d), dexamethasone treated groups (groupD6h, groupD24h, groupD72h, groupD7d). The acute transient focal cerebral ischemia reperfusion model was established with modified method that inserting the nylon thread into middle cerebral artery, staying for two hours and then withdrawing from arteries. In experiment groups the neurological behavior scores and TTC stain of brain slices were observed. The expression of VEGF by immunohistochemistry (ICH) was semiquantitative analysed through measure of integrated optical density (IOD). **Results:** Abnormal neurological behavior scores were observed in model groups, apigenin treated groups and dexamethasone treated groups, but A7d groups were better than the others groups in neurological behavior ($p < 0.05$). Typical cortical infarct lesions in model groups, apigenin treated groups and dexamethasone treated groups were found by TTC stain, which were site in cerebral cortex and striatum. The expression of VEGF were significantly higher in A and D group than S group ($p < 0.05$), A24h group was higher than M24h group ($p < 0.01$). A7d group is obviously higher than D7d group ($p < 0.01$). **Implications/Impact on Rehabilitation:** Apigenin recover the rats brain function, promote the expression of VEGF in the acute transient focal cerebral ischemia-reperfusion injury in rats, the recover of the rats brain function may be related to improving angiogenesis at recovery time of cerebral ischemia injury, apigenin could promote angiogenesis after cerebral ischemia.

No. 256

THE EFFECT OF COMMUNITY BASED REHABILITATION TO THE MIDDLE AND LATE PERIOD STROKE**Fengzhen Du Ying Hou, MD**
China

Objective: Study the activity of daily living (ADL) of stroke patients those who had got rehabilitation therapy in rehabilitation institutions and went back to their communities 3 months before. Get the effect of the community based rehabilitation (CBR) to the middle and late period stroke patients. **Method:** Collate the data of 123 stroke patients discharged between 2006 and 2009 who matched the conditions and had complete follow-up data. Divide the 123 patients into rehabilitation group and not rehabilitation group depend on if or not they had accepted the CBR as asked, and compare the ADL of the two groups when leaving hospital and in 3 months after discharged by Modified Barthel Index (MBI). **Results:** The ADL of rehabilitation group had improved obviously ($p < 0.05$), and that of not rehabilitation group had decreased obviously ($p < 0.05$). **Implications/Impact on Rehabilitation:** It is important to develop CBR in our country to increase the ADL of middle and late period stroke patients.

No. 257

CLINICAL STUDY ON EFFECT OF PERIOSTEUM MASSAGE PLUS RESISTANCE EXERCISE ON OBSTRUCTIVE SLEEP APNEA HYPOPNEA SYNDROME**Pin Lv; Chen Xiang Xian, PhD**

College of Physical Education Anhui Normal University, Beijing, China

Objective: To discuss cause and mechanism of OSAHS (obstructive sleep apnea hypopnea syndrome); to treat OSAHS with periosteum massage plus resistance exercise; to provide new theoretic basis and application approach for study on the cause, mechanism and treatment of OSAHS. **Method:** 20 cases of OSAHS were divided into two groups at random, namely, 10 cases in the periosteum massage plus resistance exercise group and 10 cases in the conventional medicine treatment group; the experiment lasted two month; patients in the two groups were treated once every three days, 20 times in total. Rehabilitation level is measured and statistically recorded before, during and after the experiment through polysomnography, fuzzy measure of neck pain, cardio-pulmonary function, vertebral activity meter, neck muscle strength and C-reactive protein. **Results:** For the periosteum massage plus resistance exercise group, there is no mouth and nose airflow stop during sleep, with 0.59 apneas and hypopneas per hour, i.e. respiratory distress index is normal, with 4 apneas and hypopneas per night for 7 h on average. For conventional medicine treatment group, mouth and nose airflow stop during sleep is no less than 8 s, with 9 apneas and hypopneas per hour, i.e. respiratory distress index is less than 7, with 61.4 apneas and hypopneas per night for 7 h. With regard to polysomnography, fuzzy measure of neck pain, cardio-pulmonary function, vertebral activity meter, neck muscle strength and C-reactive protein, periosteum massage plus resistance exercise group ($p < 0.05$) is significantly superior to the conventional medication treatment group. **Implications/Impact on Rehabilitation:** Conclusion: OSAHS is mainly caused by respiratory system pressed by infected soft tissue at neck and chest (muscle oedema, pain, convulsion occurring because of acute or chronic injury and muscle getting short and thick caused by muscle tension and natural degradation); periosteum massage therapy treats soft tissue tension, oedema and convulsion at neck and chest, relieve pressure on respiratory tract. Resistance exercise relieves convulsion and abnormal movement of muscle and trachea around cervicothoracic junction, recovers and improves cervicothoracic

muscle strength and stretch, expands range of motion of cervical spine, improves motor nerve conductive pathway of the injured muscle and enhances ability of lower brain stem motor central nerve to coordinate work of muscle group at the location to realize ease, comfort and coordination of neck and chest.

No. 258

THE EFFECTS OF SEGMENTAL STABILIZING EXERCISES ON HEALTH-RELATED QUALITY OF LIFE IN PATIENTS WITH LOW BACK PAIN IN THE COMMUNITY

Jue Yin

China

Objective: Low back pain is a common health problem with enormous social and economic impact in many countries. The health-related quality of life in low back pain patients are affected in various areas, including physical, psychological, social areas. The segmental stabilizing exercises can improve health-related quality of life for patients with low back pain. The modified Oswestry Low Back Pain Questionnaire is widely used to assess quality of life for patients with low back pain. *Method:* 120 patients with chronic low back pain were randomly divided into two groups: the control group ($n=60$) and the experiment group ($n=60$). The experiment group accepted segmental stabilizing exercises for 3 months, while the control group accepted none intervention. The modified Oswestry Low Back Pain Questionnaire (mOLBPQ) was used to assess the quality of life for patients before and after treatment. *Results:* The score of the mOPBPQ was significantly improved in the experimental group ($p<0.001$). While there was no difference before and after 3 months in the control group ($p>0.05$). *Implications/Impact on Rehabilitation:* Low back pain is a common health problem with enormous social and economic impact in many countries. The health-related quality of life in low back pain patients are affected in various areas, including physical, psychological, social areas. The segmental stabilizing exercises can improve health-related quality of life for patients with low back pain. The mOPBPQ is widely used to assess quality of life for patients with low back pain.

No. 259

EFFECTS OF COMPREHENSIVE REHABILITATION ON IMPROVING THE DYSFUNCTION OF FLEXION OF THE KNEE JOINT

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Objective: To investigate the effect of Chinese medicine fumigation combined with TENS and routine rehabilitation on improving the dysfunction of flexion of the knee joint. *Method:* 38 patients with dysfunction of flexion of the knee joint were divided randomly into experiment group ($n=19$) and control group ($n=19$). The experiment group received Chinese medicine fumigation combined with TENS and routine rehabilitation, and the control group only underwent routine rehabilitation treatment. *Results:* There were significant improvement on active and passive range of motion of knee joint of both the experiment group and the control group after treatment ($p<0.01$). The experiment group got more effective improvement on both active and passive range of motion of the knee joint ($p<0.05$). *Implications/Impact on Rehabilitation:* Application of Chinese medicine fumigation combined with TENS and routine rehabilitation treatment can improve the dysfunction of flexion of the knee joint. The remedial effect by both Chinese medicine fumigation combined with TENS and routine rehabilitation is more effective compared with that of routine rehabilitation treatment.

No. 260

SURGICAL TREATMENT FOR 46 CASES OF FRACTURE OF TIBIAL PLATEAU

Gu Yanglin, PhD

China

Objective: Surgical treatment for 46 cases of fracture of tibial plateau. *Method:* Clinical data of 46 patients with fracture of tibial plateau were retrospectively analyzed. *Results:* Operative incision of 46 suffers were primary healing. 46 cases were followed-up for 13–42 months. Among 46 cases, 28 were excellent, 10 were good, 6 were common, 2 were bad. The excellent and good rate was 82.61%. *Implications/Impact on Rehabilitation:* The patients who suffered from fracture of tibial plateau were treated by open reduction, good internal fixation and active functional exercise of knee joint. The patients got satisfactory results.

No. 261

PRELIMINARY STUDY OF EFFICACY OF INTRANASAL RADIATION WITH LOW-DENSITY SEMICONDUCTOR LASER FOR ACUTE MYOCARDIAL INFARCTION

Fanghong Jin, MD; Dai Hao-jie; Zhu Ping

China

Objective: We found that myocardial blood flow perfusion and cardiac function can be improved by Low-intensity semiconductor Laser Irradiation treatment, which the feasibility and validity of the treatment is confirmed in this study. *Method:* Five patients with acute myocardial infarction in the stable phase were treated by semiconductor laser irradiation intranasal cavity. The output wavelength was 650 nm and output power was 5 mW with the total exposure time in 40 min. Before and after treatment, the myocardial blood flow perfusion was routinely observed by SPECT. The changes of the cardiac function parameters before and after treatment were also automatically analyzed qualified by the computer system. *Results:* Before treatment, the ventricular thickness, the ventricular wall motion and myocardial perfusion in patients were 4.79 ± 2.85 mm, $23.31\pm 11.68\%$ and $57.92\pm 18.43\%$, respectively. The above parameters are significantly increased after laser treatment, which were 5.32 ± 2.95 mm, $26.54\pm 13.03\%$ $59.92\pm 18.30\%$, respectively. The main target parameter of left ventricular ejection fraction (LVEF) was increased from $41.00\pm 5.77\%$ before treatment to 45.00 ± 6.73 after treatment. The end-systolic volume was decreased from 146.5 ± 18.19 ml before treatment to 141.75 ± 14.66 ml after treatment. The end-diastolic volume was decreased from 86.75 ± 16.19 ml before treatment to 77.75 ± 13.18 ml after treatment. It had clearly showed in all 5 patients that the region of the poor myocardial blood flow perfusion was markedly improved after laser treatment in the myocardial perfusion map in the target area, the cardiac short axis, horizontal long axis and vertical long axis. *Discussion:* Ischemic heart disease can be treated by Low-Intensity Semiconductor Laser Irradiation in the intranasal cavity, which therapeutic effects is objectively evaluated by the 99m Tc-MIBI. It can also be used to accurately observe the changes of cardiac functions, especially on myocardial blood flow perfusion before and after laser treatment. SPECT can provide with useful reference data for judging favorable prognosis. *Implications/Impact on Rehabilitation:* Preliminary study of efficacy of intra-nasal radiation with low-density semi-conductor laser for acute myocardial infarction.

No. 262

THE CHARACTERISTIC OF MUSCULAR POWER CHANGES OF KNEE JOINT AND THE STATIC BALANCE IN ELDERLY PATIENTS WITH KNEE OSTEOARTHRITIS

Guohui Xu, MD; Jiejiao Zheng

China

Objective: To explore the characteristic of muscular power changes of knee joint and the static balance in the elderly patients with knee osteoarthritis. **Method:** Isokinetic test and computerized static posturography were performed in 50 controlled subjects and 59 age-matched patients with knee OA. Isokinetic and posturographical parameters were recorded. **Results:** PT, TW, AP and TAE were significantly decreased in the patients with OA of knee joint compared with that of the controlled subjects at the low velocity of concentric pattern ($p < 0.05$), while H/Q value increased statistically ($p < 0.05$). The values of A, L, L/A statistically increased in patients with knee OA compared with the controls only when eyes closed ($p < 0.01$), and so did it in knee OA groups between eyes opening and eyes closing pattern ($p < 0.05$); There was significantly positive relationship between L/A and H/Q value. **Implications/Impact on Rehabilitation:** The ability of balance decreased in the patients with knee OA along with the knee muscular power. Especially the non-spontaneous decrease of extensor and flexor power of the knee joint. It was indicative to improve the muscular balance between extensor and flexor for the patients with knee OA in the procedure of rehabilitation.

No. 263

THE STUDY ON REHABILITATION INTERVENTIONS FOR IMPROVEMENT ON ACTIVE AND PARTICIPATION ABILITY OF THE EARTHQUAKE INJURED

Jiejiao Zheng, MD; Weiming Zhang; Xiu'en Chen; Jiufu Gu
China

Objective: To study the influence of rehabilitation interventions on the earthquake injured to reduce the effects of disability, to improve the recovery of the overall function of the wounded in the earthquake and guarantee their return to family and society. **Method:** The Rehabilitation Team-work exercised one-month comprehensive intervention in 92 fracture patients after the earthquake and measured them by the scale of participate and activities ability, before, after and in the middle of intervention. **Results:** The communication and understanding, the ability to move body, the self-sufficiency, ability to get along with others, daily activities, social participation scores from the scale of participate and activities ability for the earthquake injured had significant difference. **Implications/Impact on Rehabilitation:** Rehabilitation interventions with Team-work can effectively enhance the abilities of the earthquake injured to participate in activities and improve the quality of life.

No. 264

STUDY ON THE SURFACE ELECTROMYOGRAPHY OF WOUNDED PERSON WITH MULTIPLE PELVIS FRACTURE BY EARTHQUAKE

Jiejiao Zheng, MD; Jiufu Gu
China

Objective: To investigate the changes of surface electromyography (sEMG) activities and biomechanics on trunk and low extremities in wounded person with multiple pelvis fracture by earthquake. **Method:** 13 patients with multiple pelvis fracture after Wenchuan earthquake walked without assist device. The surface electromyography signals from the bilaterally latissimus dorsi, external oblique abdominis, gluteus medius, adductors, rectus femoris, biceps femoris, tibialis anterior and lateral gastrocnemius were recorded synchronously. **Results:** The significant abnormal sEMG activities of bilaterally gluteus medius and adductors resulted in the weakening stability of the hip joint during walking in participants. Lower sEMG activities were shown in affected-side latissimus dorsi, while the opposite performances were shown in affected-side external oblique abdominis. We also found that the activities of affected-side lateral gastrocnemius were delayed. **Implications/Impact on**

Rehabilitation: The results manifested the muscles activities patterns were modified during walking in multiple pelvis fracture patients, which make the impairment of the postural control and balance for locomotion. We should enhance the strength training and harmonious ability of muscle groups training on trunk and low extremities pertinently during patients for improving functional walk according to the sEMG evaluation.

No. 265

A NEW REHABILITATION MODEL FOR MAJOR DISASTERS IN RURAL AREAS-BASED ON THE EXPERIENCE FROM SICHUAN EARTHQUAKE, CHINA

Xia Zhang, PhD; Jianan Li; Xiaorong Hu; Sijing Chen; Shouguo Liu; Hong Jin
China

Objective: To explore and validate the multi-cooperation rehabilitation model after major disasters in rural areas based on the Sichuan experiences. **Method:** Four months after the Sichuan earthquake, the multi-cooperation among the NGOs which dedicated to rehabilitation assistance, Mianzhu County Hospital and local health bureau was established, which provided free medical rehabilitation treatments for earthquake survivors, by means of recruiting volunteers, donating equipments and paying the medical charge (The so-called Mianzhu model). The medical benefit measures included ADL, Life Satisfaction Questionnaire (LSQ), and SF-36. The economical and social benefits were evaluated by average hospitalization expense and employment advantage (the number of victims who resumed to previous job after recovery divides total investment) respectively. The outcomes were compared with Shifang County which was lack of the medical rehabilitation services after the earthquake. **Results:** Two years after the Mianzhu model was performed, 40 national and international rehabilitation professionals and 30 local staff had been involved in the treatments of 436 earthquake victims. The average hospitalization time was 45 ± 22.7 days. The percentage of ADL scores above 90 in 387 fractures increased from 82% to 95% ($p < 0.05$) before and after the treatments, with the same tendency from 46% to 54% ($p < 0.05$) in 26 SCIs. The average score of LSQ in Mianzhu was significantly higher than those of Shifang ($p < 0.05$), notably in physical health, mental health and self-care. The scores in physical and mental composite of SF-36 questionnaire in Mianzhu were significantly higher than Shifang ($p < 0.05$). Altogether ¥ 1.9 million was spent on the treatments for the survivors in Mianzhu and the average cost was ¥ 4300, which was equivalent to 85% of the victim's annual family income. The ADL score rise of 5 points raised the medical cost by ¥ 5600. The employment advantage was 0.82 person per ¥ 10,000. The Mianzhu model had been applied in Anxian and Zundao township successively, on which ¥ 900,000 was invested to serve 205 victims for the medical rehabilitation treatments. **Implications/Impact on Rehabilitation:** The Mianzhu model should be applied to the medical rehabilitation facilities in rural areas in case of future disasters.

No. 266

ARE THE STEM CELLS, THE KEY IN TREATMENT OF OSTEOARTHRITIS?

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Colombia

Objective: To evaluate the usefulness of Tissue Regeneration Technology available and the use of autologous Stem cells in the treatment of injuries resulting from degenerative osteoarthritis in the hyaline cartilage of large joints. **Method:** In the Outpatient of Clinica Meta (Villavicencio, Colombia), chose 10 patients before clinical diagnosis, X-ray and nuclear magnetic resonance, classifying the degree of commitment of osteoarthritis in the joints (knees).

We stratified clinical commitment measured by visual analog pain scale, and measurement of joint range. Also for functional test and measurement of functional independence. All patients received conventional therapy consisting of analgesics, joint-saving techniques and low impact aerobic exercise, but five of them were added in parallel, and previous informed consent, a local activation protocol by articular injection technique, developed by the Institute for Tissue Regeneration in Colombia, called Cytogel[®], each 15 days for two months, and up to six months. After that cases were reevaluated by the same clinical tests and by X-ray images and MRI. *Results:* Still under development. We hope to have final results in July 2011. *Implications/Impact on Rehabilitation:* This therapy poses a new frontier in the treatment of degenerative diseases of the mesenchymal tissues, including cartilage. Progress could be made, not in the arrest of tissue damage and degenerative diseases, but also in the desired reversal of structural and functional impairments that limit functional independence of people who suffer.

No. 267

DYADIC CONSENSUS AND WELL-BEING IN INDIVIDUALS WITH TBI

Maria Christina Quijano Martinez, MSc; Tara Lehan, PhD; Juan Carlos Arango-Lasprilla, PhD; Carlos José de los Reyes, MS; Emilie Godwin, PhD

Colombia

Objective: 1) Examine how TBI survivors' and their caregivers' perceptions of survivor neurobehavioral functioning influence their own satisfaction with life. 2) Explore how TBI survivors' and their caregivers' perceptions of survivor neurobehavioral functioning influence the other's satisfaction with life. 3) Assess level of congruence in TBI survivors' and their caregivers' perceptions of the survivors' neurobehavioral functioning. 4) Determine the influence of level of congruence on survivors' and their caregivers' satisfaction with life. *Method:* Fifty-one pairs of TBI survivors and their caregivers in Colombia completed the Neurobehavioral Functioning Inventory and the Satisfaction with Life Scale. *Results:* Results of hierarchical linear modeling analyses showed that survivors' and their caregivers' satisfaction with life was negatively influenced by their own, but not the other's, perceptions of survivor functioning. Survivors and caregivers with similar perceptions of survivor neurobehavioral functioning also reported greater satisfaction with life. *Implications/Impact on Rehabilitation:* Findings highlight the need for clinicians to develop and implement culturally appropriate interventions to improve the satisfaction with life of individuals with TBI and their caregivers. Studies that can assist researchers and clinicians in understanding the factors that contribute to positive perceptions of survivor neurobehavioral functioning and improved survivor-caregiver agreement with regard to survivor neurobehavioral functioning are warranted. Results of these studies can then be used to inform interventions aimed at strengthening families' abilities to face the challenges of living with TBI without jeopardizing their satisfaction with life.

No. 268

THE TIES THAT BIND: THE INFLUENCE OF CAREGIVER BURDEN ON THE NEUROPSYCHOLOGICAL FUNCTIONING OF TBI SURVIVORS

Maria Christina Quijano Martinez, MSc; Tara Lehan, PhD; Juan Carlos Arango-Lasprilla, PhD; Carlos José de los Reyes, MS

Colombia

Objective: To examine the influence of caregivers' subjective burden on the objective neuropsychological functioning of individuals with TBI after controlling for survivor and injury variables. *Method:* The sample was comprised of 51 pairs of TBI survivors and their caregivers living in Colombia. The Zarit Caregiver Burden Scale was used

to measure caregiver burden, whereas a comprehensive neuropsychological instrument (NEUROPSI) was used to assess the cognitive functioning of the individuals with TBI. *Results:* Survivors receiving care from a family member who reported a higher level of burden had poorer objective neuropsychological functioning than those receiving care from a family member who reported a lower level of burden. *Implications/Impact on Rehabilitation:* Although most previous researchers have examined the impact of survivor functioning on caregiver burden, it seems that influences survivor functioning. That is, the relationship between the two is bidirectional, rather than linear. For this reason, family caregivers also require ongoing support in managing caregiving demands to improve not only their own health and functioning, but also that of the individual with TBI and the family as a whole. Therefore, a family-focused approach is likely to maximize intervention effectiveness, whether or not other family members are directly involved in the health-related behaviors that the intervention is designed to change. In addition, caregiver subjective burden has the potential to change with intervention, whereas the demographic and injury-related characteristics often cannot.

No. 269

EFFECTIVENESS OF PULMONARY REHABILITATION OF PATIENTS ADMITTED TO INTENSIVE CARE UNIT: PILOT STUDY

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Objective: The objective of this study was to demonstrate the effectiveness of an hospital-based program vs home-based program. *Method:* Design, setting and patients: Randomized single blind clinical trial enrolling 17 patients in third-level university hospital, over 18 years old, with a diagnosis of pulmonary diseases with invasive mechanical ventilation ≥ 5 days. Intervention: Hospital Based Program (HBP) with three times per week for 8 weeks, monitored and supervised exercise aerobic (70% of MHR). Home based program (HoBP) was individual education with an exercise prescription. Main outcome measures: 6-min walking distance (6MWD), forced expiratory volume in 1 s (FEV1), forced vital capacity (FVC), SF-36 quality of life scale (HRQOL), St George HRQOL. Measurements were carried out at the start of the randomized trial and at months 2, and 6. *Results:* Baseline patient characteristics were similar in two groups. Main outcome 6MWD improved at 2 months in HBP from 296.1 (102.8) to 411.9 (118.9), $p=0.05$, and in HoBP from 300 (70.1) to 402(85.4), $p=0.028$. In HBP group Mets changed from 3.3 (1.3) to 13.3 (16.7), $p<0.05$, this change was maintained at 6 m. In the HoBP group there were not differences. Statistically significant differences in SF-36 scales were found in HBP group at 2 m, main changes were in PF (27.5 to 71.0); PR (10.0 to 55), SF (21.1 to 69.6),VT (38.5 to 66.5), MH (41.6 to 67.2). Statistically significant differences were found in HoBP at 2m in PR (33.5 to 58.3) and SF (21.1 to 69.6). However no statistically significant differences were found between groups. *Implications/Impact on Rehabilitation:* This research demonstrated that a HBP or HoBP are effective in improving the functionality and HRQOL in patients with pulmonary disease at discharge of Unit Intensive Care.

No. 270

MUSCULOSKELETAL DISORDERS OF UPPER LIMBS FUNCTIONAL COMPROMISE, EVALUATOR'S PERSPECTIVE

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National University of Colombia, Colombia

Objective: Identify the factors considered in determining Earning Capacity Loss (ECL) sary to work related musculoskeletal disorders (MSD) of upper limb, in a Colombian Professional Risks Insurance Company. **Method:** A descriptive study. We reviewed the reports of ECL score of 2008. We searched for common MSD diagnoses and established the relationship of each of them with the ECL. They were grouped as follows: (1) Carpal Tunnel Syndrome (CTS), (2) Shoulder (tendinitis), (3) Elbow (epicondylitis) and (4) Wrist tenosynovitis. **Results:** 814 cases. 413 women (50.7%) and 401 men (49.3%). Average age 45.6 years (8.54 SD), %ECL: Female 16.46%, Male 15.51% ($p=0.014$). MSD mainly affect people between 40-54 years. The CTS was the most frequent diagnosis 46.1% (67.6% women), followed by shoulder tendinitis 14.1% (80% men), epicondylitis 10.1% (55% female) and finally wrist tenosynovitis 1.7% (77.7% women). The CTS had the highest ECL 18.5%, followed by shoulder tendinitis 15.3%, wrist tenosynovitis 12.9% and epicondylitis 11.9%. There were associations between the different groups, especially between groups 1–2 and 1–3. **Implications/Impact on Rehabilitation:** In Colombia the most common work related musculoskeletal disorder of upper limb is the CTS. This condition prevails in females as well as wrist tenosynovitis. Shoulder tendinitis is the second most common diagnosis, predominantly in men. According to the evaluator perspective, the higher ECL was found in CTS, which is attributed to the high quantification of this disease in the current Manual of Disability Rating. This finding contrasts with previous studies that have assessed the patient's perception with the DASH scale, in which it was found that epicondylitis is the MSD that generates greater functional impact.

No. 271

A MULTICENTER STUDY OF CLINICAL AND OUTCOME CHARACTERISTICS OF INDIVIDUALS WHO SUSTAINED MOTOR VEHICLE ACCIDENTS (MVA) IN MEDELLIN, COLOMBIA

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Objective: To describe the sociodemographic, clinical, and outcome characteristics of a group of individuals involved in motor vehicle accidents in Medellín, 2008–2010. **Method:** A sample of 835 individuals who had been involved in MVA were recruited from nine different hospitals. Information was obtained regarding sociodemographic characteristics as well as clinical (diagnosis (ICD10), injury classification by NISS) and outcome characteristics (Short Form Health Survey (SF-36), World Health Organization Disability Assessment Schedule II (WHODAS II), and depression (PHQ-9)) at admission to the hospital. **Results:** The majority of participants were young (mean age: 32.4 (11.6), males (75.7%). Most (66%) had completed high school, 74.6% were employed, and 97% had health insurance. Eighty percent had been involved in motorcycle accidents, 11% in automobile accidents, and 17% were injured as pedestrians. Forty-six percent were injured in the lower extremities; 23% in the upper ; and 18% on the head, neck, and/or face. Twenty-six percent of injuries were classified as minor, 42% moderate, and 32% severe. Regarding clinical characteristics, there were no differences in depression PHQ-9 scores by level of severity of injury. However, some differences in outcome measures were observed. Participants with severe injuries scored lower on all SF-36 domains. RF was the lowest in all injury groups with minor, moderate, and severely injured patients scoring 21.0 (37.4), 8.7 (26.0), and 9.1 (26.8), respectively. PF was the second lowest domain in moderate and severe patients, who scored 28.5 (29.9) and 13.4 (24.7), respectively. WHODAS II domains were higher in patients with severe injuries, with the exceptions of Understanding and Communication. **Implications/Impact on Rehabilitation:** Rehabilitation profession-

als should use these results to identify individuals at risk of having vehicle accidents in Medellín-Colombia and develop interventions to improve their physical and emotional well being.

No. 272

EFFECT OF EXERCISE ON THE C-REACTIVE PROTEIN LEVEL IN OBESE PATIENTS

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India

Objective: To assess the effect of aerobic exercise on the C-Reactive protein level in obese patients. **Method:** It is a prospective follow-up study with 54 patients enrolled, out of which 33 were followed to the end of the study. Baseline investigations were done including Serum CRP levels and body analysis including Weight, BMI, Fat Mass, FFM, BMR. The same were repeated after three months of exercise regime of 5 days per week and the effect was analysed statistically. **Results:** The study resulted in weight-loss ($p<0.001$), decrease in fat mass ($p<0.001$), reduction in circulating CRP concentrations ($p<0.001$), FFM ($p<0.001$). The change in CRP levels were strongly correlated with the change in fat mass ($p<0.002$). **Implications/Impact on Rehabilitation:** The study highlights that serum CRP levels are related to the amount of adipose tissue in the body and the reduction of CRP levels post-exercise has a direct bearing on reducing the risk of cardiovascular events and type 2 diabetes mellitus.

No. 273

IS MOBILITY IN LONG TERM POLIO SURVIVORS A MEASURE OF WORK POTENTIAL?

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Israel

Objective: The aims of the current study are to determine the effects of social and functional variables as barriers or facilitators to work participation in persons with PPS. **Method:** Charts of one hundred and twenty three post polio patients of working age that were seen in the post polio outpatient clinic, between the years 2000 and 2005 were reviewed for the study. Data on age, gender, family status, level of function in activities of daily living, basic and extended (B-ADL and E-ADL), and mobility were then analyzed for correlation to the vocational status. **Results:** Seventy-two people (58.5%) were employed at the time of the survey. Gender and marital status were not found to significantly differ as regard to employment. Driving, walking without aids or orthoses, and independence in basic ADL were positively associated with the employment status of the PPS individuals. **Implications/Impact on Rehabilitation:** Persons with PPS encounter important barriers to work participation, particularly on the International Classification of Functioning, Disability and Health (ICF) components of activity and environment.

No. 274

EVALUATION OF A HYDRAULIC PROSTHETIC FOOT WHILE STANDING ON SLOPES

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Objective: The mechanism of a prosthetic foot was shown to influence the stability, gait symmetry and comfort of the transtibial

amputee (TTA) (Friel, 2005). The Echelon hydraulic prosthetic foot (Endolite, Chas A Blatchford and Sons Ltd, England) utilizes hydraulic fluid to mimic the way muscle adapts during stance phase and allows automatic self alignment to compensate for the changes of the surface. In this study, we aim to evaluate the efficiency of the hydraulic foot in TTA prosthetic-users standing on slopes, by means of kinetic and kinematic data. *Method:* Subjects: 10 active unilateral traumatic TTA male subjects (age 43 ± 12 years; weight 78 ± 11 kg; number of years post amputation 16 ± 10 years). *Apparatus:* The Vicon 12 cameras motion analysis system which comprises an electronically-controlled tilting platform, equipped with two force plates. *Procedures:* Each subject stood on the platform while it tilted backward 10° (for 20 s) and then returned to a horizontal position for 30 s rest. The process was repeated 3 times and then a similar procedure followed as the platform tilted forward 10° for 20 s (also repeated 3 times). This trial was conducted for each subject with his own prosthetic foot. The foot was then replaced to the hydraulic foot and after a month, the same trial was conducted with the hydraulic foot. *Data Analysis:* We analysed kinematic data, e.g. knee and foot angles in the sagittal planes, and kinetic data, e.g. vertical forces and center of pressure (COP) separately for each subject. Average and standard deviation were also calculated (Lab view 8.6, National Instruments). *Results:* We found that the Hydraulic foot enabled a larger flexion range (approximately 4° more than the subjects' own prosthetic foot). This resulted in a decrease in sagittal knee angle fluctuations in both legs. The COP was more centered with the Hydraulic foot. *Implications/Impact on Rehabilitation:* Overall, the hydraulic prosthetic foot had an effect on the posture of the subjects during the trials, as expressed by both kinetic and kinematic measurements acquired while the subjects stood on the tilted platform. Our results indicate that the hydraulic foot may assist the TTA prosthetic-user while ambulating on uneven terrain. Future work should include dynamic measurements of gait parameters while walking on plane and grass, as well as descending and ascending stairs and slopes in order to quantify the effect of the hydraulic foot on gait symmetry and efficiency.

Reference

1. Friel, K. J Am Acad Orthop Surg 2005; 13: 326–335.

No. 275

KINEMATICS, KINETICS AND INTERNAL MECHANICAL STRESSES OF TRANSTIBIAL AMPUTEES WALKING AND CLIMBING STAIRS WITH HYDRAULIC FEET

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Objective: The mechanism of a prosthetic foot was shown to influence the stability, gait symmetry and comfort of the transtibial amputee (TTA) (Friel, 2005). The Echelon hydraulic prosthetic foot (Endolite, Chas A Blatchford and Sons Ltd, England) utilizes hydraulic fluid to mimic the way muscle adapts during stance phase and allows automatic self alignment to compensate for the changes of the surface. In this study, we aim to evaluate the influence of the hydraulic foot on kinematic, kinetic and internal mechanical stresses in the TTA residuum during level walking and stair climbing. *Method:* Subjects: 10 active unilateral traumatic TTA male subjects (age 43 ± 12 years; weight 78 ± 11 kg; number of years post amputation 16 ± 10 yrs). *Apparatus:* The CODA-3D motion analysis system (Codamotion cx1, England) which comprises: 6 cameras, miniature infra-red active markers and four force plates.

Additionally, we used a subject-specific internal stress monitor ($n=8$) that utilizes 3 thin and flexible force sensors (FlexiForce, Tekscan Co. MA, USA), placed under the residuum. *Procedure:* Subjects participated in two test sessions: (i) while using their own prosthetic foot and (ii) with the hydraulic foot. In each trial, the subjects walked at a comfortable speed on a 12 m path. Then subjects ascended and descended a 4-stairs construction. *Results:* We found that using the hydraulic foot enabled a dorsi-flexion movement through the swing phase and enabled less hip flexion, as measured during initial contact and during the swing phase. Additionally, a greater ankle plantar-flexor moment and power was measured while ambulating with the hydraulic foot. Peak internal stresses at the distal tibial end decreased significantly ($p < 0.01$) while the TTA subjects were ambulating with the Echelon foot compared to using their own prosthetic foot. *Implications/Impact on Rehabilitation:* Our results suggest that enabling a motion at the ankle via the hydraulic prosthetic foot results in less compensation at the hip and knee and enable a smooth and natural transition from backward to forward acceleration. Furthermore, internal stresses under the truncated bones decreased while using the Echelon foot, thereby lowering the risk for internal injury to the soft tissues of the residuum.

Reference

1. Friel, K. J Am Acad Orthop Surg 2005; 13: 326–335.

No. 276

ORGANIZATION OF REHABILITATION MEDICINE AFTER A DISASTER – HAITI 2010

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Objective: On January 12th 2010, Haiti was struck by a major earthquake, 7.0 on the Richter scale. An estimated 230,000 people were killed with an additional 300,000 injured – the majority suffering from severe limb injuries. Initial treatment was delivered by a multitude of teams which arrived from all over the world. The treatment was delivered in facilities ranging from clinics through field hospitals to more advanced medical facilities, but all were done in a setting of mass injury – damage control approach. This catastrophic event left in its aftermath thousands of people with either amputations (estimated number – 4,000), or severe sequelae of fractures and soft tissue injuries – all of which requires further treatment and prolonged rehabilitation in order to return to a reasonable level of function. Realizing these needs as well as their urgency, we organized a comprehensive team which was sent to Haiti in order to assess the needs and plan a long term rehabilitation mission. The field of rehabilitation was underdeveloped in Haiti before the earthquake. The disparity between the needs and service availability was obviously increased hundred fold following the calamity. This applies to all aspects of rehabilitation including personnel, facilities and equipment. *Method:* At the end of April 2010, we established a joint Haitian-Israeli Rehabilitation Center in Haiti in the General University Hospital in Port-au-Prince. The center is based on rotating Israeli multidisciplinary teams. The goal of the center is to concomitantly treat the patients, as well as training of local personnel at all levels. We regard this as a long-term project with the aim of eventually handing it over to full Haitian operation. *Results:* Until the end of November 2010, 535 patients had treatments in the center. 80 new lower limb prosthesis were fitted free and the amputees underwent gait training. 5 physiotherapy assistants and one MD were trained in PM&R. A workshop for prosthesis making was established. *Implications/Impact on Rehabilitation:* The presentation will address international collaboration, cultural aspects, the lack of involvement of the international rehabilitation organizations and practical facts of operating a rehabilitation project in the third world.

No. 277

A COMPARISON BETWEEN POST-STROKE DRIVERS' SELF ASSESSMENT, REGARDING THEIR DRIVING, AND THEIR CAREGIVERS ASSESSMENT***Tali Skira, OT; Oxana Zlasov; Noa Gotfried; Katalin Goldenberg****Israel*

Objective: To compare between a stroke survivor self assessment and a caregiver's assessment regarding his driving ability. With the comparison the study results will provide us better information of the driver's awareness of his driving behavior and consequently a better knowledge about the risk results in their driving, if it exists. Study assumptions: The drivers will consider themselves as safe drivers, in contrary to their caregivers' assessment, a strong negative correlation will be found between involvement in traffic accidents and drivers' self awareness and a strong negative correlation will be found between drivers' report about self-driving-limitations and caregiver's assessment. **Method:** Study design was a correlative study, using a convenience sample. The sample included 78 participants that met the inclusion criteria for the present study recruited from 178 patients at Rehabilitation Department, Bnai Zion Medical Center, Haifa Israel. Study group included 29 subjects and 29 of their main caregivers. All subjects in study group have resumed driving after experiencing a stroke and are 26–70 years old [mean = 55.14 (SD = 10.63)]. Comparison group included 49 subjects between the ages of 28–70 years [mean = 56.1 (SD = 9.67)] who have not resume driving. ADL functioning was evaluated by FIM scale and IADL functioning by Lawton&Brody scale. Awareness assessment tool used in the current study was the modified Driving Awareness Questionnaire taken from the Canadian Driving Rehabilitation Guide (CMA Driver's Guide, 2006). **Results:** High participation and independent functioning among drivers. Majority of drivers have also returned to work. No significant differences were evident between drivers and caregivers' assessments. Findings indicated a strong correlation between drivers and caregivers' confidence in drivers' driving behavior ($r=0.801, p<0.001$). **Implications/Impact on Rehabilitation:** Driving rehabilitation.

No. 278

FUNCTIONAL CHARACTERIZATION OF GENETICALLY OBESE PATIENTS***Paolo Capodaglio, MD; Veronica Cimolin; Luca Vismara; Graziano Grugini****Italy*

Objective: To characterize muscle function, gait and posture in patients affected by syndromic obesity. **Method:** Fourteen patients (8 females and 6 males; BMI: $41.29 \pm 7.33 \text{ kg/m}^2$; age: 32.86 ± 4.42 years) with Prader-Willi syndrome (PWS) and two matched control groups (44 obese (O), and 20 healthy subjects (H)) participated in this study. An optoelectronic system with 6 cameras (460 Vicon, UK) was used for gait analysis at 100 Hz. Postural evaluation was conducted with a force platform at 500 Hz (Kistler, CH) integrated with a video system. Muscle strength was assessed with an isokinetic dynamometer (Cybex Norm). **Results:** H, O and PWS appear to be clearly stratified with regard to muscle strength: PWS show the lowest absolute peak torque (PT) for knee flexor and extensor muscles as compared to O (–55%) and H (–47%) ($p=0.00001$). When normalised by body weight, PWS showed a 50% and a 70% reduction in PT as compared to O and H, respectively. PWS walk with a 5% reduced cadence, with a 6.3% longer stance phase duration, a 10% reduced single support phase, a 16.25% shorter normalized stride length and at a 19% slower normalized velocity as compared to H. Moreover, PWS show a 3% reduced cadence, their stance phase last 2% more, their single support is 5% reduced, the normalized stride length is 11.8% shorter and normalized walking speed is 14% reduced as compared to O. PWS show significant reduced

sagittal plane ROM at knee and ankle in comparison both with O and H. PWS patients show a poorer balance capacity than O and H, with greater differences in both the A/P and M/L direction than O. **Implications/Impact on Rehabilitation:** The objective functional characterization provides baseline and outcome measures that may quantify specific deficits amendable with tailored rehabilitation programs and monitor effectiveness of treatments.

No. 279

FALLING IN STROKE. THE DANGER OF WALKING AND ITS ACCELERATION***Augusto Fusco, MD; M. Iosa; G. Morone; L. Tucci; S. Paolucci****Italy*

Objective: The case of a fall of a patient with subacute stroke was reported, during an assessment of his body accelerations. **Method:** The patient was enrolled for routine tests of our research unit, just 2 days before dismissal. He had a Barthel Index of 76, a Canadian Neurological Scale score of 8, and the Rivermead Motricity Index was 7. The patient was asked to perform a 6 min walking test. These tests were performed under the careful supervision of the physiotherapist walking close to him. He walked using a tripod cane held in his left hand and with the right hand fixed to his trunk by means of a belt. Furthermore, he wore a low-weight wireless device incorporating a triaxial accelerometer and three gyroscopes, locating the sensors on L3 spinous process. The triaxial accelerometers recorded the data along the three body axes: antero-posterior (AP), latero-lateral (LL) and cranio-caudal (CC), and the three gyroscopes recorded the angular velocities around these axes. **Results:** A focus on the steps immediately before falling did not show any progressive instabilities. In the last left step immediately before the fall, the AP-deceleration phase was not completed before the beginning of the new step. At the same time it started a progressive LL-acceleration on the right, in the direction of the paretic limb: instead of a minimum in right acceleration a flex was recorded, followed by an ulterior accelerative phase. A similar pattern was recorded for angular velocity around AP-axis. It implied an high anterior acceleration peak, as well an high right acceleration peak that resulted uncontrollable by the patient. **Implications/Impact on Rehabilitation:** This case report refers to quantitative data recorded during a real fall and it could improve the knowledge about the reasons of falls in patients with stroke in not-simulated conditions.

No. 280

ABLE AND STABLE: ASSESSMENT OF UPPER BODY ACCELERATIONS FOR PATIENTS WITH STROKE***Augusto Fusco, MD; M. Iosa; G. Morone; L. Tucci; S. Paolucci****Italy*

Objective: To assess gait dynamic stability in patients with stroke, by means of a suitable computation and normalization of upper body accelerations. **Method:** Fifteen healthy adults and 15 subjects with hemiparesis due to stroke were enrolled. Rivermead Mobility Index (RMI) is used to assess the functional performance of walking. Participants performed the ten meter walking test wearing an elastic belt including a wireless triaxial accelerometer located on the back in correspondence of L2–L3. The antero-posterior (AP), latero-lateral (LL) and cranio-caudal (CC) root mean square (RMS) were computed. The correlation of values with walking speed (WS) and functional gait (RMI) were investigated. In particular, the dependence of acceleration RMS by WS that, in spite of a general quadratic relationship, resulted axis- and population-specific, was faced and a normalization of RMS by WS was proposed. **Results:** The RMS resulted significantly correlated ($p<0.05$) with the measured WS for both groups along all the three body axes, especially along the

cranio-caudal one. These positive correlations found between RMS and WS, between WS and RMI-scores, and hence between RMS and RMI-scores, suggest the need of a normalization of RMS to take into account the WS-effect. We performed this normalization dividing the RMSAP and RMSLL for the less informative RMSCC. The so obtained ratios resulted not correlated with WS for healthy subjects and negatively correlated with WS and RMI-scores for patients along all the three axes. *Implications/Impact on Rehabilitation:* The suggested normalization provided values of upper body accelerations not related to the subject's walking speed for healthy people, and values related to the clinical assessment for patients. This normalization can help the future researches in rehabilitation to obtain more suitable data recording pathological walking and to manage better the data obtained by these instruments.

No. 281

ITALIAN AIDS FOR AMPUTEE CHILDREN IN HAITI

Germano Pestelli, MD; Daniele Bonacini

Italy

Objective: We would like to explain the Italian actions for Haitian children after the earthquake and to present a particular kind of prosthesis made with carbonium. *Method:* To present best practices for helping disabled people. *Results:* A lot of children in Haiti (about 300) can now walk and have a better life when using particular kind of prosthesis. *Implications/Impact on Rehabilitation:* To improve international cooperation for rural and developing countries especially for disable people and to improve rehabilitation in developing countries.

No. 282

DIFFERENTIAL DIAGNOSIS IN PHYSICAL THERAPY AND PHYSICAL EXAMINATION OF PATIENT WITH REFERRAL WITH LOW BACK PAIN: CANCER OF KIDNEY CASE REPORT

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¹Musculoskeletal Disorders Rehabilitation, Genova University, ²"Padre Pio" Foundation Rehabilitation Centers, Foggia, ³Manual Therapy and Musculoskeletal disorders Rehabilitation, Orthopedic Rehabilitation Division, "Santa Chiara" Institute, Lecce, ⁴"Sant'Agostino" Institute, Bari, Italy

Objective: The objective of this study is to highlight the importance of differential diagnosis in physical therapy when approaching a patient suffering with low back pain. Although serious diseases related to the spine represent only 1% of patients with LBP, it is necessary for physical therapists to be able to find and locate signs and symptoms expression of important issues. The aim of physiotherapy differential diagnosis is the result of a complex process of clinical reasoning and decision making. *Method:* The patient has been sent to physical therapy by physician with a diagnosis of LBP: AF, woman, 42 years old, 60 kg for 1.50 m high, BMI: 26.7, housewife, married with two daughters. She referred pain localized in the left thoracolumbar area with front radiation to the navel. She began about a month ago with no apparent causes, with a VAS 3/10 but increased to 8-9/10. The pain continues even at night disturbing sleep and defecting to carry out daily house activities. Starting from this basic informations a complete assessment has been performed, along with a thorough history and physical examination. *Results:* According to the case history data the red flags LBP diagnosis are: unintentional weight loss of 5 kg (in the last 2 months), hypertension, abnormal ESR, family history of cancer. Physical examination confirmed this strong suspicion, so the patient was sent back to the physician. Subsequently, the patient performed an ultrasound

followed by a CT scan which confirmed the presence of left renal cancer removed by laparoscopic surgery enucleation. *Implications/Impact on Rehabilitation:* As we analyzed in this case report, it is essential before starting treatment to exclude any serious medical condition needing a specialistic diagnosis. Close cooperation between physician and physical therapist can drastically help the therapeutic course and the positive outcome of the patient.

No. 283

EXPERIENCES DESIGNING A LONG FORM ICF CORE SET FOR MARFAN SYNDROME

Carla Gallo, MD; V. Bozzo; B. Contini; C. Foti

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Objective: To describe the proceedings and process for the assessment and insertion of categories of the ICF in a Generic ICF Core Set for Marfan Syndrome. *Method:* ICF items were selected in three rounds of revision with a team of experts whose work process was inspired by a Delphi protocol. The team also used the core sets for related diseases like pain, arthritis, osteoporosis, low back pain, cardiovascular and respiratory problems as a comparison or a facilitator for the evaluation of the correlation for the domains of activity and participation. *Results:* The profile generated contains 134 codes of which 15 from Structure, 37 from Body including alteration of the immune system and blood, 27 from Activities and Participation and 55 from Environment. During the revisions and comparisons, Structure and Body items were widely represented indicating a specific feature of Marfan disability. While Activities and Participation had the same pattern of Core Set items as patients suffering from Chronic Widespread Pain. *Implications/Impact on Rehabilitation:* Marfan Syndrome is a genetic disorder with comorbidities and peculiar disabilities experienced by patients which are on the increase due to longer life expectancy. Classification and study of the syndrome in multidisciplinary centers utilizing a common language to share results and efforts between Specialists with same experience and methods is required. The Core Set obtains a description of disabilities and abilities, it is an instrument for the longitudinal evaluation of changes after treatments. This core set responds to the above stated need for a tool which provides a common language for physicians working with Marfan patients and is particularly useful given the wide array of problems seen in Marfan. The long form of ICF items generated here would benefit from wider use in the hopes of developing a more useable short form.

No. 284

SWALLOWING ANALYSIS FOR SEMI-SOLID FOODS TEXTURE IN POST-STROKE PATIENTS WITH DYSPHAGIA

Ryo Momosaki, MD; Masahiro Abo; Wataru Kakuda

Japan

Objective: To clarify the most appropriate texture of semi-solid foods for post-stroke patients with dysphagia based on the findings of the fiberoptic endoscopic evaluation of swallowing (FEES). *Method:* Fifty-two post-stroke patients with dysphagia (age: 72 ± 8 years old) were studied. They were usually eating paste, semi-solid or minced foods in response to the evaluation of swallowing function performed at our department. For this study, 52 homogenous semi-solid foods with different textures included in the National Dysphagia Diet Level 1, were prepared. Physical properties of the foods were measured using a TPU-2C (Yamaden) under the following conditions: plunger diameter, 20 mm; height, 8 mm; Petri dish diameter, 40 mm; height, 15 mm; clearance, 5 mm; compression rate, 10 mm/s; and compression frequency, twice. Each patient was asked to swallow 4g of one food among them without chewing, and simultaneously FEES was performed in the sitting position. In the FEES, pharyngeal residues, penetration into the larynx, and the presence/absence and degree of aspiration were evaluated. We

evaluated the association between the texture of the foods and swallowing movements by FEES. Statistical analysis was performed using Wilcoxon's and Kruskal-Wallis' tests. *Results:* All examinations were performed without any adverse effects. Regarding the physical properties of the applied foods, the hardness, cohesiveness and adhesiveness was 1,873–19,510 (mean 9,129) N/m², 0.13–0.86 (mean, 0.33) and 2–878 (mean, 209) J/m³, respectively. Significant association between the increase in residues and the increase in adhesiveness, between the degree of penetration and the cohesiveness, were found (all $p < 0.05$). In addition, the degree of aspiration was significantly influenced by the gumminess which equals to hardness multiplied by cohesiveness ($p < 0.05$). *Implications/Impact on Rehabilitation:* It is suggested that there are appropriate and inappropriate semi-solid foods in terms of the physical properties for post-stroke patients with dysphagia and FEES seems to be useful for this discrimination.

No. 285

COOKING AND QOL IN FEMALE PATIENTS WITH RHEUMATOID ARTHRITIS

Yoko Goto, OT; Mariko Nakamura; Yuko Sasaki; Masahiro Kohzuki; Setsuko Monma
Japan

Objective: For persons 20–40 years of age it is easy to get rheumatoid arthritis (RA), and it is the disease for more women than men. We examine the QOL of RA female patients who must cook everyday. *Method:* Ten RA female patients (55.4±5.1 years old). They cook for average 5.8 days a week. We evaluated their physical functions, activities of daily living (ADL) and QOL. 1. Physical functions: 1) A class classification of Steinbrocker, method to express functional disorder of RA, 2) The pain of the joint, 3) joint transformation, 4) muscular strength, 2. ADL: modified Stanford health assessment questionnaire (MHAQ), 3. QOL: SF-36. *Results:* By a class classification of Steinbrocker, there were nine patients classified with classification 2 (some exercise with restrictions and exist pain, but normal work is possible), and there was one patient with the classification 3 (the functional disorder that all the daily movement is highly confined). Those nine patients had a pain in the joints when they worked. All the members had transformation of joints, and a decrease in their muscular strength. In MHAQ, many patients had a difficulty with “Dressing”, “Hygiene”, “Grip”, and “Rising” because of a pain and the transformation of the joints. The QOL evaluation deteriorated generally. In particular, role physical (RP), bodily pain (BP), general, health perceptions (GH), vitality (VT) were low scores. *Implications/Impact on Rehabilitation:* Because RA patient was accompanied with a pain to a body, the physical QOL scores deteriorated in comparison with the mental QOL scores. It is the necessity for woman with disability to have a role at home. In particular, cooking needs a lot of time in their everyday life. It is said that the patient who performs household chores well tends to maintain daily activities. So, it is an important part of life adaptation.

No. 286

DEVELOPMENT AND VALIDATION OF A SIMPLE PREDICTION MODEL OF DISABILITY IN PATIENTS WITH ACUTE SUBARACHNOID HEMORRHAGE

Koichi Miyakoshi, MD; Takumi Nasu; Shigeo Iai; Hiromu Hadeishi
Japan

Objective: Prediction of long-term functional status in patients with subarachnoid hemorrhage (SAH) is difficult and unestablished, because of its complicated symptoms or clinical courses. Here we report our development of a new simple prediction model

of functional outcome for acute SAH patients, and its validation. *Method:* Study participants were consecutive acute aneurismal SAH patients who admitted to our hospital from 2004 to 2010. We divided them randomly in two groups; development and validation group. Using the development group, we invented a prediction model by multivariate analysis. As prognostic factors, we selected 8 items from our medical record retrospectively: age, Hunt and Kosnik grading, World Federation of Neurological Surgeons grading, Fisher group of CT finding, presence of intraventricular hematoma, intracerebral hematoma, site of aneurysm and previous medical histories. As the outcome indicator, we adopted Functional Independence Measure version 3 Japanese edition (FIM) scores. Stepwise multivariate regression analysis demonstrated the significant predictive factors. Using this result, we discovered a newly developed simple scoring system, and we examined its precision by applying it on the validation group. *Results:* There were 236 participants. Firstly we developed a predictive scoring system, using samples of development group. Significant predictive factors chosen by multivariate regression analysis were age, Hunt and Kosnik grading and Fisher group of CT finding. We incorporated these 3 items into a formula, allocating 4, 2 and 2 points for each predictive factor respectively, utilizing the result of standardized coefficients of the regression analysis. Secondly, we examined this scoring system using the samples of validation group. The sensitivity was 72.7%, and the specificity was 73.3%. *Implications/Impact on Rehabilitation:* Significant prognostic factors which affect disability in patients with SAH were age, Hunt and Kosnik grading and Fisher group. We could develop a simple model of disability prediction.

No. 287

DISABILITY PREVENTION OF CARDIOVASCULAR AND CHRONIC KIDNEY DISEASES: EFFECTS OF EXERCISE TRAINING ON NITRIC OXIDE SYNTHASES IN RATS WITH CHRONIC HEART FAILURE

Daisuke Ito, PhD
Japan

Objective: Exercise training is known to have beneficial effects in patients with heart disease. The cardioprotective effects of exercise training are known to be mediated through an upregulation of endothelial nitric oxide synthase (eNOS) in heart and vasculature. However, the effects of exercise on nitric oxide synthase in the kidney of chronic heart failure (CHF) are unclear. The aim of this study is to examine the effects of exercise training on eNOS and neuronal NOS (nNOS) expressions in heart and kidney of rats with CHF. *Method:* Male Sprague-Dawley rats underwent the operation of myocardial infarction (MI) (the ligation of left coronary artery) or sham operation, and at 4 weeks after those operations, were randomly assigned to sedentary conditions or 4-weeks of a treadmill exercise protocol; four experimental groups: sedentary-sham, exercised-sham, sedentary-CHF, and exercised-CHF groups. Expression of eNOS and nNOS in thoracic aorta, left ventricular (LV) myocardium and kidney were analyzed by Western blot analysis. *Results:* Exercise training improved cardiac and renal function, as indicating echocardiographic data, plasma brain natriuretic peptide (BNP) level and creatinine clearance. The eNOS and nNOS expressions were significantly decreased in aorta, LV and kidney of CHF rats, while exercise training markedly increased the expressions. *Implications/Impact on Rehabilitation:* Exercise training exerts cardiac and renal protective effects against CHF. The favourably affections of exercise training in CHF rats may be mediated in part by eNOS and nNOS in heart and kidney. These findings also suggest that the upregulation of the renal NO system may be a novel mechanism that could explain the beneficial effects of exercise training, and that exercise training may be a novel therapeutic approach for preventing the development of renal dysfunction in addition to cardiac dysfunction in patients with CHF and post-MI.

No. 288

PEOPLE WITH CHRONIC SCHIZOPHRENIA WORKING IN SOCIETY IMPROVE THEIR INDEPENDENT LIVING SKILLS

Yuki Miyake, OT; Etsuko Namba; Ryuji Kobayashi
Japan

Objective: The purpose of this study is to clarify the differences in independent living skills of people working in supported employment workplaces and people working in community workshops or other workplaces. **Method:** Sixteen people with chronic schizophrenia employed at the K Community Workshop (community workshop) participated in this study. We separated them into two groups: group A (7 men and 5 women, average age 41.8 ± 2.7) and group B (4 men, average age 54.5 ± 3.6). Group A included people who were working at a university, a cleaning company, a care facility for the elderly and a hospital. Group B included people working only at a community workshop or other workplaces. Their independent living skills were evaluated by observation using Methodology of Life Assessment Scale for the Mentally Ill (LSAMI). LSAMI has five sections: daily living (12 items), interpersonal relations (13), work (10), endurance & stability (2), and self-recognition (3). An unpaired Mann-Whitney test was used to compare the groups. **Results:** A significant difference was seen in daily living ($p < 0.006$) and interpersonal relations ($p < 0.005$). **Implications/Impact on Rehabilitation:** Results of this study indicate that people with chronic schizophrenia working in some workplaces have high daily life and the interpersonal relationship skills. They work and get used to the job. Thus, it is thought possible for them to connect with the people they work with, and they are able to try to have fun in their life. In the area of vocational rehabilitation, working while receiving support indicates the possibility that people with chronic schizophrenia can obtain daily life and the interpersonal relationship skills necessary for work. It would appear that these skills contribute to their happiness and deepening of friendships.

No. 289

DEVELOPMENT OF THE PULMONARY INSTRUMENTAL-ACTIVITIES OF DAILY LIVING QUESTIONNAIRE (P-IADL) IN PATIENTS WITH COPD

Yoko Goto, OT; Masahiro Kohzaki; Yuko Sasaki; Setsuko Monma
Japan

Objective: When we produce the pulmonary rehabilitation program, it is necessary to know the life style of the respiratory patients in detail. From the standpoint of their health related quality of life, to evaluate the instrumental activities of daily living (IADL) is very important, as well as the basic-ADL (BADL) including self-cares. **Method:** We made an IADL questionnaire for pulmonary patients at home (P-IADL). P-IADL consists of 18 items covering five domains of instrumental activities (housekeeping, domestic tasks (e.g. gardening, repair the house), going out, leisure and job, and communication), and an additional question whether you wanted to do it or not. It was evaluated by five response choices (1. I have not done it before, 2. I can do it without a problem, 3. I have a little difficulty, but I can do it, 4. I cannot do it as well as before getting ill, 5. I cannot do it compared to one year ago). We tried it to nine pulmonary patients (average age 78.2 ± 7.4 years old) using home oxygen therapy. **Results:** There were many patients who hoped to enjoy their spare time such as a movie/eating out and a trip, a visit to friends/acquaintance's, which had decreased after getting ill. For these causes, they might be concerned not only for the physical problems but also the appearance why they have to carry oxygen. **Implications/Impact on Rehabilitation:** We should perform the evaluation that the subjective element was taken in as well as objective evaluation. It will be effective to set a spontaneous objective for the patient, and to enhance their motivation for pulmonary rehabilitation.

No. 290

CAN THE THERAPEUTIC EXERCISE PREVENT THE LOW BACK PAIN IN THE WORKPLACE?

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Japan

Objective: The purpose of this study is to examine the effects of therapeutic exercise in the workplace for preventing low back pain (LBP), based on the investigation and experiences during 23 years from 1982. **Method:** 1) Subjects of study: Soft-drink salesmen, who engaged in the transportation of heavy materials, are all male. The survey began in 1982, their average age was 29.0 years. In 2004, an average of 42.6 years and 13 years of aging. We studied for about 900 people a year. Thus 23 years in total, 24,289 people were investigated. 2) Therapeutic exercises: Before opening, they exercise 15 min a day. The exercise consists of not only the trunk but also the leg and arm movements. 3) Investigation of rate of complaints on low back pain (RC-LBP). 4) Physical check-up using modified Kraus-Weber Test (mK-W Test). The test is composed with 2 items for abdominal muscles (check of strength) and 5 items of keeping posture for 60 s (check of durability) of abdominal and back muscles. For comparison the year, among all workers, the percentage of people got full marks for the mK-W Test has been calculated annually. **Results:** In 1981, the year the study started, the RC-LBP was 44%. In 1982, the first year of the study, the RC-LBP fell to 17 percent and gradually declined thereafter. RC-LBP is under 1% in 2004. In 1982, the percentage of people got full marks in mK-W Test was 40%. However, that was increased to 80% in 1986 and the rate has been continued until 2004 in spite of 13 years of aging. LBP as industrial accident has been decreased and zero has been recorded from 1995. **Implications/Impact on Rehabilitation:** The decrease of RC-LBP and LBP as industrial accident, which contains chronic LBP, are not only from therapeutic exercise but also changes to the cans from bottle and mechanization of labor and product. However, the role of exercise in the workplace is undeniable. The mK-W Test might be useful evaluating method of spinal function. In conclusion, the therapeutic exercise in the workplace have the possibility to prevent LBP.

*Some parts of these studies have been reported only in Japanese.

No. 291

CHANGE OF INTRANEURAL VASCULARITY ON COLOR DOPPLER ULTRASONOGRAPHY IN ULNAR NEUROPATHY AT THE ELBOW: A CASE REPORT

Yuka Kurihara, MD; Toshiaki Furukawa; Michi Tochikura; Noboru Takanashi; Yui Ishi; Yuki Kariya; Kozo Hanayama; Yoshihisa Masakado
Japan

Objective: The color doppler ultrasonography has been used to detect intraneural vascularity in median nerve at wrist. To our knowledge, there is no report to detect intraneural vascularity in ulnar nerve. The aim of this study is to detect intraneural vascularity on color doppler ultrasonography in ulnar neuropathy at the elbow. **Method:** Seventy-four-year-old male patient complained of right elbow pain, ulnar side's numbness and could not use chopstick. His right ADM, FDI and FCU muscles were atrophic. Electrophysiological study, ultrasonography and CT were performed. He was then diagnosed as right ulnar neuropathy at elbow and elbow osteoarthritis. He underwent operation. At one and two years after operation, we reexamined electrodiagnostic study and gray scale, color doppler ultrasonography. **Results:** He could use chopstick around six month after operation. FCU muscle's atrophy improved two years after operation. We compared electrodiagnostic and ultrasonographic findings between one year and two years after operation. In nerve conduction study, CMAP and SNAP of right ulnar nerve were not evoked. In needle electromyography, spontaneous activity was

disappeared in FCU muscle. In FDI muscle, we found spontaneous activity and electrical silence at one year. We found spontaneous activity and just one motor unit MUP at two years. In gray scale ultrasonography, the cross sectional area did not change at the level of epicondyle and at 2 cm distal to this level. However in color doppler ultrasonography, we found intraneural vascularity increased in swelling site two years after operation than one year. *Implications/Impact on Rehabilitation:* When we monitor recovery in ulnar nerve neuropathy at the elbow, it is useful to compare intraneural vascularity in swelling site in color doppler ultrasonography.

No. 292

INVESTIGATION OF FREE PERIODIC WALKING AFTER STANDING UP FROM A CHAIR USING A FOOT PRESSURE DISTRIBUTION MEASUREMENT SYSTEM

Hideyasu Watanabe, MD

Japan

Objective: Using a foot pressure distribution measurement system, time-course changes in foot pressure on periodic walking were investigated on free walking after standing up from a chair. *Method:* The subjects were 10 healthy adult men (mean age: 33.4±4.5 years) with no past orthopedic history. The subjects had a foot pressure distribution measurement system (F-scan II, Nitta Corporation) attached and walked 10 m freely after standing up from a chair, and the contact pressure loaded on the sole was recorded and evaluated. The subjects were instructed not to use either arm to stand up, and they chose which leg to start walking with. They walked while fixing a visual line in the anterior horizontal direction at their usual walking speed. *Results:* The contact pressure of the sole showed a bimodal M-form course: the pressure rose after heel contact (HC) as the first peak, decreased in mid stance (MS), and re-rose after heel-off (HO) as the second peak. The results varied among the subjects, and could be divided into the following types: propulsive type in which the second peak contact pressure was higher than the first peak, brake type in which the first peak contact pressure was higher than the second peak, and mixed type in which the contact pressure differed between the bilateral feet. The contact pressure at HC gradually increased while that at MS gradually decreased as the step number increased, showing expansion of the pressure difference, and the difference became constant at 6–7 steps, although there were differences among subjects. *Implications/Impact on Rehabilitation:* It was suggested that 6–7 steps are necessary for healthy adult men to achieve a constant, normal gait after standing up from a chair. We are planning to observe changes due to the age and orthopedic diseases by increasing the number of cases.

No. 293

THE EFFECT OF EXERCISE TRAINING ON WALKING ABILITY AND HEALTH-RELATED QUALITY OF LIFE IN PATIENTS WITH PERIPHERAL ARTERIAL DISEASE

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Japan

Objective: Walking impairment and lower health-related quality of life (QOL) are observed in patients with peripheral arterial disease (PAD). In this study, we evaluated the effect of exercise training on walking ability and health-related QOL in PAD patients with re-occlusion or without indication for angioplasty or surgery. *Method:* Eleven PAD patients were enrolled in a 12-week supervised exercise program. Six patients were re-occluded after an angioplasty or surgery, and 5 patients were unindicated for angioplasty or surgery. The exercise program was performed with a treadmill at 10 sessions per week for inpatients and 2 sessions per week for outpatients during 12 weeks. QOL was measured by the Peripheral Arterial Disease Walking Impairment Questionnaire (WIQ) and the 36-item Short-Form

(SF-36) before and after the exercise program. *Results:* After the exercise program, maximal walking distance (MWD) significantly improved ($p=0.027$). Maximal leg power, anaerobic threshold, peak VO₂ and pain walking distance tended to increase. Walking distance ($p=0.046$) and walking speed ($p=0.015$) in WIQ and physical function (PF) ($p=0.018$) in SF-36 were also significantly improved. Between MWD and SF-36 scales, the change in MWD correlated positively with the changes in role physical (RP), bodily pain (BP), vitality (VT), and social functioning (SF) and correlated negatively with the change of in mental health (MH). *Implications/Impact on Rehabilitation:* Exercise training improved walking impairment and QOL in PAD patients even with re-occlusion or without indication for angioplasty or surgery. Exercise training should be considered as a sary treatment strategy for these patients.

No. 294

THE IMPLEMENTATION OF CARDIAC REHABILITATION AFTER ACUTE MYOCARDIAL INFARCTION IN NORTHERN JAPAN

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Objective: The implementation of cardiac rehabilitation (CR) after acute myocardial infarction (AMI), especially recovery phase CR and outpatient CR, is extremely poor in contrast to the broad dissemination of percutaneous coronary intervention (PCI) for AMI in Japan. The purpose of the present study was to investigate the implementation of CR for AMI in Miyagi prefecture. *Method:* Questionnaires were sent in 2009 to 40 hospitals with Department of Cardiovascular Medicine, participating the MIYAGI-AMI Registry Study. *Results:* Effective replies were obtained from all hospitals (100%). In a total of 40 hospitals, 16 hospitals were authorized by the Japanese Circulation Society as cardiology-training hospitals (THs). The percentages of hospitals treating hospitalized AMI patients and implementation of PCI in a total of hospitals were 65% and 50% respectively. All of THs treated hospitalized AMI patients and carried out PCI for AMI. The rates of implementation of CR for acute phase AMI were 35% in total hospitals and were 75% in THs, respectively. Patient education programs were highly implemented (79% of hospitals implementing acute phase CR), but cardiopulmonary exercise testing with expired gas analysis were so poorly implemented (14% of them). Although no hospitals implemented CR for recovery phase in Department of Cardiovascular Medicine, two hospitals carried out CR for recovery phase in Department of Rehabilitation Medicine. *Implications/Impact on Rehabilitation:* This survey revealed the fact that in Department of Cardiovascular Medicine the absence of implementation of recovery phase CR, although the broad dissemination of comprehensive CR for acute phase AMI. In two hospitals, however, Department of Cardiovascular Medicine worked in cooperation with Department of Rehabilitation Medicine. The more close cooperation between Department of Cardiovascular Medicine and Rehabilitation Medicine may be a mean to disseminate recovery phase CR for AMI.

No. 295

EFFECTS OF EXERCISE TRAINING ON HYDROGEN PEROXIDE AND NO PRODUCTION

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Objective: The long-term exercise training (Ex) has antihypertensive and renal-protective effects. To clarify the role of hydrogen peroxide

(H₂O₂) and NO in these effects, the present study was designed to test the effects of the Ex on H₂O₂ and NO production, and the direct effect of H₂O₂ on NO production. *Method:* Five-week old, male spontaneously hypertensive rats (SHR) or Wistar-Kyoto rats (WKY) were randomly divided into two groups: a control group and an Ex group. The treadmill running was performed to the Ex groups for eight weeks. To test a direct effect of H₂O₂, H₂O₂ was infused with the physiological saline continuously in WKY for one week. H₂O₂ and NO₂/NO₃ (NOx) in plasma and urine were measured. The expressions of endothelial and neuronal NO synthases (eNOS and nNOS) proteins in the kidney were analyzed using Western blots. *Results:* The Ex significantly lowered the systolic blood pressure (SBP) in SHR, but did not change it in WKY. Ex increased H₂O₂ and NOx in plasma and urine and the renal eNOS and nNOS expressions in SHR and WKY. H₂O₂ infusion increased NOx in plasma and urine and the renal eNOS and nNOS expressions in WKY. *Implications/Impact on Rehabilitation:* The Ex increases the renal NOS expression and NO production in both SHR and WKY, and endogenous H₂O₂ is a mediator of the upregulation of the renal NOS expression and NO production by Ex.

No. 296

EXERCISE TRAINING DECREASES THE ENHANCED EXPRESSION OF SOLUBLE (PRO)RENIN RECEPTOR IN THE KIDNEY OF SPONTANEOUSLY HYPERTENSIVE RATS

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Objective: The long-term exercise training (Ex) has antihypertensive and renal-protective effects. (Pro)renin receptor (PRR), a newest member of rennin-angiotensin system, has two forms: the full length (f-PRR, 37 kDa) and the soluble form (s-PRR, 28 kDa). PRR-bound (pro)renin enhances the enzymatic activity to generate angiotensin II and associates with hypertension and renal disease. Thus, the aim of the present study is to determine the effect of Ex on the expression of the two forms of PRR in the kidney and plasma of spontaneously hypertensive rats (SHR). *Method:* Five-week-old SHR and Wistar-Kyoto rats (WKY) were submitted to a control group and an exercise group (a moderate Ex with treadmill running: 20 m/min; 60 min/day; 6 times/week) for 8 weeks, and the systolic blood pressure (SBP) was measured. The expression of PRR in the renal cortex and plasma was analyzed by Western blots. *Results:* After 8 weeks, the SBP of SHR was higher than that of WKY and was significantly lowered by the Ex. Compared to WKY, the s-PRR expression was higher, and the f-PRR expression was lower in the renal cortex of SHR. The Ex decreased the s-PRR expression in the renal cortex of SHR, but did not affect the f-PRR expression. The Ex did not affect the two forms of PRR expression in the renal cortex of WKY. The s-PRR expression in plasma had no differences between WKY and SHR, and the Ex did not affect it in WKY or SHR. *Implications/Impact on Rehabilitation:* The Ex decreases the enhanced expression of s-PRR in the kidney of SHR. This may be a mechanism for the antihypertensive and renal-protective effect of the Ex.

No. 297

ELECTRICAL STIMULATION ON ABDOMINAL MUSCLE WOULD BE AN ALTERNATIVE TO REHABILITATION TRAINING IN BED RIDDEN PATIENTS

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Japan

Objective: We have expressed that Low-frequency electrical stimulation (LFES) of the skeletal muscles on lower limbs has been shown to increase blood flow and oxidative enzyme activity, to enhance muscular regeneration, and to prevent atrophy. However, the trunk muscles also become critical, since they provide the necessary trunk stabilization and the improvement of walk for the bed ridden patients. The aim of this study was to investigate whether electrical stimulation on abdominal muscle could increase abdominal muscle power and improve activities of daily living (ADL) and represent an alternative rehabilitation method for bedridden patients. *Method:* The patients aged 87 years old with stable bedridden, and Functional Independence Measure (FIM) was 86, was studied. They had 8 weeks low-frequency electrical stimulation (LFES) applied simultaneously to the abdominal muscle, quadriceps and calf muscles (1 h/day for 7 days/week). After the 8 week period, dynamometry was performed to determine muscle power of under limb. Moreover, VC, FEV1, MEP, and MIP were measured by spirometry before and after LFES to estimate abdominal muscle power indirectly but easily. Moreover we inspect FIM score of the patients to evaluate ADL. *Results:* 8 weeks of LFES increased muscle power of under limb, VC, FEV1 and MEP. However MIP and FIM did not increased. Blood pressure and heart rate did not change after LFES. *Implications/Impact on Rehabilitation:* LFES on abdominal muscle and under limb improved muscle power. But LFES did not improve ADL. Moreover LFES could be confirmed for the safety of bedridden patients Therefore LFES could be recommended for an alternative rehabilitation method in bedridden patients.

No. 298

MR IMAGING ACTIVITIES DURING THE SHOULDER EXTERNAL ROTATOR MUSCLE CONTRACTIONS

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Objective: It is difficult to examine the activities of deep-seated shoulder muscles by using electromyograms. We attempted to evaluate muscle activities by using magnetic resonance imaging (MRI) signal intensities following shoulder external rotation exercise. *Method:* MRI was performed eight healthy males (age, 19–22 years old). Images were obtained using the echo-planar imaging technique. The subscapularis, supraspinatus, infraspinatus, teres minor, and deltoid muscles were analyzed. After an initial scan, subjects performed a shoulder external rotation exercise. One exercise set consisted of 50 rotations. Subjects were asked to lie down on a bed with their upper arms held close to the side of their body and their elbows flexed at 90° as they pulled 6 kg weights. A s MRI was performed immediately after exercise. Each subject performed 10 exercise sets and was scanned 11 times. MRI was performed in the oblique sagittal plane at the glenoid level. The circumference of the muscles that were assessed was circled and signal intensities were measured. Statistical analyses of differences among the 5 muscles were performed using two-way repeated analysis of variance. The analyses were carried using IBM SPSS ver. 19 with values for $p < 0.05$ being regarded as significant. *Results:* The average (SD) signal intensities of these muscles were as follows (before /after exercise): subscapularis, 82.93 (9.29)/80.44 (11.08); supraspinatus, 126.59 (17.76)/124.60 (20.63); infraspinatus, 157.22 (20.79)/198.07 (29.75); teres minor, 148.10 (15.76)/186.71 (25.28); deltoid, 186.69 (11.37)/189.02 (13.89). There were significant differences among exercise sets and muscles, and there was interaction between muscles and exercise sets. *Implications/Impact on Rehabilitation:* Infraspinatus and teres minor exhibited increased signal intensities after the exercise session. This result showed that noninvasive evaluation of deep-seated shoulder muscles was feasible by using MRI signal intensities.

No. 299

INVESTIGATION OF PROSTAGLANDIN E2 TO VASODILATION CAUSED IN BICARBONATE WARM WATER BATHING**Masaharu Maeda, MD¹; Masaru Ichikawa¹; Mariko Hara¹; Yoshimi Sakurai¹; Emi Hirano¹; Jun Yamamoto¹; Eisuke Kogure¹; Shinobu Shimizu²**¹International University of Health & Welfare graduate school, ²Kitasato University, Japan

Objective: The footbath by the bicarbonate warm water is done to physical therapy to the peripheral circulatory dysfunction of arteriosclerosis obliterans etc. in Japan. Details of the vasodilation mechanism of the bicarbonate warm water are not researched enough. The difference is recognized in the metabolic product of prostaglandin E2 (PGE2) by the bathing experiment of the rat. Then, we examined whether PGE2 correlate the vasodilation by the carbonate warm water in man. **Method:** It was made hole body bathing to 36.5°C artificial bicarbonate warm water (1000pm) for 15 min for five healthy adults, and PGE2 was measured before and after that. The control was tap water of 36.5 degrees. Meanwhile, it was monitored the blood pressure, the pulse rate, the changes of the precordial deep body thermometer and the surface bloodflow of thigh. **Results:** The influence of a thermal action was excluded as there was no difference of the changing the blood pressure, the pulse rate, and the deep body thermometer between the bicarbonate and tap warm water. The surface skin flow rose slightly by the bicarbonate warm water compared with tap water. PGE2 after the 15 min bathing was more increased in the bicarbonate warm water with $5.6 \pm 1.1 \mu\text{g/ml}$ than in the tap water with $3.2 \pm 0.5 \mu\text{g/ml}$ ($p < 0.05$). **Implications/Impact on Rehabilitation:** The bicarbonate is a material that is recognized as a waste matter in the inside of the body, and excluded immediately. The improvement of the peripheral circulation due to vasodilation is important in this exclusion. In this results, even human thought that the vasodilation of the bicarbonate warm water was due to PGE2 increasing. It seemed that PGE2 caused the production vasodilation in the vascular endothelial cell and the surroundings when the bicarbonate diffused the capillary. It seemed that the vasodilation of the bicarbonate warm water bathing used by physical therapy was related to increasing of PGE2 in the vessel.

No. 300

REHABILITATION OF SEVEN HEAT STROKE PATIENTS IN AN ACUTE SERVICE**Ikuko Saotome, MD, PhD; Junko Fujitani, MD, PhD; Masashi Fijimoto, MD**

Japan

Objective: We report 7 cases of severe heat stroke during their hospital stay at the acute service in the summer of 2010. Patients were needed for the rehabilitative intervention due to physical sequelae that were connected to heat illness related systemic multiple organ failure and central nervous system dysfunction. **Method:** A retrospective case study of the medical record at the urban emergency service in Japan was held. Twenty-six out of 79 cases were admitted having heat-related illnesses during that summer. Demographic, circumstance of the onset, functional status, family situations, rehabilitation needs and courses, outcome at discharge datum were examined. 7 people were consulted for rehabilitation for this study. **Results:** Two young males collapsed outdoors from heat exposure, others were 65 years or older staying alone at home. Rehabilitation needs were mainly both cognitive and physical assessment concerned with an encephalopathy. Four cases needed full assistance for daily activities. The average hospitalization was 16.8 days. None of them were in the condition of returning to their home. **Implications/Impact on Rehabilitation:** In the rare clinical state of acute encephalopathy according to the heat stroke, we had the chance to experience rehabilitative intervention. Our cases were

remained irreparable impaired. Rehabilitation physicians should be aware of the dangers of heat stroke.

No. 301

EFFECT OF COMPREHENSIVE REHABILITATION IN PEDIATRIC NONALCOHOLIC FATTY LIVER DISEASE (NAFLD)**Osamu Ito, MD; Yoshiko Sakata; Fumika Suzuki; Yoshikazu Muroya; Nobuyoshi Mori; Makoto Nagasaka; Satoru Ebihara; Masahiro Kohzuki**

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Objective: Nonalcoholic fatty liver disease (NAFLD) is a series of disease from asymptomatic steatosis with or without elevated transaminases to cirrhosis and a phenotype of metabolic syndrome. Paralleling the increasing prevalence of obesity in Japan, NAFLD becomes to be common and potentially serious even in children. There are few reports of therapeutic intervention for pediatric NAFLD. Thus, we determined the beneficial effects of comprehensive rehabilitation in children with NAFLD. **Method:** Eight obese children (age 12.0 ± 1.6 years, male/female 7/1), who had elevated serum transaminases and the diagnosis of fatty liver by plain computer tomography were admitted to Tohoku University Hospital for 71.4 \pm 44.0 days. They underwent exercise therapy with a bicycle ergometer (20–30 min/day, 5 days/week) and an underwater treadmill (20–30 min/day, 5 days/week) and a mild diet of 1,900 kcal. After a guidance of life style modification, they followed at home for 6 months. **Results:** On admission, the height and the body weight were 158.6 \pm 6.8 cm and 87.8 \pm 11.0 kg. Blood pressure was normal. Serum aspartate transaminase (AST) and alanine transaminase (ALT) were 84 \pm 36 IU/l and 153 \pm 62 IU/l. Serum triglyceride was a high range in two cases, and low-density lipoprotein (LDL) cholesterols was a high range in two cases, but high-density lipoprotein (HDL) cholesterols was a normal range in all cases. Diabetes mellitus was shown in two cases. The homeostatic model assessment (HOMA) was 4.5 \pm 1.1, which indicated insulin resistance. After the comprehensive rehabilitation, the body weight decreased to 77.5 \pm 9.7 kg, and serum AST and ALT decreased to 21 \pm 4 IU/l and 27 \pm 7 IU/l, respectively. **Implications/Impact on Rehabilitation:** The clinical course of these cases indicates that the comprehensive rehabilitation has beneficial effects in pediatric NAFLD.

No. 302

COMBINATION OF CHRONIC EXERCISE AND G-CSF PROTECTS RENAL FUNCTION IN CHRONIC RENAL FAILURE (CRF) RATS**Chihiro Suda¹; Masayuki Kanazawa²; Qiang Yao¹; Kenta Takashima¹; Yoshiko Sakata¹; Yoshikazu Muroya¹; Nobuyoshi Mori¹; Makoto Nagasaka¹; Satoru Ebihara¹; Osamu Ito, MD¹; Masahiro Kohzuki¹**¹Department of Internal Medicine and Rehabilitation Science, Tohoku University Graduate School of Medicine, ²Department of Internal Medicine and Hypertension/Diabetes Mellitus, Sendai Shakaihoken Hospital, Sendai, Japan

Objective: It has been suggested that appropriate exercise may have renoprotective effects and produce improvement of physical strength in patients with CRF. However, the effects of exercise are still insufficient, and development of therapy to let the effects enhance is expected. Granulocyte colony-stimulating factor (G-CSF) is a kind of cytokine that enhances differentiation and multiplication of neutrophil, and enhances function of maturity neutrophil. Furthermore, G-CSF has effects of antiapoptosis, anti-inflammatory, multiplication and migration of a vascular endothelial cell. There are a few reports that G-CSF has a renoprotective effect in acute renal failure. Therefore, we assessed the effects of a combination

of chronic exercise and the G-CSF that application to noninvasive regenerative therapy is expected. *Method:* Male 5/6-nephrectomized WKY rats were divided into five groups according to the following treatments: 1) no treatment (C); 2) exercise with treadmill running (20m/min for 60 min/day, 5 days/week) (EX); 3) G-CSF (5 micro g/kg/day, sc); 4) EX+G-CSF; and 5) sham operation (S). The rats were then treated for 12 weeks. *Results:* The 24 h-urinary excretion of protein, serum creatinine in the EX+G-CSF group, and the blood urea nitrogen in the G-CSF and EX+G-CSF groups were significantly lower than those in the C group. The index of glomerular sclerosis (IGS) in the EX, G-CSF and EX+G-CSF groups were significantly lower than that in the C group. The IGS in the G-CSF and EX+G-CSF groups were significantly lower than that in the EX group. The expression of α -smooth muscle actin in the glomerulus was the lowest in the EX+G-CSF group. *Implications/Impact on Rehabilitation:* These results suggest that both chronic exercise and G-CSF have renoprotective effects in CRF model. They also suggest that the simultaneous treatment of chronic exercise and G-CSF can enhance endurance with the renoprotective effects.

No. 303

GAIT TRAINING OF A SPINAL CORD INJURY PATIENT USING ROBOT SUIT HAL

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Japan

Objective: Our goal is to enhance the quality of life of persons with motor disabilities by means of an active motion support system that assists the impaired motion in a way that matches as much as possible to the motion of able-bodied persons. To this end we developed the Robot Suit HAL (Hybrid Assistive Limb) to actively support and enhance the human motor functions. The objective of this research is to investigate the effectiveness of the rehabilitation of a person with spinal cord injury using HAL. *Method:* The HAL can be controlled using the Voluntary Control method or the Autonomous Control method. Voluntary Control provides physical support according to the wearer's voluntary muscles activity. Autonomous Control provides a predefined functional motion based on recorded motion patterns from able-bodied persons. In this research, we used Voluntary Control for a person with spinal cord injury. The subject was a 69 years old man who was diagnosed with spinal canal stenosis. He has difficulty flexing his right hip and knee joints during the swing phase as well as extending these joints during the standing phase. The trials were organized in one-hour sessions, which were performed twice a week for eight weeks. In the trials, gait training with the HAL was performed on a treadmill. *Results:* The gait training was evaluated by comparing the time and step count of the 10 m walk test, before and after the eight-week gait training. The walking speed was higher and the step count was decreased after the eight weeks. *Implications/Impact on Rehabilitation:* The HAL allowed the patient to provide motion support voluntarily, which improved walking ability. This research suggests the HAL may be effective as active rehabilitation devices.

No. 304

DIFFICULTIES IN EVERYDAY TECHNOLOGY USE AFTER BRAIN INJURY: ASSESSMENT USING THE EVERYDAY TECHNOLOGY USE QUESTIONNAIRE (ETUQ)

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Japan

Objective: To reveal difficulties people with brain dysfunction have using Everyday Technology (ET) in their daily life. We also consider how to solve some of these problems through technology. *Method:* The participants were five cases with higher brain dysfunction living at home after brain injury. Neuropsychological testing was conducted using the Wechsler Adult Intelligence Scale - 3rd edition (WAIS-III), the Wechsler Memory Scale - Revised (WMS-R), and the Behavioural

Assessment of Dysexecutive Syndrome (BADS). Everyday life at home was assessed through semi-structured interviews with them and their caregiver. We assessed ET with the Everyday Technology Use Questionnaire (Rosenberg et al, 2009), Japanese version: ETUQ-Kobe. *Results:* They use 29 to 36 items of the 100 items included in the ETUQ-Kobe. The items that they felt difficult using were microwave ovens (using switches, or forgetting to remove items), gas stoves (adjusting the gas-level), air conditioners (switching between heating and cooling modes), etc. We classified the cause of problems in ET use as: prospective memory disorder (such as forgetting to take out laundry from the washing machine), attention disorders (such as forgetting flush a toilet), and executive function disorders (such as don't understand the operational procedure of remote control). We also developed the support system for the problem caused by impaired attention "forgetting flush toilet water". *Implications/Impact on Rehabilitation:* For people with higher brain dysfunction, some ET items are difficulty due to their complex procedures, or due to forgetting, although they can operate that item. Some items can be used if appropriate prompts or stimulation are provided.

No. 305

THE EFFECT OF POSTOPERATIVE SWALLOWING REHABILITATION ON SWALLOWING FUNCTION AND QOL IN PATIENTS WITH HEAD AND NECK CANCER

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Objective: Postoperative swallowing dysfunction is thought to impair quality of life (QOL) in patients with head and neck cancer surgery. However, few studies have thoroughly investigated about the relation among swallowing dysfunction, QOL and swallowing rehabilitation. This study evaluated the effect of postoperative swallowing rehabilitation on postoperative swallowing function and QOL. *Method:* Subjects were 27 patients who underwent surgery for head and neck cancer at the Tohoku University Hospital between 2006 and 2009. Thirteen patients received postoperative swallowing exercises for 2 months were served as REHA group. Fourteen patients who did not receive postoperative swallowing exercises were served as Control group. Assessment of Frenchay Dysarthria Assessment test (FDA), speech intelligibility, swallowing function and The European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire H&N35 (QLQ-H&N35) was conducted at just before the operation I (before the rehabilitation), and 3 months (after the rehabilitation) after surgery. *Results:* In REHA group, FDA score improved significantly as compared with Control group. With regard to the QLQ-H&N35, score for Open mouth, pain, social contact score improved in REHA group. Performing postoperative swallowing exercises produces improvements in post treatment swallowing function in patients with surgery for head and neck cancer. *Implications/Impact on Rehabilitation:* Postoperative rehabilitation, especially postoperative swallowing exercises may be effective in improving swallowing dysfunction and QOL in patients with head and neck cancer surgery.

No. 306

IN-HOME REHABILITATION SUPPORT PHYSICIAN SYSTEM

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Japan

Objective: We have been operated a new system called “In-home Rehabilitation Support Physician System”, because there are only a few community rehabilitation services available in Japan. **Method:** We started this project by cooperation of local administrative agencies (Sumida City, Tokyo, Japan), a community rehabilitation support center and Sumida Medical Association. Support Physicians (SPs) are general practitioners who follow up with patients discharged from convalescent rehabilitation hospitals, who have rehabilitation knowledge as well as perspective and willingness to collaborate with the staffs involved in long-term care insurance services. Of the Sumida City residents who require continuing rehabilitation after being discharged from hospital or long-term care facilities, those who can visit SPs approximately four times a year for evaluations. Tokyo Metropolitan Rehabilitation Hospital, serving as the contact channel, supervises home rehabilitation programs for each patient using this system. **Results:** As of December 2010, 84 (44 male, 40 female) people registered since the end of September 2008, of which 31 are ongoing users. The average age of them in 70.3. and their primary diseases include cerebral infarction (12 patients), cerebral hemorrhage (7), femur fracture (2), and others (10). For 1 year follow-up there were 5 improved, 22 sustained and 4 cases were deteriorated in their lanks of long-term care insurance. SPs scored three items of FIM (Functional Independence Measure) for evaluating ADL. The mean total FIM scores at the start was 104.7 ± 22.3 at the end 105.0 ± 25.0 , respectively. **Implications/Impact on Rehabilitation:** Our results suggests that this SPs System is effective for sustaining ADL of participants who have mild disabilities. Under the condition that the infrastructure of rehabilitation service is not yet fully in community, it is important to concern and manage systems that do not rely on rehabilitation specialists.

No. 307

DETERMINATION OF ITEMS OF FUNCTIONAL SKILL MEASURE AFTER PARALYSIS WITH RASCH ANALYSIS AND NOMINAL GROUP DISCUSSION

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Japan

Objective: The purpose of this study was to determine the items for Functional Skill Measure After Paralysis (FSMAP) developed to examine the functional skills of patients after stroke. The beta-version of FSMAP was devised by authors and its psychometric property was reported elsewhere. **Method:** Subjects: One hundred five patients (58 males and 47 females) with stroke who were admitted to Nanakuri Sanatorium, Fujita Health University. The mean age was 64.6 (SD: 12.6). All the subjects admitted within four months after the onset of stroke. **Methods:** Subjects' functional skills were examined with beta-version of FSMAP at the discharge. Beta-version of FSMAP included 15 domains and each domain had three to five items. The total number of items in Beta-version of FSMAP was 65. The results were analyzed with Rasch analysis. The predetermined criterion for misfit was that the either outfit mean square or infit mean square were over 1.5. Item difficulty order was also determined and scaled score that was distributed 0 to 100 was calculated with logit of each item. In addition to the Rasch analysis, we performed Nominal Group Discussion (NGD) in order to select items from the view point of clinical use for final version of FSMAP. **Results:** Eight items were judged as misfit by Rasch Analysis and those were included in 7 domains such as Folding Paper, Hands-washing, Holding Paper, Donning/Doffing Garments, Donning/Doffing Pants Bathing Face and Fastener. It was also suggested with NGD that seven items should be eliminated. Finally, there remains 50 items for final version of FSMAP. **Implications/Impact on Rehabilitation:** We thought that final version of FSMAP would be used in clinical situation with ample validity and utility. With this measure, we believe that we would be able to detect the change of functional skills on the process of patient's recovery after stroke.

No. 308

RELATIONSHIP BETWEEN GLIDING OF THE FEMORAL NERVE AND THE ROTATION ANGLE OF THE HIP JOINT

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Japan

Objective: We investigated the relevance between gliding of the femoral nerve during knee flexion and the rotation angle of the hip joint in healthy persons. **Method:** The subjects were 15 healthy volunteers (6 female and 9 male, age: 28.3 ± 7.3 years). Exclusion criteria were defined as history of major injuries, surgery and osteoarthritis of lower extremity. We evaluated the passive-range of motion (ROM) using the goniometer; 1) Flexion angle of the knee joint in standing (KF), 2) Flexion angle of the knee joint with trunk and neck flexion in standing (TFKF), 3) Internal / External rotation angle of the hip joint in prone. The test of 2) is the tension test of femoral nerve that David devised in 1987. Pearson's correlation coefficient was used to assess relationship between “KF-TFKF” value and rotation angle of the hip joint. Before participating, the subjects were informed of possible risks and signed a consent form approved. **Results:** The mean of TFKF value showed a low value in comparison with the mean of KF value ($p < 0.05$, paired *t*-test). Internal rotation angle ($r = -0.42$, $y = -1.2x + 56.7$, $p < 0.05$) and External rotation angle ($r = -0.21$, $y = -0.4x + 53.0$) related to “KF-TFKF” value. **Implications/Impact on Rehabilitation:** To decline in gliding of femoral nerve could be related to the rotation angle of the hip joint. It may be important for patients declined in gliding of femoral nerve to perform ROM exercise of the hip rotation.

No. 309

THE KINETICS OF INSULIN SRETION AND INSULIN RESISTANCE OF THE SUBJECTS JUDGED AS NORMAL PATTERN OF OGTT, IN TERMS OF PREVENTIVE REHABILITATION

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Objective: We found several cases at the medical checkup, whose patterns of OGTT were normal but whose insulin sretion and/or insulin resistance were already abnormal. We examined their insulin kinetics in terms of preventive rehabilitation. **Method:** We examined FPG for the 15,160 subjects from April 2006 to March 2009. OGTT was performed for the 186 subjects of the impaired hyperglycemic subjects (FPG was between 110 mg/dl and 125 mg/dl), Thirty two subjects was judged normal pattern of OGTT, we examined retrospectively for these 32 subjects. **Results:** The mean level of I.I. (Insulinogenic Index) = $\delta R1/\delta PG$ was 0.79 (0.16–41.80) except maximum and minimum two cases. The ratio of I.I. < 0.4 was 28.1% (9/32). The times of the peak concentration of blood insulin after glucose loading were as follows : 30 min in 14 subjects, 60 min in 9, 90 min in 4, 120 min in 5. The peak concentration of the insulin was 11.9 mIU/ml to 106.0 mIU/ml. The mean level of HOMA-R was 0.93 (0.14–2.42), HOMA-R not less than 2.5 was not recognized. **Implications/Impact on Rehabilitation:** Even in the subjects with normal state of OGTT, we recognized that the 1st phases of insulin sretion decreased, and the time of the peaks of insulin sretion delayed, and there are possibilities of latent deterioration of pathological diabetic change. Even in this state, the proper evaluation and the proper management of diabetes mellitus which is one of the main source of atherosclerotic disease for example the stroke, the myocardial infarction, the ASO and so on, is very important in terms of preventive rehabilitation.

No. 310

EVALUATION OF THE LATENT RISKS IN CARDIOVASCULAR SYSTEM IN THE PATIENTS WITH LOW RESPIRATORY FUNCTION (THE 3RD REPORT)**Hiroko Miyazaki, MD***Department of Rehabilitation, Kyotokatsura Hospital, Japan*

Objective: We reported the latent risks in cardiovascular system in the patients with low respiratory function at 4th and 5th ISPRM. In this 3rd report, we tried to detect the relationship between the ischemic disorder with the grade of respiratory function in the patients who executed the CAG examinations having somewhat ischemic disorders which detected by exercise loading test. **Method:** During 57 months, among 308 patients with 789 exercise loading test, 19 patients with 20 exercise loading tests executed the CAG examinations. COPD was most numbers, IPF, DBP, after thoracoplasty, etc. The loading test was performed monitoring ECG, blood pressure, pulse rate, SpO₂ and the Modified Borg's Scale, under the supervision by the doctor of the rehabilitation medicine, and we determined the appropriate exercise intensity for the pulmonary kinesitherapy. **Results:** 11 patients with 11 exercise loading tests had the ischemic disorders should be treated by PCI and 1 patient with 1 exercise loading test should be treated by CABG, whose average %FEV1.0 was 65.58%. 8 subjects with 8 exercise loading tests had no or slight ischemic disorders should not be treated by PCI or CABG, whose average %FEV1.0 was 41.30%. **Implications/Impact on Rehabilitation:** We could not detect the relationship between the ischemic disorder with the grade of respiratory function. The existence and the severity of cardiac ischemia is depending on the several elements for example smoking habit, lack of exercise, hypertension, diabetes mellitus, obesity or lipid-disorder and so on, it's risky to speculate the ischemic disorder only from the grade of respiratory function, we think. When we will practice the pulmonary rehabilitation, we anytime should pay attention to the latent risks in cardiovascular system, even if it is the slight decline of the function of the respiratory system.

No. 311

THE PERIOPERATIVE OCCUPATIONAL THERAPY FOR OPEN SURGERY FOR BREAST CANCER**Hiroko Miyazaki, MD***Kyoto-Katsura Hospital, Department of Rehabilitation, Japan*

Objective: We saw several patients whose upper limb became edematous or whose shoulder joint became frozen by the operation for breast cancer. Then we began the perioperative occupational therapy for all the operative patients for breast cancer, since September 2005. **Method:** The day before the operation, we orient to the patients and execute the preoperative evaluations. The day after the operation we start ROM exercises for their shoulder joint until 90 degree by flexion, but for the group who executed chemotherapies before the operation, whose tumor was huge & massive, who had been treating by anticoagulant, we used to start two days after the operation, against there risks of bleeding. If they can not achieve their rehabilitation-goal until their discharge, we continue their occupational therapies for outpatients. We hold the conference for the patients once a month by mammary surgeon, rehabilitation medicine doctor, occupational therapist, nurse, clinical psychotherapist, pharmacist, nutritionist, and so on. **Results:** The bleeding, the acute postoperative complication for breast cancer and the frozen shoulder joint, the chronic postoperative complication were not recognized, after the occupational therapy. 4 patients with edematous upper limbs, the chronic postoperative complication were recognized but they soon healed by the occupational therapy again. **Implications/Impact on Rehabilitation:** We estimate that the perioperative occupational therapy for open surgery for breast cancer effectively reduce the postoperative complications, and the method that many people with many kinds of medical occupations concern the mammary patients is effective to reduce the female proper anxiety or sadness.

No. 312

CARDIOVASCULAR RESPONSES ASSOCIATED WITH THE TRANSFER OF DOMINANT TRAINING – THE INFLUENCE OF PSYCHOLOGICAL CHARACTERISTICS**Masahiro Kohzuki, MD, PhD¹; Kazuaki Iokawa^{1,2}; Masahiro Kohzuki¹; Masanori Munakata³; Tomomi Hattori³; Shyuko Saiki²; Toshimasa Sone²; Osamu Ito¹***¹Department of Internal Medicine and Rehabilitation Science, Tohoku University Graduate School of Medicine, ²Department of Rehabilitation, Faculty of Health Science, Tohoku Fukushi University, ³Preventive Medical Center, Tohoku Rosai Hospital, Sendai, Japan*

Objective: In occupational therapy, the transfer of dominant training (TDT) has been often conducted for the dominant disorder in stroke patients. This training is considered to augment the cardiovascular responses because of stressful task. It is not fully understood, however, how TDT could affect the cardiovascular measures. The aim of this study was to examine the cardiovascular responses during the TDT in normal volunteers, and further to study if the psychological characteristics could influence the cardiovascular responses during TDT. **Method:** Blood pressures (BP) and heart rate (HR) were continuously monitored during 5 to 10-min resting period, 5-min TDT and 1-min cold pressor test (CPT) in 34 healthy volunteers (21.3 ± 2.1 years, 16 men). All subjects received the self-reported questionnaire, such as The center for Epidemiologic Studies Depression Scale (CES-D), The State Trait Anxiety Inventory (STAI), The State-Trait Anger Expression Inventory (STAXI), The 20-item Toronto Alexithymia Scale (TAS20) beforehand. **Results:** Blood pressures were significantly increased during both stress tests compared to rest ($p < 0.01$). The HR remained unchanged during TDT but was significantly lowered during CPT ($p < 0.01$). Both systolic and diastolic BP responses during TDT significantly correlated with TAS 20 scores ($p < 0.05$ and $p < 0.01$). Moreover, the diastolic BP response during TDT correlated with CES-D scores ($p < 0.05$). There were no correlations between cardiovascular responses during CPT and any psychological scores. **Implications/Impact on Rehabilitation:** These data suggest that 1) TDT significantly raises blood pressure without increasing heart rate and 2) the BP response during TDT is influenced by psychological characteristics such as depression or alexithymia.

No. 313

HEALTH-RELATED QUALITY OF LIFE, ANXIETY AND DEPRESSION STATUS FOR RECTAL CANCER WITH OR WITHOUT A STOMA**Hitomi Kataoka¹; Masahiro Kohzuki², Chang-Wan Han³; Takashi Tsuchiya⁴; Iwao Sasaki⁴***¹Sendai City Medical Center Sendai Open Hospital, ²Department of Internal Medicine and Rehabilitation Science, Tohoku University Graduate School of Medicine, Japan, ³School of Health and Welfare, Woosong University, Deajoen, Korea, and ⁴Division of GI & Colorectal Surgery, Tohoku University Graduate School of Medicine, Japan*

Objective: While having a stoma may affect the patient's QOL, however, some resent studies found even better QOL in patients with a stoma. The purpose of this study was to assess differences in the health-related QOL (HRQOL), anxiety and depression status between stoma patients and non-stoma patients for treated rectal cancer, and determine how HRQOL, anxiety, and depression status in each patients change over time. **Method:** In this prospective study, 22 patients with rectal cancer from October 2003 to September 2005 were evaluated. The HRQOL questionnaire (SF-36), the State-Trait Anxiety Inventory (STAI) and the Self-Rating Questionnaires for Depression (SRQ-D) were administered to the patients before surgery, before discharge, 3 and 6 months after surgery. **Results:** The

scores of SF-36 before surgery in stoma patients were worse than non-stoma patients, however, some improvement was observed until 6 months after surgery. Stoma patients had significant higher scores of STAI-II than non-stoma patients before surgery. Both stoma patients and non-stoma patients were representing depression throughout the study period. In non-stoma patients, some scales of SF-36 dropped at discharge and never improved until 6 months after surgery. *Implications/Impact on Rehabilitation:* In conclusion, 6 months after operation for rectal cancer, HRQOL, anxiety and depression of stoma patients and non-stoma patients was changed over time. Some scales of SF-36 dropped before discharge and never improved until 6 months after surgery. We suggest that interventions before surgery are required to help understand their stoma, and it may also suggest that the assessment of regular support for non-stoma patients improve their QOL more rapidly.

No. 314

BIOLOGIC DISEASE MODIFYING ANTI-RHEUMATIC DRUGS AND THE EFFECTS OF REHABILITATION FOR PATIENTS WITH RHEUMATOID ARTHRITIS

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Objective: To clarify the effects of biologic disease modifying anti-rheumatic drugs (biologic DMARDs) and rehabilitation for patient with rheumatoid arthritis, we investigated disease activity, grip strength, upper limb disorder and Activities of Daily Living (ADL) classifying each of 30 patients who did not use biologic DMARDs and 28 patients who used biologic DMARDs into two groups of not having rehabilitative intervention and having rehabilitative intervention, respectively. *Method:* The measurements were done before and one, three and six months after the intervention. The rehabilitation was set as “intensive training” having dual tracks of individual training that was performed five times in two weeks and self training, and “home training” to be performed at home after the program. *Results:* Regardless of whether the biologic DMARDs was used, disease activity and upper limb disorder were significantly improved by the intervention with rehabilitation after one, three and six months. Also, improvement of grip strength for the group that used biologic DMARDs was maintained in a similar manner one month after the rehabilitation. On the other hand, no items were improved for the group that did not use biologic DMARDs and rehabilitation. *Implications/Impact on Rehabilitation:* The intervention of rehabilitation for the patients of rheumatoid arthritis was effective and its effectiveness seemed to contribute to better improvement when it was combined with use of biologic DMARDs.

No. 315

EFFECTS OF EXERCISE TRAINING ON THE EXPRESSION OF ANGIOTENSIN-CONVERTING ENZYME IN THE KIDNEY OF SPONTANEOUSLY HYPERTENSIVE RATS

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Objective: Exercise training (Ex) has anti-hypertensive and renoprotective effects. Angiotensin-converting enzyme (ACE) and ACE2 are involved in each of generation and degradation of angiotensin II. In this study, we investigated the effects of the Ex on ACE and

ACE2 protein expression and blood pressure in spontaneously hypertensive rats (SHR). *Method:* Five-week-old male normotensive Wistar-Kyoto rats (WKY) and SHR were randomly assigned either to a control group (con-WKY and con-SHR) or exercise group (ex-WKY and ex-SHR). Exercise groups were subjected to moderate-intensity exercise on a motor-driven treadmill continuously for a period of 8 weeks (6 days per week; 60 min per day at 20 m/min, 0% grade). Systolic blood pressure (SBP) was monitored by the tail-cuff method. After 8 weeks, the kidney was hemixed and stoned into the cortex and the others. The expression of ACE and ACE2 proteins in the renal cortex was examined by Western blot. *Results:* The SBP was significantly lower in the ex-SHR than in the con-SHR (212.8 ± 2.1 versus 223.8 ± 3.0 mmHg, $p < 0.05$). Meanwhile, the SBP was not different between the con-WKY and the ex-WKY (154.7 ± 3.1 versus 155.3 ± 2.6 mmHg). The ACE expression tended to increase in the con-SHR compared with the con-WKY, however, the difference is not significant. The ACE2 expression was significantly higher in the con-SHR than in the con-WKY ($p = 0.0002$). The Ex did not significantly change ACE and ACE2 expression in the con-WKY and con-SHR. However, there were increasing tendency of ACE (136%) and decreasing tendency of ACE2 (66%) in the ex-SHR compared with the con-SHR. *Implications/Impact on Rehabilitation:* The Ex lowers blood pressure without changing the renal expression of ACE and ACE2 in SHR.

No. 316

EFFECT OF MIST DIAMETER OF STEAM ON THE HEATING EFFICIENCY OF WHOLE BODY THERMAL THERAPY THROUGH RESPIRATORY TRACT

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Japan

Objective: It has been reported that repetitive low temperature sauna bathing improve endothelial function with cardiovascular diseases such as severe heart failure, arteriosclerosis obliterans and so on. Although whole body thermal therapy has many therapeutic meaning, there are some restrictions to use sauna and bath tub as a device for general body heating practically, especially in case that the subjects have some physical disabilities. We have already reported about the effects of steam inhalation using commercial vaporizer on the deep body temperature. The aim of this study is to analyze the effect of mist diameter of steam on the heating efficiency of heat inhalation for whole body thermal therapy. *Method:* Seven healthy male subjects were inhaled steam at 43–44°C for 20 min using the prototype heat inhaling device we built. Mist diameter were controlled mechanically between 0.64 to 8.75 μm (mean: 2.09 μm). Subjects were covered with cloth material to prevent heat loss from the body surface. Esophageal and tympanic temperatures were measured as the deep body temperature. Blood pressure and heart rate were measured by the automated sphygmomanometer. Local sweat production was observed in sternal, back and lumbar portion by measuring the difference of absorbed sweat of the paper. *Results:* Both of the esophageal and tympanic temperatures rose up slightly 0.3°C which is smaller difference than former our report. There were no significant change in blood pressure and heart rate. Subjects sweated slightly in all portion. *Implications/Impact on Rehabilitation:* Though the mist diameter of our device was so small to be delivered to the alveolus and so smaller than commercial vaporizer of which the average mist size was 13 μm , the heating efficiency was smaller contrary to expectation. This study shows that the very small mist diameter size has no positive effect on heating deep body temperature.

No. 317

THE NEEDS OF REHABILITATION FOR THE JAPANESE ADOLESCENT FEMALES WITH A TENDENCY FOR EATING DISORDERS

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Objective: We identified the characteristics and quality of life of adolescent females with tendency for eating disorders in order to protect their future health. To describe the development and investigate the psychometric properties of a new instrument to measure the problem for individuals with an eating disorder. **Method:** A questionnaire survey on health status, psychological features, and eating habits was conducted on Japanese 126 female high school students and college students. **Results:** The responses revealed that there were more college students than high school students with the experiments for eating disorders. There were more high school students than college students with a low body weight (BMI < 18.5 kg/m²) or abnormal menses, and psychological characteristics and eating habits of two student groups were similar. The average of body mass index (BMI) was 20.5 kg/m². But they answered that the ideal BMI was 18.6. They hoped to get thinner more. The student of 16% was told to get thinner by the family. Fifty percent of students have wanted to be thinner, and 40% respectively, have attempted to lose weight. They were significantly more likely to perceive their ideal body size as a little smaller body size than their current size. Twenty percent of the student skipped breakfast, and 60% compensated for skipped breakfast by eating between-meal snacks for keep their QOL. The QOL was significantly and independently predicted by subjective bulimic episodes and compensatory behaviors, including food avoidance. A strong negative correlation was observed between self-negation and normal menses. **Implications/Impact on Rehabilitation:** It is necessary to provide dietary education since many of the female students had no eating plan. And rehabilitation is necessary for the adolescent females with a tendency for eating disorders. We have started rehabilitation program of gradual increase of physical activity with 60–90 min of daily cycling and moderate 2 × 60 min walking. These findings suggest that subjective bulimic episodes may be independently associated with impairment in the QOL.

No. 318

STRATEGIES OF THE CENTRAL NERVOUS SYSTEM IN THE UPPER EXTREMITY OF BRAIN DISORDER PATIENT DURING REACHING MOTION

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Japan

Objective: Patient with cerebral arteriovenous malformation (AVM) has poor coordination of upper extremity (UE) movements on the affected side. Numerous moments-of-force (MOF) will involve using the affected UE. Where, MOF are net effects of all agonist and antagonist muscles crossing that joint and in spite of their mechanical units they must be considered to be neurological signals. The purpose of this study was to construct the novel method for the analysis of the role of CNS in patient with AVM during reaching motion. **Method:** The reaching motion of the patient was analyzed three-dimensionally with a motion analysis system and synchronized with two force platform. Segmental interaction of kinetics due to the proximal to distal of UE estimated by an inverse dynamics approach were evaluated by calculating component which induced MOF. **Results:** Hand trajectories and acceleration during reaching motion were clearly different between AVM patient and normal data from a data base of young adult. Especially, forearm contribution to the hand acceleration of AVM patient was smaller than that of normal data. The component of MOF was same order (joint acceleration term-segment CG acceleration term-inertia term) at each joint in normal data. On the other hand, component of MOF was different order at each joint in AVM patient. Especially, contribution of gravitational term of AVM patient was greater than that of normal data. **Implications/Impact on Rehabilitation:** We have successfully

developed the novel method for the analysis of the role of CNS in AVM patient during reaching motion. Segmental interaction and MOF analysis highlights the role of CNS.

No. 319

THE RELATIONSHIP BETWEEN PHARYNGEAL AREA ON VIDEOFLUOROGRAPHY AND THE SEVERITY OF DYSPHAGIA ON THE PATIENTS WITH INFLAMMATORY MYOPATHY

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Japan

Objective: It was reported that about 10–73% in the patients with polymyositis (PM), and dermatomyositis (DM) had dysphagia. The mechanism of dysphagia on the patients with PM and DM was unclear. The purpose of this study was to evaluate the relationship between the severity of dysphagia and contraction of the pharynx on Videofluorography (VF). **Method:** We reviewed VF recordings for each 12 patients with PM and DM who were performed from July 1st, 2009 until December 31st, 2010. The primary outcome measure was the pharyngeal area in the lateral view of VF and the pharyngeal constriction ratio (PCR). In addition, we investigated age, sex, Bathel Index (BI), MMT and blood test (CK, CRP) from medical records. We divided the patients into two groups (aspiration and non aspiration) by using DSS (Dysphagia Severity Scale). **Results:** The aspiration group and non aspiration group were by six people each. There were no significant differences on age and sex between the aspiration and non aspiration groups. Both BI and MMT were associated with the severity of dysphagia ($p < 0.05$). The original pharyngeal area did not differ between two groups, however, the PCR tended to decrease in the aspiration group. **Implications/Impact on Rehabilitation:** We could not find out the reports associated with the relationship of the severity between dysphagia and the severity of inflammatory myopathy. Our findings suggested that both the muscular strength and ADL were related to the severity of dysphagia. We consider that the decreasing of PCR on the patients with inflammatory myopathy was caused by the atrophy and weakness of various pharyngeal muscles.

No. 320

REHABILITATION APPROACH AND ADL CHANGE AMONG RELATIVELY AGED PATIENTS WITH BURN INJURY

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Japan

Objective: Burn injuries result in significant rehabilitation challenges due to the long-term physical complications and psychological issues. The purpose of this study is to investigate the utility of inpatients rehabilitation and its effect on the status of burn injury patients after they are discharge from the hospital. **Method:** We reviewed medical records to examine patient's biography, total body surface area (TBSA), burn index, length of hospital stay (LOS), and changes in the Barthel Index (BI) score during hospitalization. Then we also reviewed patients' course after they were discharged. Twenty-eight patients were admitted to our university hospital between September 2006 and December 2009 and received cure and rehabilitation for their burn injury. **Results:** Eighteen males and 10 females with a mean age of 65.3 years participated in this study. Eleven participants were scalded with hot water when they took baths (a mean TBSA of 37.3%, a mean burn index of 19.3), and thirteen were burned by fire (a mean TBSA of 30.7%, a mean burn index of 19.7). Six of the 28 participants were discharged from the hospital to their home (a mean LOS, 68.3 days), and final BI scores improved markedly from an average of 11.5 before rehabilitation to an average of 87.5 after. Thirteen of them were discharged to nursing home and other

hospitals (a mean LOS, 46.2 days) and they had complications of dementia, cerebrovascular disorder, and depression. Final BI scores of these 13 participants did not improve significantly. Two participants had chemical burn. Five of them died during therapeutic courses. *Implications/Impact on Rehabilitation:* In this report, the subjects were relatively aged. Some of them recovered their physical function. But, more than half of them could not improve their ADL because of their complications. Rehabilitation exercise should be needed to reduce their functional impairment.

No. 321

THE EFFECT OF EXERCISE TRAINING ON PHYSICAL CAPACITY AND QUALITY OF LIFE IN ADULT PATIENTS UNDERGOING HEMATOPOIETIC STEM CELL TRANSPLANTATION

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Objective: During aplasia or severe neutropenia patients are isolated and are not allowed to leave their rooms for several weeks. This usually leads to immobility, which may result in muscle atrophy. Exercise programs targeting patients identified to be at risk of progressive muscle weakness may help reduce morbidity following a hematopoietic stem cell transplantation (HSCT). The purpose of this study was to evaluate the effects of supervised exercise therapy for the patient. Concerns of the study were patient endurance, lung function and quality of life (QOL). *Method:* This study is a prospective, pre- and post-test comparing an intervention group to a control group receiving conventional care. Exercise testing, pulmonary function test and QOL questionnaire, MOS 36-item Short Form Health Survey, was performed before the study period and after HSCT. To measure the endurance performance treadmill exercise test was used. The pulse limit under stress was set to 190 minus the patient's age. The protocol of St. Marianna University School of Medicine treadmill walking test was used. The test was aborted as soon as the pulse limit was exceeded. *Results:* No adverse reactions that could be attributed to the intervention were observed. Interventions were performed once or twice a day. The difference in mean scores for the peak $\dot{V}O_2$ did not reach statistical significance about 40 days after HSCT. *Implications/Impact on Rehabilitation:* The physical fitness before transplantation was difficult to maintain. It was thought that the influence of drug reaction, under nutrition and treatment related symptoms were also considered to have played a part. More comprehensive approach is needed.

No. 322

PREDICTION OF DESTINATIONS AFTER DISCHARGE IN ACUTE STROKE PATIENTS; EVALUATIONS ON THE BED AT THE FIRST DAY OF THERAPEUTIC INTERVENTION

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Japan

Objective: The purpose of this study was to investigate factors influencing destinations after discharge in acute stroke patients using evaluations on the bed at the first day of therapeutic intervention.

Method: Age, sex, types of stroke, Brunnstrom recovery stage (BRS), and three subitems of Stroke Impairment Assessment Set (verticality of trunk, ROM of shoulder abduction and ankle dorsiflexion in paralyzed side) were investigated retrospectively for 115 acute stroke patients at the first day of intervention after onset from each medical record. The subjects were classified into two groups about their destinations; discharge to home directly ($n=48$) (Group 1) and other hospitals ($n=67$) (Group 2). Relationship between their destinations and each factor were analyzed. Statistical analysis was performed using the Mann-Whitney U test for comparisons of each factor between the two groups. The multivariate logistic regression analysis was used to select relevant factors to destinations. A value of $p < 0.05$ was considered statistically significant. *Results:* The rate of patients who were discharged directly to home was statistically higher in male than in female. ROM of ankle dorsiflexion in paralyzed side, BRS, and verticality of trunk were significantly lower in Group 2, respectively. The verticality of trunk (odds ratio: 1.64) and BRS of fingers (odds ratio: 2.83) were shown to be important factors related to destinations. The logistic regression formula was indicated. *Implications/Impact on Rehabilitation:* We suppose that the evaluations on the bed at the first day of therapeutic intervention serve important roles for prediction of destinations after discharge in acute stroke patients. The verticality of trunk and the BRS in fingers were suggested to be important factors for discharge to home directly, and the logistic regression formula may be useful for prediction of destinations.

No. 323

DISABILITY AND DIABETES: THE NATIONAL HEALTH AND NUTRITION SURVEY 2006

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Mexico

Objective: To describe the frequency of permanent and current disabilities in people with type 2 diabetes. *Method:* This study is based on the National Health and Nutrition Survey (ENSANUT2006), a representative survey with multistep, stratified and probabilistic sampling. A total of 2965 (6.5%) subjects who reported having DM were included. Analyses were weighted by using specific expansion factors. The following variables were considered: age, sex, schooling, permanent disability (PD), current disability (CD), comorbidity and diabetes complications. *Results:* 60.47% of individuals were women; 10.53% of subjects reported having some PD, the most frequent being walking (67.63%). Mean age of subjects with and without PD was 66.4 and 54.76 years, respectively ($p < 0.01$). DM duration was 12.66 years in subjects with PD and 7.38 years in those without ($p < 0.01$). 54.17% of individuals with PD and 38.31% of those without had hypertension. The most frequent complication was retinopathy (34.94% in subjects with PD and 10.56% in those without). Walking disability was present in 73.05% of individuals with PD and 23.45% of those without. In a multiple logistic regression analysis, age (RM=1.06, 95% CI 1.05–1.07), comorbidity (RM=1.11, 95% CI 1.02–1.20) and complications (RM=3.88, 95% CI 3.01–5.02) caused by diabetes were significantly associated with PD. In this population, walking was the most common PD and CD; it was associated with comorbidity (chiefly hypertension) and complications due to DM (mainly retinopathy). *Implications/Impact on Rehabilitation:* With the approximate knowledge of the disability caused by diabetes in Mexico, will focus the efforts of the health stor for prevention and treatment by rehabilitation.

No. 324

ADAPTATION STRATEGIES OF TRANSTIBIAL AND TRANSFEMORAL AMPUTEES IN NORMAL LEVEL WALKING – A SYSTEMATIC REVIEW

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Objective: Provision of an overview of the adaptation strategies in the intact and amputated leg of people with a transtibial (TTA) or transfemoral (TFA) amputation. **Method:** The following databases were searched: Medline, Embase, Cinahl, PEDro, and Cochrane register of controlled trials. Studies were selected when a comparison between 1) intact and amputated leg, 2) intact and a normal leg, or 3) amputated and a normal leg was made. Outcome measures should include joint power or joint work obtained during normal level walking. Eligibility of identified studies was independently assessed by two reviewers. Methodological quality was assessed using the Downs and Black instrument. Data extraction was performed using an adapted version of the standardized form of the Cochrane Collaboration. When results of multiple studies could be pooled, heterogeneity was statistically tested. In case of heterogeneity, random effect models were used instead of fixed effect models. When data could not be pooled, results of individual studies are presented. **Results:** A total of 13 studies were identified based on the applied inclusion criteria. Trials studied TTA ($n=1$), TFA ($n=1$), and both TTA and TFA ($n=1$). Results of studies of TTA showed a reduced work performance of the amputated leg. The intact leg seems to compensate this reduction by increasing work performance of the knee. In addition, major adaptations were seen on hip level. The hip extensors of the amputated and intact leg show increased work performance during the early stance phase. Peak power values of the hip show similar results. Results of studies of TFA show similar trends on hip level when compared with the TTA trials. In addition increased work of the ankle plantar flexors of the intact leg was seen. **Implications/Impact on Rehabilitation:** This systematic review showed that the amputated and intact leg are asymmetrical in function. TTA and TFA show remarkable similar adaptation strategies. The majority of these adaptation strategies can be attributed to the loss of ankle plantar flexors of the amputated leg. Striving towards gait symmetry seems inappropriate in people with a transtibial or transfemoral amputation. In addition, muscle groups are described that seem to overcompensate for the loss of ankle plantar flexors of the amputated leg. Rehabilitation programs could emphasize on these muscle groups, thereby enabling maximal adaptability.

No. 325

WORK REQUIREMENTS RELATED TO OVERLOAD INJURIES COMPARED BETWEEN POWER ASSISTED AND MANUAL WHEELCHAIR PROPULSION

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Objective: Upper extremity complaints among wheelchair users are a common problem. Work requirements of manual wheelchair propulsion linked to shoulder injuries are (high) repetitive forces and moments at the shoulder, extremes of motion during propulsion and muscular imbalance. To reduce work requirements and risk of overload injuries, it is recommended to use a light wheelchair, avoid weight gain, adjust the wheelchair ergonomically, and optimize the propulsion technique. Also the use of a power assisted wheelchair is useful to decrease the workload. However, no previous research is published about the influence of power assisted propulsion on forces at moments acting on the shoulder. Therefore, we investigate the influence of power assisted propulsion on shoulder kinematics, kinetics, and muscle activation patterns. **Method:** Nine healthy volunteers propelled an instrumented wheelchair (six degrees of freedom force and torque sensor) on a treadmill at 0.9 m/s. The first trial was without power assist, followed by a trial with power assist. Both conditions were repeated twice. **Results:** During power assisted propulsion compared to manual wheelchair propulsion: 1) the peak force applied to the pushrim was significant lower with significant less internal rotation at the shoulder during the peak force; 2) the flexion, adduction and internal rotation moments at the shoulder decreased significantly; 3) the posterior, superior and lateral directed forces on the shoulder decreased significantly; 4)

the RMS decreased significantly for the anterior and posterior deltoid, pectoralis major, biceps and triceps. **Implications/Impact on Rehabilitation:** Theoretically, a power assisted wheelchair can intervene on risk factors of shoulder injury. Because, shoulder load and muscular demand tended to decrease, however, kinematic load seemed less influenced. Longitudinal research with follow-up measurement is necessary to investigate the long term effects of a PAPA on shoulder injuries.

No. 326

WHY COMMUNITY REINTEGRATION OF DISABLED LARGELY FAILS IN PAKISTAN? REASONS AND REMEDIES

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Objective: Objectives were to explore and identify the factors and barriers in the optimal community reintegration of persons with disability (PWDs) in Pakistan and to suggest a plan for optimal community re-integration. **Method:** This presentation is based on our 5-year experience of managing major and minor disabilities at the largest Rehabilitation institute in Pakistan. For this presentation only the major disabilities like SCI, Stroke, TBI and amputations were considered. Informal in depth interviews were conducted with PWDs living in the community for more than one year and their attendants/ care givers presenting at our institute. Their attitudes and perceptions towards their disability were explored, response of their families was noted and social and mobility barriers were identified. An electronic literature search (English, 1965-2010, Key words: Persons with Disability, rehabilitation, disability, Pakistan, spinal cord injury, amputation, community reintegration) was carried out. **Results:** The following factors were identified: 1) Patient related factors and issues; Poor motivation for independent living; Unrealistic expectations; Low educational status; Non availability of role models; Lack of peer support groups. 2) Inadequacies on the part of Health care professionals; Poor/ No counselling; Poor understanding of disability; Lack of motivation towards disability management. 3) Social, Societal and Cultural issues; Barriers to mobility; Barriers to socialization; Financial constraints; Lack of vocational and avocational opportunities; Stigmatization of disability; Social rejection by community. 4) Government and legislative issues; Improper implementation of disability related laws; Underdeveloped infrastructure for community-based rehabilitation. **Implications/Impact on Rehabilitation:** PRM focuses on disability management and optimal community reintegration of PWD. PRM is underdeveloped in Pakistan and this is the first attempt to identify the factors and barriers hindering the community reintegration of Pakistani PWDs. It is the most comprehensive and pioneer study on this topic and the model suggested can be copied in other developing countries of the world too.

No. 327

ROLE OF PHYSIATRISTS IN POST DISASTER SCENARIOS – LESSONS LEARNT FROM PAKISTAN, CHINA AND HAITI EARTHQUAKES

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Objective: To present an overview of the Rehabilitation strategies employed by physiatrists in the Pakistan, China and Haiti earthquake and the positive impact of these interventions in improving the outcomes in disabled survivors. **Method:** Authors had firsthand experience in the acute and emergent care and rehabilitation of trauma patients after Pakistan, China and Haiti earthquakes. An electronic literature search (English, 1965–2010, Key words: trauma, rehabilitation, disability, spinal cord injury, amputation, disaster, earthquake, physiatry, physical medicine and rehabilitation, nerve injury) was carried out. Experience sharing through committees, online forum, and communications were conducted with physiatry colleagues internationally. **Results:** In these three recent earthquakes, Physiatrists provided direct patient care, including guidance in the evacuation of survivors with pre-existing disabilities, transport of persons with spinal trauma, treatment of wounds, fractures, pain, spinal trauma patients and persons with amputations. Physiatrists devised appropriate plans for conservative management of fractures. Education of local staff and coordination of rehabilitation was initiated. Monitoring, prevention and treatment of sary complications including prolonged immobility, pressure ulcers, chronic pain, urinary, bowel and respiratory dysfunction was performed. Physiatrists helped in patient counseling and family education, and have played a critical role in identifying the longer term needs for patients newly disabled, to assist in health planning. **Implications/Impact on Rehabilitation:** PMR has an important role to play in the acute care and emergent rehabilitation phases following disasters. Physiatrists by virtue of their training and skills are in a better position to manage the disabilities, including direction of rehabilitation and community integration, prevention of complications, and education and training of health workers and teams. Timely rehabilitation interventions for newly injured, including Spinal cord injuries and lower limb amputations following the Pakistan, China and Haiti earthquakes resulted in reduction in morbidity and mortality among those with catastrophic injuries, and have increased the local capacity of communities to continue to provide ongoing rehabilitation services.

No. 328

THE EFFECTIVENESS OF A MULTIDISCIPLINARY REHABILITATION PROGRAM IN THE MANAGEMENT OF FIBROMYALGIA

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Peru

Objective: Fibromyalgia is considered one of the musculoskeletal disorders of higher psycho-social impact in our population. It causes widespread pain and is increasingly becoming a cause of disability and poor quality of life. Its management should be multidisciplinary. The aim of this study is to assess the effectiveness of a multidisciplinary rehabilitation program in the management of disability and quality of life in patients with fibromyalgia. **Method:** This prospective study was divided into two stages. The first stage included 48 patients diagnosed with fibromyalgia, from whom a clinical epidemiological profile was established by means of a baseline assessment of disability and quality of life, based on the FIQ (Fibromyalgia Impact Questionnaire), SF-36 questionnaire and the number of tender points (ACR). The second stage involved the monitoring of 26 patients after participating in a multidisciplinary rehabilitation program consisting of physical exercise, education and psychological support. **Results:** The symptoms most commonly associated with fibromyalgia were paresthesia in the hands (87.5%), sleep disorders (72.9%), and sensation of joint inflammation (70.8%). The average number of tender points far exceeded the criterion of 11 points and no patient was below this level. The impact on patients' usual functionality was moderate (58.4 in FIQ), and the SF-36 showed a low level of perceived quality of life (36.7). Both, the FIQ and the SF-36 were not associated with educational level, employment status, or marital status. After the multidisciplinary rehabilitation program, there was a reduction in the number of tender points ($p < 0.05$), in the FIQ score ($p < 0.01$), as well as an increase in the SF-36 score ($p < 0.01$). **Implications/Impact on**

Rehabilitation: It was shown that a multidisciplinary rehabilitation program is effective in the management of pain and disability, and improves quality of life in patients with fibromyalgia.

No. 329

HETEROTOPIC OSSIFICATIONS – A SINGULAR CASE REPORT

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Objective: Heterotopic ossifications (HO) are bony formations in non-skeletal tissue. Risk factors include post-surgery, clinical situations with spasticity, spinal cord injury, and cervical and/or thoracic trauma. The treatment tries to impede the progression and optimize the function of the affected segment. With this work the authors want to review the literature on the state of the art about the management of HO and the advances in the Rehabilitation of the patients that exhibit HO, by presenting a case report. **Method:** Research of the articles and international guidelines published in PubMed between 2000 and 2010 with the MeSH terms: myositis ossificans, heterotopic ossifications and physical therapy modalities. The authors found 8 papers that gathered the characteristics and information desired. The authors also analysed the clinical report of the patient reported in this work. **Results:** Case report of a male, 54-year-old, traffic accident in 23/8/2010 with TBI and severe toraco-abdominal trauma. Physical examination in 8/11/2010: severe pain on the mobilization of the left shoulder. Right knee: 30° flexion, -20° extension. Walking only possible with the help of a third person. The exams revealed 2 large and metabolically active HO, one on the left shoulder and the other on the right knee. Under physiatrist's responsibility, he started rehabilitation management and medication with oral corticoid, acetaminophen, NSAID and bisphosphonate. After the treatment the patient is independent in the ADL and walking, with mild pain and limitation of the movements of the left shoulder. **Implications/Impact on Rehabilitation:** In this work the authors present a patient with politrauma and 2 large HO that caused him pain and limitation on ADL and walking. The evolution, with a rehabilitation program, was positive with improvement of the pain and the functional limitations. This work tries to sum what every physiatrist should know for the correct management of patients with HO.

No. 330

THE FUNCTIONAL INDEPENDENCE MEASURE IN THE EVALUATION OF WILSON'S DISEASE PATIENTS

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Objective: Wilson's disease (WD) is a rare genetically autosomal recessive inherited disorder of copper metabolism that affects multiple systems. All patients require lifelong decoppering, demanding close clinical monitoring. Objective and quantitative measurement of severity of the disease is essential to test and compare different treatment regimens. Several clinical evaluation scales have been used in WD patients. Since these patients are spread across various specialties, most of validated scales like Unified Wilson's Disease Rating Scale (UWDRS) are difficult to be applied by non-neurologists, unlike Functional Independence Measure (FIM) scale, which can be easily administered by any health care professional. The purpose of this study was to test the sensitivity of the FIM scale to functional changes in patients with DW. **Method:** We prospectively evaluated 34 (16 male and 18 female) WD patients, with a mean age of 34.8 ± 14.4

(range 17–78) years and a mean disease duration of 10.48 ± 7.6 (range 1–29) years. The pattern of dependence was assessed by the FIM scale and the spectrum of clinical symptoms was evaluated by a clinical rating scale, UWDRS, aiming to validate the FIM scale. **Results:** Nineteen out of 34 WD patients present some kind of neurological symptoms, being dysarthria, dystonia and parkinsonism the most frequent. Twenty out of 34 WD patients were fully independent. Only 2 patients needed maximal assistance. Significant correlations were found between total FIM and total UWDRS ($r = -0.82, p \leq 0.01$), as well as between FIM's self-care items and UWDRS's items report by the patient or family ($r = -0.64, p < 0.01$) and also between FIM's score comprising sphincters, mobility, communication, psychosocial and cognition and UWDRS's neurological and behavioral items ($r = -0.76, p < 0.01$). **Implications/Impact on Rehabilitation:** FIM scale proved to be sensitive, constituting therefore an easy and accurate mean of functional status' evaluation in WD patients.

No. 331

SPHINCTERS' CONTINENCE DURING AND AFTER ADMISSION TO A REHABILITATION CENTRE

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Portugal

Objective: To analyze the urinary and fecal continence/incontinence of patients after discharge from a Rehabilitation Centre. **Method:** Data collected from clinical records of 274 inpatients admitted during 2008 and 2009. In December 2010 the authors tried to contact the patients/caregivers by telephone, to apply an original questionnaire. Four attempts were made before considering the patients "unreachable". 91 patients/caregivers contacted; 84 responded. Data were analyzed with SPSS. **Results:** Sample: 84 patients, 75% male, mean age 51.79 ± 16.84 years, contacted 22.47 ± 7.27 months after discharge. Major functional limitation groups: spinal cord injury (41.7%) and stroke (32.1%). The caregiver responded to 57.1% of the questionnaires. At discharge, 86.6% had no urine leakage. At the time of the survey, the number of urinary incontinent patients was statistically higher ($p = 0.008$). At discharge, 10.7% of the patients used indwelling catheters, increasing to 11.9% after discharge; 14.3% used intermittent self-catheterization, dropping to 11.9% after discharge. At discharge, 82.2% of patients had complete fecal continence; this number increased to 88.0% after discharge, without statistical significance. Medium Vaizey score was low (2.0 ± 3.0). Patients on bowel training significantly decreased. FIM G decreased after discharge and FIM H increased. Cognitive FIM score was similar and the motor score worsened, but without statistical significance. FIM's cognitive score post-discharge was correlated with fecal losses ($p = 0.030$). FIM's motor score post-discharge was highly correlated with fecal ($p = 0.001$) and urinary losses ($p = 0.000$). **Implications/Impact on Rehabilitation:** Most patients were continent at discharge. Patients with urinary incontinence significantly increased; patients performing bowel regimen significantly decreased. Patients' motor skills are closely related to sphincters' continence. Cognitive abilities are related mainly with fecal continence. It is quite important to achieve sphincters' continence during inpatient rehabilitation, which will depend on the functional level (among others), as well as periodic monitoring to avoid losing gains.

No. 332

IN-PATIENT REHABILITATION OUTCOME OF A WOMAN WITH ANTI-NMDA RECEPTOR ENCEPHALITIS: A CASE REPORT

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Puerto Rico

Objective: To describe the case of a 36-year-old female diagnosed with anti-NMDA receptor encephalitis with a superimposed critical-illness polyneuropathy. The coexistence of these conditions is rarely seen in an inpatient rehabilitation setting and has not been previously reported in the literature. **Method:** Patient information was taken from the patient's chart at the inpatient rehabilitation unit after informed consent was taken. After the patient was diagnosed with anti-NMDA receptor encephalitis she spent 2 months in an acute care hospital and was then transferred to a Health South inpatient rehabilitation unit in San Juan, Puerto Rico. She received a multidisciplinary rehabilitation program, which included physical, occupational, and speech therapy, as well as psychologic and psychiatric evaluations during one month. Also, an electrodiagnostic study was performed during her hospitalization revealing a critical illness polyneuropathy, which was superimposed to her primary diagnosis. **Results:** Upon admission to the rehabilitation facility, the patient was dependent in most functional activities with impaired arousal, attention, and cognition. She also had severe dysphagia, generalized weakness and pain. The patient showed significant improvement in all rehabilitation areas and an excellent response to a multidisciplinary rehabilitation setting after one month. At the time of discharge the patient had an improvement in FIM scores. She was moderate to supervised assistance in most functional activities, with significant improvement in dysphagia pain, range of motion, strength, and was independent in all cognitive skills including communication, comprehension, expression, intelligibility, problem solving, memory and attention. **Implications/Impact on Rehabilitation:** A multidisciplinary rehabilitation program in an inpatient rehabilitation setting makes an appropriate level of care for patients diagnosed with this rare condition and can help improve their recovery and function.

No. 333

DELAYED REHABILITATION AFTER MEGAPROSTHESIS PLACEMENT

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Puerto Rico

Objective: Discussion of megaprosthesis use, advantages and disadvantages. To establish an effective rehabilitation plan for a patient after megaprosthesis placement. To establish the importance of hip stabilizers in the delayed phase of rehabilitation after megaprosthesis placement. **Method:** Case Review. A 59-year-old male patient with past medical history of hypertension, hypercholesterolemia, diabetes mellitus, left frontotemporal hemorrhagic contusion, post-traumatic parkinsonism who was on his usual state of health consisting of free ambulation and independent ADLs until he had a near fall incident tripping then he suddenly heard a "crack". ER evaluation revealed pathological fracture of right femoral fracture with underlying cortical soft tissue component. MRI showed pathologic fracture with circumferential soft tissue encasement with subsequent open biopsy showing myxoid chondrosarcoma. Hip disarticulation was recommended by the tumor board but patient obtained a s opinion recommending megaprosthesis placement with incision over tensor faciae and gluteus fasciae. Hip proximal femoral replacement with hemiarthroplasty was performed. Trochanteric slide was performed such that the abductors and the vastus lateralis remained attached remained attached to the greater trochanter. On post operative day 1 rehabilitation program was started as an inpatient where patient was discharged independent to modified for ADL's, safe care and ambulation. Patient subsequently has a fall event causing periprosthetic fracture requiring hip revision surgery. Outpatient rehabilitation program was started in view of patient's preference. On subsequent examination gait revealed lateral trunk shift towards right, which was noted to be a compensation mechanism for his weakened hip abductors since no leg length discrepancy was found. **Results:** Improved ambulation capacity with resolution of apparent leg length discrepancy after delayed rehabilitation phase for strengthening of hip stabilizers. Emphasis was made on gluteus medius, gluteus minimus which generate a force vector that keeps the femoral head well within the acetabulum correcting the Trendelenburg

displayed by this patient. *Implications/Impact on Rehabilitation:* Increased awareness of the need of focusing on hip stabilizers after megaprosthesis placement to improve hip stability thus influencing ambulation status. Improved knowledge of surgical procedure to the rehabilitation personnel as well as precautions required.

No. 334

HEREDITARY NEUROPATHY PRESSURE PALSY LIABILITY IN A YOUNG COMPETITIVE MALE SWIMMER

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Puerto Rico

Objective: Hereditary neuropathy with liability to pressure palsies (HNPP) is an autosomal-dominant disorder characterized by recurrent episodes of palsies which are usually precipitated by minor trauma or compression. It is now known to be caused in the vast majority of the cases by a 1.5 base microdeletion in the short arm of chromosome 17 (17p11.2). This relatively rare condition prevalence was studied at Finland and found with a prevalence of 16 in every 100,000. It is considered to be under diagnosed as well as misdiagnosed. In this report we describe the case of a young male swimmer whose diagnosis of HNPP was an incidental finding after seeking evaluation for shoulder pain. *Method:* A 17-year-old competitive male swimmer presented for evaluation due to right shoulder pain after training, additionally patient stated recurrent episodes of left hand numbness with an ongoing episode of several weeks of evolution. Patient's physical exam revealed no shoulder pathology but was remarkable for left hand intrinsic muscles weakness and ulnar distribution impaired sensation. Shoulder MRI revealed no pathology, electrodiagnostic studies revealed left ulnar nerve demyelinating neuropathy. DNA testing revealed a microdeletion in chromosome 17. Patient was instructed to avoid activities that reproduced symptoms, such as swimming, with subsequent resolution and no recurrences in a 2-year period. *Results:* DNA testing revealed a chromosome 17p11.2 microdeletion consistent with Hereditary Nerve Pressure Palsy Liability. *Implications/Impact on Rehabilitation:* A high degree of clinical awareness is required for the diagnosis of Hereditary Neuropathy Pressure Palsy Liability. Careful history and examination should raise the suspicion for this condition and lead to further diagnostic testing, being genetic testing the gold standard. The mainstay of treatment involves activities modification since the mechanisms leading to phenotypic manifestation involve minor trauma and compression.

No. 335

BRACHIAL PLEXUS INJURY DURING CARDIAC CATHETERIZATION IN A SCOLIOSIS PATIENT

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Puerto Rico

Objective: Brachial plexus injury (BPI) can be caused by compression, traction or laceration injury. During surgical procedures the incidence of BPI is almost 0.1% mostly sary to malposition of the patient during general anesthesia. Awareness of severe anatomical anomaly as scoliosis may prevent such injuries. *Method:* A 15-year-old female with history of single ventricle status post pulmonary artery bending and severe left cervical levoscoliosis presented with right arm motor deficit with proximal predominance after cardiac catheterization. She was found with impaired sensation to soft touch and pinprick in right forearm and hand. *Results:* Magnetic resonance imaging from brain show no intracranial pathology. Laboratory done did not show evidence of coagulation abnormalities. Electrodiagnostic study were performed two week after initial presentation and revealed subacute brachial plexus lesion affecting the posterior

and medial cord. *Implications/Impact on Rehabilitation:* BPI is one of the most common injuries after surgical procedure. Surgeon and anesthesiologist must be aware of several risk factors such as improper positioning and anatomical anomaly to prevent potential disabilities to the patient.

No. 336

THE EFFECT OF COMBINED THERAPY OF LIGHT EMITTING DIODE AND PROSTAGLANDIN E1 ON WOUND HEALING IN DIABETIC RAT MODEL

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Objective: To investigate the effect of combined therapy of light emitting diode (LED) and prostaglandin E1 (PGE1) on wound healing in diabetic rat model. *Method:* Twenty 9-week-old male Sprague-Dawley rats were used. Diabetes mellitus was induced by intraperitoneal (IP) injection of 50 mg/kg Streptozotocin (Streptozotocin®, Sigma, St. Louis, USA). We made 2 cm-sized circular wound on left buttock using medical scissors in all rats. They were randomly assigned into 4 groups. Group A underwent povidone iodine dressing only. Group B underwent 640 nm LED (Aileen®, Cynics, Gwangju, Korea) irradiation (8 J/cm², 15 min/day, 10 days) after dressing. Group C received IP injection (once a day, 10 days) of 0.16 µg/kg PGE1 (Prostandin®, Dong-A Pharmacy, Seoul, Korea). Group D received combined therapy of LED irradiation and IP injection of PGE1 after dressing for 10 days. We daily checked the size of wounds. Relative wound healing was described in a formula: [(Slope treat – Slope control)/Slope control] × 100. Histopathological study was performed for the evaluation of epithelialization, vascularization, granulation and inflammation reaction. *Results:* There was no significant difference in the relative wound healing among groups ($p=0.96$). On histopathological study, there were significant differences in vascularization score ($p=0.015$) and granulation score ($p=0.009$) among groups. There were no significant differences in epithelialization score ($p>0.05$) and inflammation reaction score ($p>0.05$) among groups. *Implications/Impact on Rehabilitation:* Combined therapy of LED irradiation and PGE1 injection showed more considerable additive effect than monotherapy on wound healing in diabetic rat model. We think that combined therapy would be a helpful strategy for managing the wound.

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No. 337

THE SIGNIFICANCE OF CONTINUOUS OVERNIGHT CO₂ MONITORING TO DETERMINE INITIAL MECHANICAL VENTILATOR APPLICATION IN PATIENTS WITH PULMONARY INSUFFICIENCY

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Objective: CO₂ level is an important parameter to consider in determining the point to start mechanical ventilation. Arterial

blood gas analysis (ABGA) is most widely used to monitor ventilatory status, but it only reflects ventilatory status at puncturing moment and invasive for serial follow-up. We aimed to reveal the significance of continuous CO₂ level monitoring which reflects subtle changes of ventilatory status. *Method:* 162 patients who started home mechanical ventilation from June 2008 to May 2010 at our hospital became candidates of this study. ABGA was done at the 1st hospital day, and the change of CO₂ level was continuously monitored during overnight with transcutaneous blood gas analysis device (Sentec®). Maximal CO₂ level was compared with the result through ABGA. *Results:* Of the 162 patients, 53 (32.7%) presented inconsistent results in CO₂ level between ABGA and continuous overnight monitoring. Mean CO₂ level of the 53 patients in ABGA was 36.61 ± 5.33 mmHg. However, maximum CO₂ level with continuous monitoring device was 51.94 ± 6.59 mmHg. The difference in CO₂ level between ABGA and maximal CO₂ level through transcutaneous monitoring device was 15.34 ± 6.72 ($p < 0.001$). Mean age of the 53 patients was 40.7 ± 21.9 years (37 male and 16 female), and there were 25 patients with myopathy, 23 with motor neuron disease, 3 with cervical spinal cord injury, 1 with Guillain-Barre syndrome, and 1 patient diagnosed with obstructive sleep apnea. *Implications/Impact on Rehabilitation:* In this study, about one third of the patients showed discrepancy in CO₂ level between ABGA and continuous overnight monitoring. Although ABGA only reflects ventilatory status at the puncturing moment, the results are commonly used to monitor ventilatory status in most clinical setting. In order to decide starting point of mechanical ventilation, CO₂ level through continuous overnight monitoring should be considered to find out latent CO₂ retention.

No. 338

A COMPARISON OF COUGH ASSIST TECHNIQUES IN PATIENTS WITH RESPIRATORY MUSCLE WEAKNESS

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Objective: Coughing is indispensable for clearing airway mucus. Neuromuscular disease (NMD) patients presenting respiratory muscle weakness have difficulty expectorating mucus products by coughing, and as a consequence, they are prone to develop respiratory complications. In this study, we aimed to verify the effectiveness of cough assist device by comparing it with manually assisted coughing method. *Method:* NMD patients whose respiratory muscles are too weak to be in need of noninvasive mechanical ventilation became candidates of this study. Unassisted peak cough flow (UPCF) by having the subject cough as forcefully as possible, assisted peak cough flow (APCF) by providing maximal insufflation and manual abdominal thrust, and PCF with cough assist device (Cough assist®) were measured respectively with flow meter (Certifier® FA). *Results:* 32 NMD patients (31 male and 1 female) were recruited, and their mean age was 18.8 ± 7.5 years. Mean UPCF and APCF were 97.2 ± 43.7 l/min, 150.1 ± 52.9 l/min respectively, and mean PCF with cough assist device was measured as 169.7 ± 28.6 l/min which was significantly higher than UPCF and APCF ($p < 0.05$). *Implications/Impact on Rehabilitation:* For NMD patients with respiratory muscle weakness, preservation of coughing ability is an essential element of pulmonary rehabilitation to prevent possible respiratory complications which can lower their mortality ultimately. In this study, cough assist device actually induced a higher peak cough flow than manually assisted coughing method, and therefore can be used as an equally effective alternative for those with reduced voluntary coughing ability.

No. 339

PHYSIOTHERAPY APPROACH TO A FLEXOR CONTRACTURE IN A BURNED HAND AFTER 30 YEARS

Hajrie Hundozi, PhD; Ardiana Murtezani, MD, MS; Lumnije Kamberi, MD

Republic of Kosovo

Objective: This case study describes the importance of postoperative rehabilitation program in case of contracture in the burned hand, several years ago. The purpose of this study is to report the results of kinesitherapy in restoring the functionality of burned hand, which is treated with various therapies and sessions such as: management of cicatrix, the amplitude of relocation in passive and active movements of affected joints, treatment for muscle atrophy, and coordination. *Method:* After the wounds were fully healed; slow massages to newly formed cicatrix and movements in joints MCP, DIP, PIP began (the active movements in joints PIP and DIP were precise and carefully handled considering their long-term non-functionality). The therapy continued with previous exercises as well. Strengthening exercises for eccentric muscles were applied. During the tenth week, the exercises with electrostimulation to motor points of flexor digitorum profundus muscle were applicable. Improving amplitude active movements of joints MCP, PIP, and DIP with thera-band exercises were gradually applied to achieve the muscle strength. During the rehabilitation, the patient is instructed to learn the exercises and to perform them at home. *Results:* Improvements were noted in the amplitude of passive and active movements, and muscle strength. The assessment was performed according to Modified Strickland's classification, where the total active motion (TAM) was 17.6% during the first month of treatment, however after five months of treatment, TAM reached up to 52.8%, which is assessed as positive result. *Implications/Impact on Rehabilitation:* In this study, we conclude that the physical therapy plays a major role in improving the contracture of hand, preventing additional contractures, restoring the amplitude of movements, strength, and the functioning of hand.

No. 340

RANDOMIZED CONTROLLED TRIAL TO COMPARE HIGH INTENSITY AEROBIC EXERCISE WITH PASSIVE MODALITIES PROGRAMME FOR WORKERS WITH CHRONIC LOW BACK PAIN

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Republic of Kosovo

Objective: The purpose of the present study was to investigate the effects of high-intensity aerobic exercise on pain, disability, anxiety or depression in people with chronic LBP. *Method:* Prospectively, over a period of 6 months 100 chronic LBP patients were included into the study. Fifty were randomized to each of the treatment groups. Subjects in the exercise group received a 12 week, aerobic exercise program. Subjects allocated to the control group received 12 weeks of electrophysical agents. We used following scales to assess LBP-related functional disability and psychosocial factors: the Oswestry Low Back Pain Disability Questionnaire (OWS) and the Hospital Anxiety and Depression Scale (HADS). *Results:* In the exercise group, after 12 weeks, we have distinguished significant improvement of average pain scale in comparison with basic values (6 ± 2.6 vs. 2 ± 1.7, diff. of mean = 3.9, $p < 0.001$), disability (31 ± 17.4 vs. 15.8 ± 12.7, diff. of mean = 15.2, $p < 0.001$) and anxiety and depression (21.1 ± 8.2 vs. 14 ± 6.7, diff. of mean = 7.1, $p < 0.001$). Whereas, differences in average pain scale, disability and anxiety/depression are not significant in the control group. *Implications/Impact on Rehabilitation:* The results which have come out of this prospective study suggest that subjects with chronic LBP should focus on a high-intensity aerobic exercise in order to reduce pain and improve their psychological health.

No. 341

A 20-YEAR-OLD YOUNG LADY WITH POSTBURN LOWER EXTREMITIES JOINT STIFFNESS***Nerimane Abazi, MD; Ardiana Murtezani, MD, MS; Seven Sherifi, MD****Republic of Kosovo*

Objective: This case study deals with implementation of physical exercise programs which can get to muscular strength modification, motor function and psychological improvement. The goal of this case report presentation is to describe the results of the ambulatory rehabilitation program with components of musculoskeletal system exercise among children with severe burn injuries. **Method:** The subject of our study is a female patient with severe burn injuries, dermatogenic stiffness, muscular hypotrophy and difficulty walking with ambulation. Because of existing problems the patient started with an adequate rehabilitation program focusing on elongation exercise techniques of the shortened muscles, correction of desmogenic, miogenic and tendon contractures, including muscular strengthening. A walking exercise program was included due to motoric impairment and proprioperception. **Results:** Six months after carrying the splint and intermittent physical therapy patients' functional recovery is acceptable (hip joint range of motion in fx. is 105° while ex. 25°, abd. 35° add. 20°, external rotation 40° and internal rotation 35°, meanwhile knee fx. 115° ex. 0°). Muscular strength of myotomes L2S2 is graded 4. Repeated electromyography does not register spontaneous pathologic activity. She walks without any orthotic devices. **Implications/Impact on Rehabilitation:** This research demonstrates the fact that regardless of how extensive the rehabilitation program is, the end results usually are good if physical therapy is integrated into the healing process.

No. 342

LIFE QUALITY IN PATIENTS WITH THYP III ANKYLOSING SPONDYLITIS AND SARY SERONEGATIVE SPONDYLARTHROPATHIES***Nemes Dan, PhD; Liliana Catan; Dan V. Poenaru; Mihai Dragoi; Elena Amaricai; Daniel Popa; Roxana Onofrei; Dan Surducan; George Puenea; Horia Vermesan; Dinu Vermesan; Radu Prejbeanu; Octavian Cretu****Romania*

Objective: Seronegative spondylarthropathies (SNSA) are a group of diseases with a major disabling potential, which has important medical and socio-economic repercussions, so diagnosis, complex and ongoing therapy have an extreme importance to the prognosis of this group of diseases that affect young age and have an extensive development throughout life. Quality of life is a complex, dynamic collection of objective and subjective dimensions, social and individual, positive and negative continuously interacting. Quality of life assessment of patients with SASN using specific assessment systems and global assessment and highlighting the importance of continuous and complex long treatment, and increasing quality of life of patients by including patients with SASN in an physical therapy program adapted at home. Also assess how the application of medical rehabilitation program affects the quality of life and patient compliance to treatment and leads to lower doses of drugs used. **Method:** In a period of one year (10.2009–10.2010), we studied 18 patients diagnosed with ankylosing spondylitis (AS) type III (sacroileitã + spondylitis + peripheral joint arthritis and rheumatoid factor negative) and 27 patients diagnosed with sary SASN (15 patients with psoriatic arthropathy (PA), 8 patients with reactive arthritis (RA), two patients with Crohn's disease, a patient with Reiter's syndrome), aged between 18 and 67 years, 30 men and 15 women, divided into three homogeneous groups and differential treatment was applied on each group, according to patients' agreement and compliance. Group 1 – symptomatic medications, DMARDs and specific physical therapy; group 2 – complex drug

therapy: symptomatic, DMARDs, biologic anti-TNF α monoclonal antibodies and specific physical therapy; group 3 – the same treatment as in group 2 patients, but in addition each patient underwent an individual physical therapy program at home for one year. Each patient received 7 complex assessments: initial, (E0), 5 intermediate: monthly, three months (E1, E2, E3), at 6 months (E6), at 9 months (E9) and final at 12 months (E12), consisting of complex clinical exam, laboratory investigation (ESR, CRP, RF) and X-ray for pelvis (sacroiliac), spine and peripheral joints, assessment of disease activity – BASDAI index (Bath Ankylosing Spondylitis Disease Activity Index), assessing the functionality – BASFI index (Bath Ankylosing Spondylitis Functional Index), HAQ questionnaire assessing the quality of life using HAQ-S questionnaire (Assesment Health Questionnaire), evaluation of general health and wellbeing using the SF 36 questionnaire (Medical Outcomes Study Short Form 36). **Results:** The complex methods of assesement have shown improved quality of life in patients with type III SA and sary SASN who underwent complex drug therapy, specific physical therapy and individual physical therapy program at home as well as the normalization of inflammatory tests and stopping of radiological lesion progression. **Implications/Impact on Rehabilitation:** Complex drug therapy, specific physical therapy and individual physical therapy program at home, significantly improves quality of life of patients with SASN, without the need of increasing doses of drugs.

No. 343

OSTEOARTHRITIS CHARACTERISTICS AFTER PATIENTS SELF ASSESSMENT IN A MEDICAL RHEUMATOLOGY AND REHABILITATION DEPARTMENT***Nemes Dan, PhD; Dan Surducan; Dan V. Poenaru; Mihai Dragoi; Liliana Catan; Elena Amaricai; Daniel Popa; Roxana Onofrei; George Puenea; Horia Vermesan; Dinu Vermesan; Radu Prejbeanu; Octavian Cretu****Romania*

Objective: Osteoarthritis, a degenerative rheumatic disorder, represents the most frequent disorder of the joints. The foregoing disorder leads to serious economical involvements, the costs regarding the health insurance systems and also the resources because it affects people who are still in working field. The achievement of data regarding osteoarthritis and their further assessment and the increase of the patient awareness concerning this disorder as for diagnosis and treatment. **Method:** 265 patients admitted in medical and rehabilitation department between August 2008 and August 2010 have filled special designed questionnaire before their discharge. At the end the patients gave information regarding the evolution of disease following the undergone treatment, the doctor proceeding to an evaluation of the prosthesis or surgery requirements. If there were any questions concerning the form variables the doctor provided the answers to patients. **Results:** 1) It has been pointed out a rate of 1:1, 5 regarding the age, while the rate men: women was 1:3, around 1/3 of the patients came from urban areas, the others came from rural areas. A downward trend of the time elapsed from the diagnosis was noticed, one half of the patients having less than 10 years from the diagnosis, while only 5% having more than 30 years. As for the painful joints, the knee, spine and hip are the most affected. 2) Another important aspect in 1/3 of the patients is the impairment of daily activities due to the underlying rheumatic disorder, while in 1 out of 10 patients the work activities were impaired. The blood hypertension is the most frequent concomitant disorder, being followed by heart diseases, obesity, gastritis, dyslipidemia and vascular disorders. 3) After the complex treatment 40% of the patients showed a favourable evolution, around half of them have oscillatory and stationary evolutions, while 11% of them had an unfavourable evolution. 4) The patients aged over 60 years had an unfavourable evolution in regard to the patients aged under 60 years, also in the batch of the patients with unfavourable evolution it was noticed a higher percent of the patients coming from urban

area (47%) than in the batch of the patients with favourable evolution (37%), oscillatory evolution (31.4%) and stationary evolution (29.4%). Significant difference between men and women were not encountered. *Implications/Impact on Rehabilitation:* Osteoarthritis is an often encountered disorder with important involvements; the main proof is that the patients diagnosed with this condition have some knowledge regarding it, in our study they asked for doctor's advices in few cases. The knee, hip and spine are the most affected areas, the knee and hip joints are most affected in the people with unfavourable evolution. Even if the blood hypertension and heart diseases are overall the most encountered concomitant conditions, the endocrine metabolic diseases are more encountered in the batch of patients with unfavourable evolution, obesity results in a higher loading of the joints. The patients with unfavourable evolution required in a higher percent specific pharmacological treatment as well as specific surgical procedures. The adequate medical rehabilitation treatment leads to better outcomes. Even if it is not very significant the balneary treatment plays a benefic role regarding the complex treatment.

No. 344

THE PULMONARY FUNCTION IMPROVEMENT THROUGH INSPIRATORY MUSCLE TRAINING OF PATIENTS WITH ANKYLOSING SPONDYLITIS

Mihai Dragoi, MD; Claudiu Avram; Razvan Gabriel Dragoi Romania

Objective: To compare the benefit of inspiratory muscle training (IMT) with aerobic exercise training alone in ankylosing spondylitis (AS) patients. IMT devices efficacy was not yet demonstrated in patients with AS. *Method:* Forty-eight AS patients (mean age: 47.8 ± 6.8 years, all males) were randomized into either IMT (Group 1) or aerobic exercise training (Group 2). All patients were assessed before and after the rehabilitation program, with respect to resting pulmonary function test (forced vital capacity (FVC), forced expiration volume in one s (FEV1), and cardiopulmonary exercise test (peak oxygen uptake (VO_{2peak}), metabolic equivalents for oxygen (VE/VO_2) and carbon dioxide (VE/VCO_2)). Apart from exercising at home, patients in Group 1 performed IMT sessions, three times a week for a period of eight weeks. Each IMT session was individualized by evaluating the maximum inspiratory pressure (SMIP), the training being performed at 80% of SMIP. Patients in Group 2 performed supervised in-patient aerobic exercise training, followed by a home-based exercise programme of 6 weeks. *Results:* There were significant increases in FVC (3.9%, $p < 0.001$), FEV1 (3.2%, $p = 0.004$), VO_{2peak} (0.31 L/min, $p < 0.001$), along with significant decrease in maximal VE/VO_2 (3.8, $p = 0.011$) and VE/VCO_2 (4.48, $p < 0.001$) after rehabilitation programme in Group 1. Small improvements was observed in patients from Group 2, but without reaching the statistical significance ($p > 0.05$). Even at baseline were no significant differences between groups, we noticed statistically significant differences at the end of the study regarding FVC, VO_{2peak} and VE/VCO_2 . *Implications/Impact on Rehabilitation:* IMT had beneficial effects on both rest and effort pulmonary function and physical fitness in AS patients. Associating the IMT to the classical rehabilitation training programmes of patients with AS will have a positive effect on restrictive ventilatory dysfunction and additionally will improve functional capacities of this patients.

No. 345

THE BENEFITS OF YUMEIHO THERAPY IN LOMBOSCIATICS

Elena Sirbu, MD; Florin Ilas; Serban Gligor; Anca Sava; Corina Pantea; Simona Amanar Tabara Romania

Objective: Yumeiho therapy combines massage along the energy meridians with osteoarticular manipulation. A possible use of this

therapy is in lombosciatics. The aim of this paper is to show the influence of Yumeiho therapy on lombosciatics and also to compare the results of this treatment with those obtained by conventional kinetotherapy. *Method:* We studied two groups of patients of both genders: control group (20 patients, mean age 47.1 ± 6.25 years) and experimental group (11 patients, mean age 38.09 ± 10.07 years). The study subjects underwent a traditional kinetotherapy program, whereas subjects included in experiment group followed Yumeiho therapy. The interventions consisted of two sessions per week for 6 months. Patients were assessed before and after therapeutic intervention through a health assessment questionnaire (Health Assessment Questionnaire – HAQ). *Results:* After applying this questionnaire we obtained statistically significant p values for both control group ($p = 0.0394$) and experimental group ($p = 0.034$). Also, in both therapies, we obtained a statistically significant improvement in general patient condition (for control group $p = 0.0398$ and for experimental group $p = 0.034$). A significant positive association between the initial and final results of the two groups ($r = 0.9812$ for control group and $r = 0.858$ for experimental group) was observed. After comparing the final results of the two groups we noticed statistically significant p values ($p = 0.062$). *Implications/Impact on Rehabilitation:* Whatever method of treatment (kinetotherapy or Yumeiho) was adopted we found a significant positive development in general patients condition, with a plus for kinetotherapy. In conclusion, patients with lombosciatics would benefit from a combination of both therapies in order to optimize treatment and sary prevention.

No. 346

FEATURES OF THE EDUCATIONAL PROCESS IN REHABILITATION AND PHYSIOTHERAPY FIELD IN ROMANIA

Adriana Sarah Nica, PhD; Gilda Mologhianu; Andreia Ileana Murgu; Mariana Moise; Brandusa Mitoiu; Lili Miron; Rodica Scarlet Romania

Objective: To examine the benefits and effectiveness of rehabilitation programs in terms of functional recovery of patients who have suffered an occupational accident resulted in a complex hand injury and determining functional, social, professional and economic consequences – restrictions in self-care activities, social activities and worker participation (temporary/permanent absence from work) and with a major impact on quality of everyday life and work productivity. *Method:* We analysed a number of 47 patients with complex algo-dysfunctional post hand trauma status, aged between 25 and 59 years, evaluated clinical and functional, during January–October 2010. Over 50% of them (29 patients) suffered a work-related injury. Patients were examined at admission, during rehabilitation and at discharge program. Some of them were followed in the dynamics over several successive therapeutic sessions. We evaluated peripheral neurological damage severity, extension and depth of soft tissue damage, scarring and presence of adhesions, and dynamic characteristics of pain, functional dynamics in the ADL program and quality of life improving. *Results:* The data obtained through the study observation of our patients shows an obvious improvement in functional status of the injured hand, the more important as patient compliance to the rehabilitation program was higher, proving the importance of the rehabilitation program in socio-professional reinsertion. *Implications/Impact on Rehabilitation:* Restoration of the somatic and psycho-behavioral aspects improves complex issues of quality of life. Improvement of physical function facilitate self-care and maintaining work participation (return to work) of work-disabled persons, and also improving of worker productivity. Post trauma hand rehabilitation program is crucial in both productive adult patients but also in elderly patients, where recovery program should be tailored to the dismetabolic rheumatic degenerative changes of the distal upper limb.

No. 347

CORRELATIVE ASSESSMENTS IN THE REHABILITATION FOLLOWING TRAUMATIC HAND INJURY

Adriana Sarah Nica, PhD; Gilda Mologhianu; Andreia Ileana Murgu; Mariana Moise; Brandusa Mitoiu; Lili Miron; Rodica Scarlet

Romania

Objective: To examine the benefits and effectiveness of rehabilitation programs in terms of functional recovery of patients who have suffered an occupational accident resulted in a complex hand injury and determining functional, social, professional and economic consequences – restrictions in self-care activities, social activities and worker participation (temporary/permanent absence from work) and with a major impact on quality of everyday life and work productivity. **Method:** We analysed a number of 47 patients with complex algo-dysfunctional post hand trauma status, aged between 25 and 59 years, evaluated clinical and functional, during January–October 2010. Over 50% of them (29 patients) suffered a work-related injury. Patients were examined at admission, during rehabilitation and at discharge program. Some of them were followed in the dynamics over several successive therapeutic sessions. We evaluated peripheral neurological damage severity, extension and depth of soft tissue damage, scarring and presence of adhesions, and dynamic characteristics of pain, functional dynamics in the ADL program and quality of life improving. **Results:** The data obtained through the study observation of our patients shows an obvious improvement in functional status of the injured hand, the more important as patient compliance to the rehabilitation program was higher, proving the importance of the rehabilitation program in socio-professional reinsertion. **Implications/Impact on Rehabilitation:** Restoration of the somatic and psycho-behavioral aspects improves complex issues of quality of life. Improvement of physical function facilitate self-care and maintaining work participation (return to work) of work-disabled persons, and also improving of worker productivity. Post trauma hand rehabilitation program is crucial in both productive adult patients but also in elderly patients, where recovery program should be tailored to the dismetabolic rheumatic degenerative changes of the distal upper limb.

No. 348

EFFECTS OF EXERCISE TRAINING IN A PULMONARY REHABILITATION PROGRAM FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASES (COPD)

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Objective: Exercise training in pulmonary rehabilitation programs improve exercise tolerance, pulmonary function, dyspnea and quality of life in patients with COPD. The aim of the study was to assess the effectiveness of exercise training in pulmonary rehabilitation in patients with COPD. **Method:** In a prospective, randomized study, patients with an established diagnosis of COPD participated in a 6-week multidisciplinary rehabilitation program. Patients were divided in to three groups. Group A, twenty patients with moderate COPD (64.5±5.9 of age, 14 men; FEV1 60.5±11.0). Group B, 20 patients with moderate COPD (64.20±6.3 of age; 14 men; FEV1 57.0±12.4) and group C twenty patients with severe COPD (61.7±7.2 of age; 15 men; FEV1 31.3±10.5). The 6-week supervised pulmonary rehabilitation program in group A, B, C included respiratory physiotherapy. Only in group A rehabilitation included exercise training on cycle ergometry. All patients had stable COPD and medicamentation therapy. Exercise tolerance was assessed by measuring the distance each patient walked in 6 min test, and dyspnea assessed using Medical Research Council (MRS) scale. Quality of life was measured by the Clinical COPD Questionnaire (CCQ). **Results:** The difference in distance covered on the walk test (6mW)

between group A and B was statistically significant ($p < 0.05$), group A and C ($p < 0.01$), group B and C ($p < 0.01$). The greatest improvement in dyspnea has been seen with patients in group A. MRC ($p < 0.01$). FEV1% increased significantly ($p < 0.05$) in group A. CCQ scores were the best in group A ($p < 0.01$). MRC correlated with 6mW in group A ($r = -0.658, p = 0.002$), in group B ($r = -0.632, p = 0.003$) and group C ($r = -0.551, p = 0.012$). **Implications/Impact on Rehabilitation:** After 6-week multidisciplinary rehabilitation program in patients with COPD the greatest improvement in pulmonary function, exercise tolerance, dyspnea and quality of life has been seen with patients that were part of the exercise training.

No. 349

ACUTE INPATIENT REHABILITATION OUTCOME AFTER PERITONITIS IN PATIENTS WITH END-STAGE RENAL DISEASE

Vladimir Piscevic, MD

Serbia

Objective: End-stage renal disease (ESRD) is very significant and growing social and economical problem worldwide, and the numbers of patients requiring renal replacement therapy has increased dramatically and partially unexpectedly. Peritoneal/hemodialysis (PD/HD) is a successful life-sustaining therapy for patients with ESRD, and with its effectiveness largely judged by patient survival. As the dialysis population ages and experiences multiple co morbidities, it will become increasingly difficult to maintain a reasonable quality of life for these patients. Patient treated by long-term PD/HD therapy may have variety of medical problems and complications such as peritonitis that can interfere with their level of function and general deconditioning, those patients can have deficit in mobility, self care, general weakness, and metabolic problems and have large numbers of related issues which can be addressed with acute inpatient admission at nephrology department. **Method:** Retrospective analysis of medical reports from 59 inpatients (of all 670 hospitalised) with ESRD of both gender from Institute for Renal Diseases Zvezdara University Medical Centre Belgrade, Serbia who were received acute inpatient rehabilitation programme after different reasons of inactivity from December 2009 to December 2010. **Results:** From December 2009 to December 2010 we treated 59 inpatients for different reasons of inactivity. 17 of the 59 were inactivating patients with peritonitis. For the 17 patients who had peritonitis were both sexes treated by chronic HD/PD program at Institute for Renal Disease, UMC Zvezdara-Belgrade (9 male patients age from 50 to 80, average 64.4 years; 8 female patients age from 60 to 88, average 76.5 years). The most common reason for end stage renal disease was arterial hypertension 8 cases (47%), followed by diabetes mellitus and arterial hypertension 3 cases (17.6%), glomerulonephritis 2 cases (11.8%), diabetes mellitus 1 case (5.9%), HIV 1 case (5.9%), TBC 1 case (5.9%) and intoxicate 1 case (5.9%). The commonly proscribed treatment (therapy) were HD 9 cases (52.9%), followed by PD 6 cases (35.3%), no PD/HD 2 cases (11.8%). Average duration of dialysis treatment was 22 months (min/max 1 month–13 years). During the inpatient period 4 patients were died. From 17 cases who received inpatient rehabilitation program after peritonitis, 6 were full recovery, 3 were partial recovery – still need nursing facility at home, 8 no evidence of physical recovery. **Implications/Impact on Rehabilitation:** According to our results we conclude that most of the patients get peritonitis in the early period of starting PD/HD. Repeating of infection is very common. In more than half of patients we got better condition and recovery. Early rehabilitation treatment might have resulted in better outcome and can make slower physical deconditioning and improve physical activities.

No. 350

DO PEOPLE FOLLOWING LIMB AMPUTATION RETURN TO WORK?

Helena Burger, PhD, MD

Slovenia

Objective: The main objective in rehabilitation of people after amputation is to restore or improve their functioning, which includes their return to work. Full-time employment leads to beneficial health effects and being healthy leads to increased chances of full-time employment. The aim of our study was to find out if subjects following limb amputation have problems returning to work, and which factors are the most important regarding return to work. **Method:** A questionnaire including general information (age, gender), amputation (level, reason, stump problems), co-morbidities, prosthesis (use, type, problems), rehabilitation programme, education and work before amputation, and work after amputation was sent to all people ($n=414$) following limb amputation younger than 66 years visiting our outpatient clinic. **Results:** We received questionnaires from 230 respondents (56%). Only 90 (38%) of them work after amputation and only 21 were able to return to the same job they had before amputation. Gender, amputation level, age at the time of study, pain in the stump, number of co-morbidities, skin problems and education were not associated with return to work. People younger at the time of amputation with less severe phantom pain who were able to wear their lower limb prosthesis more hours per day and walk longer distances had fewer problems, and those injured at work had more problems returning to work. **Implications/Impact on Rehabilitation:** Return to work should be one of the rehabilitation goals for anyone following limb amputation at working age. There are several factors influencing return to work. For clinicians, it is important to know these factors and to take them into consideration when setting goals of the rehabilitation programme.

No. 351

CAN ICF BE USED IN PROSTHETICS AND ORTHOTICS OUTPATIENT CLINIC?

Helena Burger, PhD, MD

Slovenia

Objective: At a prosthetics and orthotics (P&O) outpatient clinic, the clinician can see patients with very different diagnoses who have different functional problems. Presently, there is no uniform way to describe problems of the people in need of prostheses and orthoses. Most frequently, we just describe the problems and medical findings in a way we have learned during our training. Sometimes we use outcome measures. The ICF covers all aspects and levels of human functioning and was developed as common a language. However, there are no published studies on ICF use in P&O clinical practice. The aim of the study was to find out whether ICF can be used in every-day prosthetics and orthotics (P&O) clinical practice for description of human functioning, and whether it can demonstrate the influence of prosthesis or orthoses on persons' functioning. **Method:** A short list of ICF codes was compiled from annex 9 and used for one month for all patients seen at the author's P&O outpatient clinics. **Results:** One hundred patients (59 men), 58 years old on average, with different medical problems were included in the study. From 6 to 27 (14 on average) ICF categories from all four components of ICF were used in these patients. The most frequently used category for body functions was mobility of joint functions, for body structures it was structure of the skin, while for activities and participation it was walking. Public and private buildings were the only found barriers. It took one to two min to fill in the prepared list and up to five further min to find the codes for the categories not on the list. For the demonstration of impact of P&O devices on person's functioning, it was necessary to add later also qualifiers for activities and participation (one for capacity and one for performance for each code). For this task, additional 5 to 15 min were needed. Performance with the P&O devices was significantly better than capacity ($t=-10.393, p<0.001$). **Implications/Impact on Rehabilitation:** ICF can be used in every-day P&O clinical practice. List of all checked categories provides quick additional information. To be able to demonstrate the influence of P&O devices on person's functioning, at least for activities and participation, one has to use qualifiers, or preferably include some other outcome measures.

No. 352

CAN ICF BE USED IN P&O CLINICAL PRACTICE?

Helena Burger, PhD, MD

Slovenia

Objective: At a prosthetics and orthotics (P&O) outpatient clinic, the clinician can see patients with very different diagnoses who have different functional problems. Presently, there is no uniform way to describe problems of the people in need of prostheses and orthoses. Most frequently, we just describe the problems and medical findings in a way we have learned during our training. Sometimes we use outcome measures. The ICF covers all aspects and levels of human functioning and was developed as common a language. The aim of the study was to find out whether ICF can be used in every-day prosthetics and orthotics (P&O) clinical practice for description of human functioning, and whether it can demonstrate the influence of prosthesis or orthoses on persons' functioning. **Method:** A short list of ICF codes was compiled from annex 9 and used for one month for all patients seen at the author's P&O outpatient clinics. **Results:** One hundred patients (59 men), 58 years old on average, with different medical problems were included in the study. From 6 to 27 (14 on average) ICF categories from all four components of ICF were used in these patients. The most frequently used category for body functions was mobility of joint functions, for body structures it was structure of the skin, while for activities and participation it was walking. Public and private buildings were the only found barriers. It took one to two min to fill in the prepared list and up to five further min to find the codes for the categories not on the list. For the demonstration of impact of P&O devices on person's functioning, it was necessary to add later also qualifiers for activities and participation (one for capacity and one for performance for each code). For this task, additional 5 to 15 min were needed. Performance with the P&O devices was significantly better than capacity ($t=-10.393, p<0.001$). **Implications/Impact on Rehabilitation:** ICF can be used in every-day P&O clinical practice. List of all checked categories provides quick additional information. To be able to demonstrate the influence of P&O devices on person's functioning at least for activities and participation, we have to use qualifiers or – even better – some other outcome measures.

No. 353

A CASE OF SUPERFICIAL RADIAL NEUROPATHY AND PALMAR CUTANEOUS BRANCH OF MEDIAN NEUROPATHY WITH LYMPHEDEMA WHO TREATED BY COMPRESSION GLOVE

Joon Sung Kim, MD; Seoung Hoon Lim; Bo Young Hong; Won Joon Lee

South Korea

Objective: Case presentation. **Method:** Case presentation. **Results:** Lymphedema commonly occur after breast cancer surgery and can worsen the patient's life quality. So many treatments are tried to control lymphedema. Bandage is a popular therapy to reduce volume of extremities in lymphedema patients. But, it can induce compressive neuropathy at fragile sites. We present here a 45-year-old female who experienced superficial radial neuropathy after bandage therapy. She complained numbness at right lateral aspect of thumb. So we did electromyography to explain that symptom and we found that amplitude of SNAP was decreased compared with the other side. We think that in patients who are treated with compressive therapy such as bandage and stocking, we should pay attention to the possibility of compressive nerve injury. **Implications/Impact on Rehabilitation:** We need to be aware of the possibility of compression nerve injury when putting on a compression glove in a lymphedema patient.

No. 354

METABOLIC RESPONSE OF GROWTH HORMONE TREATMENT IN THE SEVERE BURN SURVIVORS***Jeong-Hyeon Mun, MD****South Korea*

Objective: The catabolic phase following burn injury increase caloric imbalance and result in substantial weight loss. This is attributed to a hypermetabolism, energy expenditures twice as much as normal documented during the first 3 weeks. Wound size and duration seem related to the length of stay in intensive care unit, which causes loss of muscle mass, the so called sarcopenia, leads to weakness and physical frailty. To determine clinical efficacy of human growth hormone (GH) on sarcopenia after burn injury, patients in the test group were given subcutaneous injections and compared the results with patients in the control group. **Method:** A total of 33 major burn patients were studied, 15 were in the control group and 18 in the GH group. We excluded patients who are over 50 years of age to rule out age related sarcopenia. Muscular strength, cardiopulmonary function, body composition and body weights were measured at baseline and at 1, 3 months after administration of GH. The test group were injected weekly for 3 months with 3mg GH (Declage®, LG life science, Seoul, Korea). **Results:** Oxygen consumption at lactate threshold and maximum level ($p < 0.05$) show improvement at follow-up on predictors of exercise capacity determined by cardiopulmonary exercise testing in GH group. And there was significant difference compared with the placebo group. Peak torque and bone mineral content, there was no difference between the placebo and GH group. The GH group showed significant changes of the adiponectin level. **Implications/Impact on Rehabilitation:** We conclude that data for identifying GH efficacy and significant metabolic response may need to be evaluated to include anaerobic capacity, muscle quality and hormone level. This study showed that GH injection in severe burn injury patients may have a probable effect on physical fitness factor, but we need more long term research on metabolic pathways in burn survivors to yield significant results.

No. 355

AMOUNT REDUCTION OF SALIVA AFTER BOTULINUM TOXIN A INJECTION IN OLIVOPONTOCEREBELLAR ATROPHY PATIENT WITH DYSPHAGIA: SINGLE CASE STUDY***Seonghoon Kim, MD****South Korea*

Objective: One case of olivopontocerebellar atrophy (OPCA) patient with severe dysphagia after botulinum toxin A injection in the salivary glands, amount of saliva was measured quantitatively. **Method:** 23 years old male patient with percutaneous endoscopic gastrostomy due to severe dysphagia was drooled in sitting position and seen the aspiration symptom in supine position. Botulinum toxin A was injected on each side by 50 IU in the submandibular and parotid glands using ultrasound. Initially, the saliva in the oral cavity was wiped by gauze. And a new dry gauze was reinserted, and removed after 5 min in oral cavity. We measured the weight of saliva that was absorbed into the gauze by an electronic scale (A&D Company, Ltd. GF-600 R). For one month after injection, the amount of saliva was measured daily. After one month the amount was measured once a week until three months, once every month until six months were measured. **Results:** The next day after injection, amount of saliva was significantly decreased and the effect was lasted for 4 weeks. After 4 weeks, there was no difference amount of saliva before botulinum toxin A injection, statistically. Side effects of injection and aspiration pneumonia were not observed for 6 months after injection. **Implications/Impact on Rehabilitation:** In OPCA patient with severe dysphagia, botulinum toxin A injection in both salivary glands is effective for the prevention of aspiration pneumonia. In this paper, there is meaningful analysis to measure salivary reduction after botulinum toxin A in OPCA patient with severe dysphagia, quantitatively.

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No. 356

CARDIAC REHABILITATION SERVICE NEEDS IN A PROVINCE OF SOUTHERN SPAIN***Irene Fernández Rodríguez, MD; Rafael Peñafiel Burkhardt; Sofía Rodríguez Moreno; Belén Pérez Ureña; Inmaculada García Montes****Spain*

Objective: Cardiac rehabilitation (CR) is a process that begins when a patient suffers a cardiovascular condition. This study shows clinic symptoms of ischemic cardiopathy (IC) patients studied at the cardiology unit of Hospital Comarcal. When considering installing a CR unit, ischemic cardiopathy was taken as reference since it is most prevalent and with the highest expectancy at CR Units. **Method:** Transversal study of a selected test/sample from IC diagnosed patients in cardiology for a year. The following data was considered: demographic date, IC type, Vascular Risk Factors (VRF), complications, physical exercise limitations. **Results:** From 1000 patients studied for a year: 361 showed IC (Acute Myocardial Stroke 60.4%, angor stable 25.8%, unstable 22.7%). 73.7% male and 26.3% female with age average of 68 ± 11 with more disposition for males at early age and for females 70 years old. About VRF, 58.4% were hypertense, 40.2% diabetic, 54.6% dislipemic and 57.3% had some experience with tobacco; such risk factors were not fully monitored. Most common complication was heart failure and ventricular disfunction (13%) with scarce arrhythmia (<2%). Close to 75–80% did not present other cardiovascular or osteomuscular pathologies to prevent exercising. **Implications/Impact on Rehabilitation:** There is a high IC prevalence with an average age between 60–80 years old that present multiple VRF not fully monitored. Most of the patients do not show limitations to exercise. A CR program with monitored exercise and VRF control would improve in their quality of life.

No. 357

NEW ORTHOTIC GLOVE DESIGNED TO AMPLIFY HAND STRENGTH***Neus Tico-Falguera, MD; Esteban Peña-Pitarch; Montserrat Abenoza-Guardiola; Georgia Romero-Culleres****Spain*

Objective: Partial hand disability represents a serious problem for many people, who although they have mobility and sensitivity in their hands, are not strong enough to hold a simple mug. For example, people with diseases, elderly or people who have suffered traumatic injuries. Principal objective, in order to improve their quality of life, we design a device such as the exoskeleton presented here. Currently, there are some similar devices nevertheless most of them need external energy and sophisticated drive mechanisms, complicating their use and maintenance. **Method:** The innovative nature of this actuated hand exoskeleton is that it is designed in such a way that does not require any external energy for its operation, as it works only by the movement of the person's wrist. This new device is useful for people that have mobility and sensitivity in their fingertips and consists of an exoskeleton that creates an external structure which is able to support the strength that is needed to hold an object. The exoskeleton consists of a glove base with a rocker, support, and beams. This system, with a single movement of the wrist, creates a kinematic movement of fingers that permits the person to grasp any object. An aesthetic glove covers the exoskeleton. **Results:** 1) Amplification of grasping force. 2) Any external power (neither batteries nor electromyography) is required for its operation, as it operates with minimal movement of the wrist. 3) Easy to manufacture and cost competitive as you can implement it without any complex mechanical components. 4) The patient's quality of life is highly improved, as they are able to manage their daily activities easily. **Implications/Impact on Rehabilitation:** This technology could be improved quality of life for patients under diseases, elderly or people with traumatic injuries, with partial

hand disability. Under point of view of rehabilitation, could help to patient independence in the daily life activities.

No. 358

PERCUTANEOUS INTERSPINOUS SPACERS IMPROVE PHYSICAL FUNCTION AND QUALITY OF LIVE IN THE ELDERLY WITH LUMBAR SPINAL STENOSIS

Carlos Vicario, MD; Irene Jimenez-Pina; Monica Alcobendas-Maestro; Maria Puerto; Rocio Puente; Rodolfo Box
Spain

Objective: To analyze if percutaneous interspinous spacers (PIS) improve function and quality of live in the elderly diagnosed of lumbar spinal stenosis (LSS), when standard physical treatment has not been effective. *Method:* Twenty-nine patients diagnosed of LSS were included in a prospective study. In all of them a standard physical treatment was instated for 6 months and was not successful, so surgery was indicated, and after it, a domiciliary rehabilitation program was instated. Patients were evaluated before surgery, 6 months and 2 years after surgery. SF-36, Oswestry disability index, visual analogic scales for lumbar and leg pain, walking distance, and subjective evaluation were reported. *Results:* Mean age was 71.2 (SD 5.6). No major surgical complications have been reported. Statistically significant improvements at 6 months and 2 years have been found in every variable studied. 23 patients (79%) were satisfied or very satisfied with the results 6 months after surgery; and 21 (72%) at 2 years. *Implications/Impact on Rehabilitation:* When standard physical therapy for LSS is not effective, PIS associated to a domiciliary rehabilitation program is an excellent surgical option in the elderly patient.

No. 359

FEMORAL CARTILAGE THICKNESS MEASUREMENTS IN HEALTHY INDIVIDUALS: LEARNING, PRACTICING AND PUBLISHING WITH TURK-MUSCULUS

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Turkey

Objective: To provide normative data regarding femoral cartilage thicknesses of healthy individuals with the use of musculoskeletal ultrasonography (MSUS). *Method:* Data with regard to 1,544 volunteers were recruited from 18 centers under the collaboration of TURK-MUSCULUS (Turkish Musculoskeletal Ultrasonography Study Group). Subjects who had a body mass index value of less than 30 and who did not have signs and symptoms of any degenerative/inflammatory arthritis or other rheumatic diseases, history of knee trauma and previous knee surgery were enrolled. Characteristic of the participants (age, sex, body weight/height, smoking and exercise habits) were noted. Ultrasonographic measurements were performed axially from the suprapatellar window by using linear probes while subjects' knees were in maximum flexion. Three (mid-point) measurements were taken from both knees (lateral condyle,

intercondylar area, medial condyle). *Results:* A total of 2,876 knees were taken into analysis after exclusion of inappropriate images. Mean cartilage thicknesses were significantly lower in females than males. Thickness values negatively correlated with age; negatively (females) and positively (males) correlated with smoking. Men who regularly exercised had thicker cartilage than who did not exercise. Increased age (in both sexes) and absence of exercise (males) were found to be risk factors for decreased cartilage thicknesses. *Implications/Impact on Rehabilitation:* Further data pertaining to other countries would be interesting to uncover whether ethnic differences also affect cartilage thickness. Collaborative use of MSUS seems to be promising in this regard.

No. 360

SONOGRAPHIC IMAGING OF THE PERIPHERAL NERVES IN NEUROFIBROMATOSIS TYPE-1 AND TYPE-2

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Objective: Although major nerve trunks, cranial and spinal nerve roots are most commonly affected in neurofibromatosis (NF), almost any peripheral nerve can be involved. Herein, presenting two cases of NF with widespread peripheral nerve involvement, we highlight the role of ultrasonography (US) in the diagnosis and management of these cases. *Method:* Case 1: A 20-year-old man with a right-sided drop foot was referred to our department for physical therapy and orthotic prescription. The patient also described gait abnormality, bladder dysfunction and hearing loss on the left side. His medical history revealed bilateral acoustic schwannoma (diagnosed to be NF-2) two years ago. Neurological examination also revealed weakness in hip abduction, knee flexion and plantar flexion (3/5, bilaterally); ankle and toe dorsiflexion (4/5, left side) and hypoesthesia on the right L5-S1 dermatomes. Electromyography revealed bilateral L4-5 and S1 nerve root involvement. Magnetic resonance imaging showed large enhancing intraspinal neurofibromas in the lumbosacral region (L1-S3) extending through left S1-S3 neuroforamina and the presacral area. US demonstrated neurofibromatic involvement in the sciatic, tibial and common peroneal nerves bilaterally. Due to progressive neurological impairment, the patient was referred to neurosurgery. *Results:* Case 2: A 22-year-old woman with a diagnosis of NF-1 was seen due to limited left-sided knee motions for the last six months after a neurofibroma excision surgery and local radiotherapy of the left tibial nerve for malignant peripheral nerve sheath tumor. Neurological evaluations displayed weakness of the left tibial nerve innervated muscles and hypoesthesia on left S1 dermatome. Additionally, US demonstrated diffuse neurofibromatic involvement of the bilateral tibial, sciatic and median, ulnar, radial, common peroneal and vagus nerves. *Implications/Impact on Rehabilitation:* In this report, we aimed to draw attention of physicians towards the fact that US can be quite helpful for visualization of the peripheral nerve pathologies, especially in cases with widespread involvement.

No. 361

SCIENTIFIC PUBLICATIONS IN PHYSICAL AND REHABILITATION MEDICINE

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Objective: As the number of publications increase in the realm of Physical and Rehabilitation Medicine (PRM), analysis of what is being published has become noteworthy. Our aim is to provide an overall analysis of publications in the realm of PRM and to explore their distribution among different journal categories. **Method:** Between the years 1970–2010, we have retrospectively searched for all papers indexed in Science Citation Index-Expanded in which “rehabilitation medicine” has been addressed as at least one of the authors’ affiliation. We have used the general search function of the ISI Web of Knowledge®-Web of Science® software. We have also elaborated the results with regard to the number of publications per year, journal category/name, institution, document type and country. **Results:** The number of publications was observed to increase especially after the period of 1995–1999. The top 5 journal categories in which physiatrists published their papers were as follows: rehabilitation (23%), sports sciences (21%), clinical neurology (16%), orthopedics (12%) and neurosciences (12%). On the other hand, significant differences were observed regarding the distribution of these categories for individual countries and it was noteworthy that rehabilitation was not the most common category in several countries. **Implications/Impact on Rehabilitation:** The persistent increase in the number of publications in PRM suggests that more journals are necessary and we believe that our results may shed light on decisions while those new journals are being embodied.

No. 362

SERUM LEPTIN, IGF-1, IGF-2, IGFBP-3 LEVELS AND RELATION BETWEEN CLINICAL PARAMETERS IN PATIENTS WITH PRIMER FIBROMYALGIA SENDROM (FMS)

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Turkey

Objective: Fibromyalgia syndrome (FMS), a condition characterized by diffuse pain, diffuse tenderness, fatigue, and sleep disturbances, is considered a multifactorial disorder. However, etiopathogenesis of fibromyalgia (FM) is still not known. The aim of this study is to investigate plasma leptin levels, serum growth hormone, IGF-1 and IGFBP-3 values and their relations with clinical parameters in patients with fibromyalgia and healthy controls. **Method:** The study was performed on 30 female patients and 30 healthy controls aged 25 to 55 years who were age-, gender- and BMI-matched. Demographic features and concomitant symptoms of patients were recorded. Levels of IGF-1 and IGFBP-3 were measured by two-site immunoradiometric assay (IRMA). Serum level of leptin was measured by the ELISA kit. BMI was calculated, and insulin sensitivity was modeled according to a homeostasis model assessment (HOMA) computer-solved model. Statistics was done using unpaired student’s-t test and Pearson’s correlation analysis. **Results:** Serum level of leptin and HOMA-IR were significantly ($p < 0.001$) higher in patients with FM than in healthy controls. There were no significant differences in levels of serum fasting blood glucose, GH, IGF-1 and IGFBP-3 between the FM and control group ($p > 0.05$). Serum HDL-C level was decreased in patients with FM than in healthy controls ($p < 0.001$). In multiple linear regression analysis, the leptin level was positively correlated with HOMA-IR and leptin level was negatively correlated with HDL-C. We found no association between GH, IGF-1 and IGFBP-3 or other parameters in either subjects with fibromyalgia. **Implications/Impact on Rehabilitation:** I think that high levels of leptin and HOMA-IR are related to some symptoms of FMS. Also, increased leptin level and insulin resistance may play a role in etiopathogenesis of fibromyalgia.

No. 363

SERUM PARAOXONASE (PON-1) LEVELS BUT NOT NITRIC OXIDE (NO) AND MALONDIALDEHYDE (MDA) LEVELS ARE

ALTERED IN PATIENTS WITH PRIMER FIBROMYALGIA SYNDROME (PFS)

Serdar Sarac, MD; Yıldız Atamer; Yüksel Koçyiğit; Nilüfer Bozkurt Yiğit; Turan Uslu; Aytaç Atamer
Turkey

Objective: Both paraoxonase (PON-1) enzyme activities, nitric oxide and malondialdehyde (MDA) levels may be altered in fibromyalgia syndrome (FMS) due to increased oxidative stress. Paraoxonase enzyme was first identified as a protective barrier against organophosphorus poisoning. The enzyme may have a role in physiopathogenesis of fibromyalgia. In the present study, oxidant/antioxidant capacity and their relationship with health status in PFM were investigated. For comparison, serum levels of other implicated biochemical influences were correlated with health status. **Method:** The study group consisted of 30 primer fibromyalgia patients and control group included 30 healthy subjects age, gender and BMI matched. Serum PON-1 activity were measured spectrophotometrically and Malondialdehyde (MDA) as end-product lipid peroxidation by the thiobarbituric acid (TBA) method; Lp(a) by nephelometric method; NO by Griess reaction. Statistical analysis of the differences between groups of subjects was performed using the unpaired student’s t-test or by the Mann-Whitney non-parametric test as appropriate. Pearson’s correlation analyses were performed. **Results:** In primer fibromyalgia group had significantly higher NO ($p < 0.001$), MDA levels ($p < 0.001$) and decreased PON-1 activity ($p < 0.001$) with respect to controls whereas Lp(a), ApoA1 and ApoB were not significantly different between the groups ($p > 0.05$). The Paraoxonase levels were negatively correlated with NO and MDA levels. However, None of the measured clinical parameters had significant correlation with each other in both groups. **Implications/Impact on Rehabilitation:** These results suggest that FMS patients have an altered activity in the oxidant/antioxidant system, most likely due to prolonged and/or repeated oxidative stress, and that the antioxidant state and potential role of NO, a potent signaling molecule thought to be involved in pain processing. Also, they may be of importance in the complex physiopathologic mechanism behind the development of FMS. Our results need to be clarified by further studies.

No. 364

PUBLICATIONS OF PHYSIATRISTS CONCERNING MUSCULOSKELETAL ULTRASONOGRAPHY: WHERE HAVE WE REACHED AND WHERE TO GO?

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Objective: Attention pertaining to use of musculoskeletal ultrasonography (MSUS) has significantly increased in the realm of Physical Medicine and Rehabilitation (PMR). However, the literature still lacks the data whether this growing interest of MSUS among physiatrists is converted to publications. we aimed to analyze worldwide the publications of PMR physicians on MSUS. **Method:** This study is a cross-stional analysis. We have retrospectively searched for all papers indexed in Science Citation Index-Expanded (SCI-Exp) and Index Medicus (PUBMED) in which “rehabilitation medicine” has been addressed as at least one of the authors’ affiliations (up to 2011). All papers were examined individually for the authors’ affiliations, document types, publication years, countries, and journal categories. Further, each paper was also classified according to the presence of a radiologist among the authors. **Results:** A total of 171 papers were included in our study. After 2004, there seems to be a significant amount of increase in

the number of publications. USA, Turkey, Taiwan and South Korea were the leading countries in which physiatrists make research and publish papers on MSUS. The top 5 journal categories in which these papers had been published were; Rehabilitation (44.3%), Orthopedics (14.1%), Radiology (10.7%), Neurology (8.1%) and Rheumatology (6.7%). *Implications/Impact on Rehabilitation:* The number of scientific publications of physiatrists on MSUS is increasing in parallel with the growing interest regarding its use in the daily practice of PMR clinics.

No. 365

DYNAMIC DOPPLER EVALUATION OF THE RADIAL AND ULNAR ARTERIES IN PATIENTS WITH CARPAL TUNNEL SYNDROME

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Objective: To evaluate blood flow characteristics of the radial/ulnar arteries of the hand of carpal tunnel syndrome (CTS) patients either in the neutral or provocative positions by using color Doppler imaging. *Method:* Subjects with relevant complaints of CTS and positive Tinel/Phalen tests were recruited. Nerve conduction studies were performed to confirm the diagnosis of CTS. Forty-four hands of 22 CTS patients (bilateral involvement) and 24 hands of 12 healthy volunteers were included in the study. Pulsed and color Doppler evaluations of the radial/ulnar arteries were performed by using 5–13 MHz linear-array transducer (Logiq 9, General Electric Medical Systems, Milwaukee, WI, USA) at neutral, phalen and reverse phalen positions. *Results:* Both CTS and control subjects were females and their mean age values were 50.77±7.69 and 46.42±4.32 years, respectively. At neutral position; flow volume, peak systolic velocity, end diastolic velocity and diameter values of both radial and ulnar arteries were significantly greater in CTS patients (all $p < 0.05$). When compared with the measurements at neutral position, the amount of blood flow decrease was significantly greater in the CTS group than the control group during Phalen and reverse Phalen maneuvers. The amount of blood flow decrease was not correlated with the disease duration. *Implications/Impact on Rehabilitation:* Blood flow in the hands of CTS patients is different from normal individuals both at rest and during certain hand movements. Future studies also with simultaneous monitorization of the sympathetic innervation could be beneficial to confirm the association between the blood flow and the sympathetics of the hand.

No. 366

CORRELATION OF FOOTPRINT AND RADIOGRAPHIC MEASUREMENTS IN FLATFOOT

*Merih Sarıdoğan, MD; Kerem Gun; Omer Uysal
Turkey*

Objective: The aim of this study was to determine the correlation of 3 different footprint measurement procedures and 3 different radiological assessment methods in diagnosis of pes planus. *Method:* Harris Mat foot prints of 338 hospital staff were taken and were evaluated by using 3 different measurement methods: Staheli index (SI), Chippaux-Smirak Index (CSI) and Grivas Classification System (GCS). At lateral weight-bearing radiogram of Fifty-two patients who are diagnosed with pes planus by the SI, calcaneal

pitch angles (CPA), talo-horizontal angle (THA), talo-first metatarsal angle (TMA) were used to describe the flatfoot. SPSS software was used in all statistical analysis process and statistical significance was determined as $p < 0.05$ with a 95% confidence interval. *Results:* In the study and 133 of 338 cases (39.4%) was male, and 205 of them (60.6%) was female. The average age was 38±8.6. According to the CSI: 118 (34.9%), according to SI: 63 (18.6%), according to the GCS: 9 (2.6%). pes planus was determined. There is strong correlation found among three footprint measurement methods (SI/CSI $r: 0.961, p < 0.001$, SI/GCS $r: -0.876, p < 0.001$, CSI/GCS $r: -0.886, p < 0.001$). But when we investigate whether the footprint measurement methods can give the same pes planus diagnosis, we found that the methods are statistically discordant ($p > 0.05$). We observed low correlation between CPA & TMA and each of three footprint measurement methods. (CPA/SI $r: -0.317, p = 0.001$, CPA/CSI $r: -0.420, p < 0.001$, CPA / GCS $r: 0.462, p < 0.001$, TMA/SI $r: 0.342, p < 0.001$, TMA/CSI $r: 0.332, p = 0.001$, TMA/GCS $r: -0.465, p < 0.001$). We have not observed statistically significant correlation between THA and footprint measurement methods. When we investigate consistency about the diagnosis made, we only found statistical consistency between CPA and GCS ($p < 0.05$). *Implications/Impact on Rehabilitation:* Even different footprint measurements and radiologic methods may show correlation with each other, in the diagnosis of flatfoot, they give incompatible results. Therefore, for the standardization of methods for diagnosis of flatfoot, new investigations are needed having more participants, in which the sample is choosed meticulously and comparing more measurement technique and clinical findings.

No. 367

THE EFFECTS OF FIBROMYALGIA SYNDROME ON WOMEN'S SEXUAL FUNCTION

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Objective: To compare sexual functions of women patients with Fibromyalgia Syndrome (FMS) with healthy controls and to investigate the correlation between sexual functions and clinical parameters. *Method:* Within premenopausal period, 111 patients with FMS and 103 controls were enrolled into the study. Permission from local ethic committee was provided. Demographic data were determined in patients. Scores of pain severity (Visual Analogue Scale-VAS), Tender Point Counts (TPC), Fibromyalgia Impact Questionnaire (FIQ) were detected. For all participants, scores of Beck Depression Inventory (BDI) and Female Sexual Function Index (FSFI) were also determined. In the analysis of data, tests of mean, standard deviation, student's t and Pearson's Correlation were used. *Results:* Both groups displayed similar features as to age, BMI,

Table I. Data on FMS patients and healthy ones

	FMS (n=111)	Controls (n=103)	t	p
TPC	15.67±2.58			
FIQ	6.58±1.58			
VAS	7.34±2.15			
BDI	19.77±9.33	6.97±3.77	13.21	0.00
FSFI total	21.44±5.78	27.97±5.35	-8.46	0.00
Desire	2.96±1.03	4.26±1.05	-9.06	0.00
Arousal	3.07±1.16	4.53±1.09	-9.44	0.00
Lubrication	3.94±1.08	4.35±0.62	-3.35	0.00
Orgasm	3.64±1.40	4.79±1.22	-6.36	0.00
Satisfaction	3.94±1.37	4.81±1.23	-4.87	0.00
Pain	3.86±1.47	5.22±1.18	-7.39	0.00

levels of education and income, and number of offspring ($p < 0.05$). In patients, BDI, and total scores and subscores of FSFI were higher than controls ($p: 0.000$) (Table I). In women with FMS, a negative correlation was detected between BDI score and total FSFI score ($p: 0.003$, $r: -288$), and between BDI score, and desire ($p: 0.003$, $r: -280$), orgasm ($p: 0.008$, $r: -253$), satisfaction ($p: 0.007$, $r: -253$) and pain ($p: 0.007$, $r: -263$) in FSFI subgroups. Between FIQ score, and the scores of desire ($p: 0.016$, $r: -230$), arousal ($p: 0.006$, $r: -260$), lubrication ($p: 0.011$, $r: -242$), orgasm ($p: 0.002$, $r: -287$) and pain ($p: 0.003$, $r: -289$), a negative correlation was also detected in FSFI subgroups. Sexual functions of women with FMS are poorer than healthy ones. Sexual functions of FMS patients seem to be related to the level of depression and the severity of the condition. *Implications/Impact on Rehabilitation:* During the diagnosis and follow-ups of women patients with FMS, sexual functions should also be evaluated, and patients with advanced sexual dysfunction should be referred to appropriate health centers.

No. 368

SONOGRAPHIC EVALUATION OF SCIATIC NERVES IN PATIENTS WITH LOW BACK PAIN AND SCIATICA

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Objective: To evaluate the sciatic nerves of patients with unilateral sciatica by using ultrasound and to determine whether ultrasonographic findings are related to clinical, radiological and electrophysiological parameters. *Method:* Thirty consecutive patients (10 M, 20 F) with complaints of low back pain and unilateral sciatica more than 1 month of duration were enrolled. All patients underwent a substantial clinical assessment, and they were also evaluated by electromyography and magnetic resonance imaging (MRI). Pain was also evaluated by visual analog scale (VAS) and Leeds Assessment of Neuropathic Symptoms and Signs (LANSS). A linear array probe (7.5–12 MHz) was used to scan sciatic nerves bilaterally in the prone position. Sciatic nerve diameters (thickness (short axis) and width (long axis)) and cross sectional areas (CSA) were measured bilaterally at the same level proximal to the bifurcation and midhigh, and the values from the unaffected limbs were taken as controls. *Results:* When compared with the unaffected leg; long axis and cross-sectional area values of the sciatic nerves were significantly greater on the affected sides both at the bifurcation and midhigh levels (all $p < 0.003$). The mean CSA was even more significant in patients with lumbar nerve compression on MRI. *Implications/Impact on Rehabilitation:* Sciatic nerves seem to be enlarged on the side of sciatica in patients with low back pain. Our preliminary results may provide insight into better understanding the lower-limb radiating pain in this group of patients.

No. 369

THE EFFECTIVENESS OF STRENGTHENING AND HIGH IMPACT AEROBIC EXERCISES IN POSTMENOPAUSAL WOMEN WITH OSTEOPENIA

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Objective: The aim of this study was to determine the effects of strengthening exercise (SE) and high impact aerobic exercise (HIAE) on bone mineral density (BMD), biochemical markers of bone formation and resorption, quality of life (QOL) and depression level in postmenopausal (PM) women with osteopenia. *Method:*

In a prospective, randomized and controlled trial, 42 PM women, who referred to the Osteoporosis Diagnosis and Treatment Unit in Istanbul Faculty of Medicine were included in the study and randomized to SE group (SEG, $n = 14$), HIAE group (HIAEG, $n = 14$) and control group (CG, $n = 14$). The patients in SEG and HIAEG participated in a supervised training program in our clinic which consisted of one-hour exercise session 3 times weekly for six months. All patients in three groups received 1200 mg calcium and 800 IU vitamin D supplementation per day. BMD values in lumbar spine and femoral neck, QOL and depression level were measured at baseline and 6-month assessments. Osteocalcin (OC) and cross-linked N-telopeptides of bone type I collagen (NTx) were measured at baseline, 3-month and 6-month. *Results:* Lumbar spine ($p = 0.018$) and femoral neck ($p = 0.012$) BMD values increased significantly in both exercise groups as compared to controls. Serum OC levels increased and serum NTx levels decreased in follow-up assessments ($p < 0.05$). QOL and depression level ($p < 0.001$) improved in both exercise groups. HIAE were more effective than SE at lumbar spine and femoral neck in increasing of BMD values as well as in decreasing of serum NTx levels. *Implications/Impact on Rehabilitation:* We concluded that 6-month SE and HIAE programs were effective in increasing BMD values and bone formation and in decreasing bone resorption.

No. 370

THE FREQUENCY OF MEDICAL VISITS, DRUG CONSUMPTIONS AND SURGICAL INTERVENTIONS IN PATIENTS WITH FIBROMYALGIA SYNDROME

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Objective: Fibromyalgia syndrome is a chronic condition characterized by generalized musculoskeletal pain, sleep problems, extreme fatigue, depression, anxiety and the presence of tender points in the physical examination. Because the pain is widespread throughout the body and there are various other symptoms accompanying the disease, patients with fibromyalgia syndrome frequently refer to physicians and hospitals. *Method:* In this study, 341 patients with fibromyalgia syndrome were compared with a control group of 226 healthy individuals, regarding the frequency of surgical interventions, visits to a physician/hospital and their drug consumptions. *Results:* It has been shown that patients with fibromyalgia visited a physician 2.6 times more than the control individuals and that they underwent surgical interventions 2.5 times more than the control group. In addition, it has been found that these patients were hospitalized 3.25 times more than the control group and consumed drugs 1.8 times more than other individuals. *Implications/Impact on Rehabilitation:* In our study, we concluded the increased rate of exposition to surgical interventions in fibromyalgia patients with their more frequent application to physicians; however further studies are required on this subject regarding confirmation of diagnostic and surgical procedures.

No. 371

PREVALENCE OF COMPLICATIONS IN PATIENTS WITH STROKE

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Turkey

Objective: The aim of this study was to evaluate medical complications in patients with stroke. *Method:* 228 patients with stroke (111 men, 118 women) attending the inpatient unit were included in the study. The mean age was 61.27 ± 12.05 years. A data file evaluation including patient history, demographic features and neurological evaluation were performed retrospectively. *Results:* The mean time

since the stroke onset was 1.17 ± 1.37 years. The Brunnstrom motor recovery scale was 2.71 ± 1.61 for upper extremity, 3.19 ± 1.48 for lower extremity, and 2.37 ± 1.75 for hand at admission. No significant complication was found in 47.8% of patients with stroke. The most frequent complications were found to be shoulder pain in 44.29% of patients with stroke, shoulder subluxation in 10%, lower extremity pain in 4.8%, and depression in 3.9%, respectively. *Implications/Impact on Rehabilitation:* Medical complications are common in stroke and lead to poor clinical outcomes. Diagnosing early the complications and recognizing their frequency would be important to employ appropriate preventive strategies and treatment.

No. 372

RESTORATION OF FERTILITY IN WOMEN WITH THE DIFFERENT TYPES OF ANOVULATORY MENSTRUAL CYCLE

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Objective: The aim of our research was the rehabilitation of reproductive function in women with the different types of anovulation for the correction of the main regulatory systems of female organism and haemodynamics of pelvic organs. *Method:* The ovarian hormonal function (estradiol, progesterone levels and their correlation) studied by means of radioimmune assay, system elastase- $\alpha 1$ - protease inhibitor by means of biochemical technique, the bloodfullness of the internal genitalia by means of rheographic method were examined in 36 patients of fertile age with the different types of anovulation, suffering from infertility for 2–7 years, as well as in 16 healthy non-pregnant women of fertile age. The rehabilitation therapy was performed by combined abdominal and vaginal pulsing vacuum daily for 14 days separately and in a concert with a hormonal therapy (estrogen-gestogen complexes) during 3-6 menstrual cycles. *Results:* After treatment in most of the patients we revealed the normalization of the ovarian hormoneproducing function, system proteases- proteases inhibitors and rheography figures. It has been found full restoration of ovulation cycle in 14 patients (38.9%) mainly with primary hypoestrogeny, mix of ovulatory and anovulatory cycles – in 7 women (19.4%). In 15 patients (41.7%) with primary hyperestrogeny local decompression was united with estrogen-gestagen complexes cyclic therapy during 3–6 months. During the 1st year of observation 27 women (75%) become pregnant pointed out. *Implications/Impact on Rehabilitation:* The combined method of local abdominal and vaginal decompression and hormonal therapy is effective and pathogenetically grounded, normalizing ovarian function, local proteolysis and blood circulation in pelvic organs. In women with different types of anovulation the restoration of menstrual and reproductive function can be achieved in 3/4 of patients.

No. 373

THE NEW METHOD OF LATENT CHRONIC PYELONEPHRITIS REHABILITATION IN PREGNANT WOMEN LEADS TO THE EPH-GESTOSIS PROPHYLAXIS

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Objective: The EPH-gestosis is most common and severe pregnancy complication, developing due to the generalized vasoconstriction mainly in placenta and kidneys microcirculation vessels. With the aim of early placenta and kidneys vessels spastic stricture prevention the infrared laser beam was used in 115 pregnant women with the gestational age of 20–24 weeks and latent form of chronic pyelonephritis. *Method:* Clinical, paraclinical, radioimmune, biochemical

(elastase and $\alpha 2$ -macroglobulin), instrumental (dopplerometry of placental and umbilical cord vessels) methods were used to prove the laser-beam effectiveness in 115 pregnant women of the main group (laser+ standard drugs) in comparison with 25 pregnant women of the control group (standard drugs only). Laser infrared irradiation was performed on kidney's (2–3 zones of anterior, medium and posterior lines) and placenta (4 zones) projection everyday in term (3 min. per one zone) by means of "Uzor" laser (wave length 890 nm, impulse beam, 80 Hz frequency) during 7 days. *Results:* It has been found, that after the laser application in women of the main group the significant increase of elastase activity and corresponding decrease of $\alpha 2$ -macroglobulin along with systolo-diastolic correlation falling in kidney's and umbilical cord arteries happen due to vasoconstriction decrease and elastotonic vessels properties and microcirculation improvement. The examined figures don't normalize in patients of the control group. The EPH-gestosis of different severity stages developed in 22 (24.4%) women of the main group and in 15 (60%) women of the control group. *Implications/Impact on Rehabilitation:* The infrared laser application to the placenta and kidneys regions in pregnant women with latent chronic pyelonephritis is effective and pathogenetically grounded, improving microcirculation in these organs and leads to the EPH-gestosis occurrence decrease.

No. 374

THE VALIDITY OF SELF-REPORTED FUNCTIONAL ABILITY AMONG PERSONS WITH COGNITIVE DISABILITY AND CAREGIVERS USING THE LANGUAGE INDEPENDENT FUNCTIONAL EVALUATION (L.I.F.E.) VS. THE BARTHEL INDEX

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Objective: Language, literacy, and intelligence are important barriers to measurement of function. The Language Independent Functional Evaluation (L.I.F.E.) is a video animated, language-free equivalent of the standard 10-item verbal/written Barthel Index functional assessment. This study set out to determine if is more useful than the verbal Barthel Index in self-report of function by Spanish speaking people with developmental disability and their caregivers. *Method:* Prospective cross-stional survey. 100 consecutive consenting persons with developmental disability at a Colombian rehabilitation facility, their caregivers, and their rehabilitation professionals completed the L.I.F.E. and the Barthel Index. These were compared to each other and to other variables including IQ testing. *Results:* Mean age was 19.6 (± 5.5 SD), 58% male, with IQ's averaging 52.93 \pm 13.66. 62% were completely illiterate. Caregivers were 93% female, 24% relatives, and 96% literate. Patient ($r=0.477$) and caregiver ($r=0.413$) L.I.F.E. scores related better to clinician scores than Barthel scores. Strong relations between scores existed for all 10 L.I.F.E. functions except elimination. Persons with lower IQ (35–49) rated their function on L.I.F.E., but not Barthel, similarly to the clinicians. *Implications/Impact on Rehabilitation:* The L.I.F.E. is a valid measure of function in Spanish speaking users. It may have special advantages in persons with developmental disability.

No. 375

SICKLE CELL ISSUES IN REHABILITATION: FOUR LESSONS FROM ONE CASE OF TOTAL HIP ARTHROPLASTY

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Objective: 1) To begin to identify peri-operative and rehabilitation issues that apply to sickle cell patients, especially those who are s/p THA. 2) To isolate topics for future education and research efforts. 3) To begin to identify pertinent literature pertaining to peri-operative care and rehabilitation of sickle cell patients. 4) To support the physical therapists, doctors and nursing staff who are involved in the care of sickle cell patients. **Method:** Case analysis with relevant literature review. **Results:** We identified four lessons from our one case of THA in a sickle cell patient. They are, in brief: 1) PNAVax is recommended for asplenic patients. Because sickle cell patients are functionally asplenic, they should be up-to-date on vaccinations against encapsulated organisms. We uncovered one nursing admission survey which included the response, “PNAVax not applicable.” We advocate future education on this issue. 2) Iron overload is a foreseeable complication of multiple transfusions. Sickle cell patients are subjected to frequent transfusions. Our patient underwent transfusion on POD #3. On POD#7 she was transferred to our service on PO Iron supplement. We learned that standard order sets include PO iron supplements and may not highlight exceptions for sickle cell patients. 3) Cold, along with hypoxia, pain, and acidosis, is a precipitant of sickle cell crisis. When our pain management consultant recommended ice therapy and pain meds for our patient we attempted to confirm through the literature the advisability of ice applications in post-op sickle cell patients but we were unable to do so. We believe that the use of ice in post-op sickle cell patients needs to be addressed in the literature. 4) Post-op complications from THA in sickle cell patients exceed those in non-sickle cell patients. Complications can be unique to them, including acute chest and sickle crisis, or be common to all patients, such as fever, pain, infection, dislocation, bleeding, DVT and PE. Our patient developed dizziness and exhibited T wave changes on EKG on POD#2. She required work up for PE. We noticed that symptoms and complaints of anemia, MI and PE overlap and could be confused with sickle crisis. The medical team ought to be prepared to deal with sudden complications. **Implications/Impact on Rehabilitation:** Our case highlights the need for education and research on the matter of post-op sickle cell patient s/p THA in the following ways: 1) There is need for further education of medical personnel and patients in the area of vaccinations for sickle cell patients. 2) Standard order sets for post-op sickle cell patients need to be reviewed, especially with respect to iron supplements. 3) There is a need for research on the effect of ice on the risk of sickle cell crisis on post-op patients. 4) Medical personnel and therapists need to be aware of the relatively higher risks faced by post-op sickle cell patients and education should address the need for very quick response to patient complaints or symptoms.

No. 376

THE NATURE AND PREVALENCE OF DISABILITY IN A GHANAIAN COMMUNITY AS MEASURED BY THE LANGUAGE INDEPENDENT FUNCTIONAL EVALUATION

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United States of America

Objective: Disability epidemiology is a special challenge in isolated, illiterate, or non-English speaking populations. The result is inadequate allocation of access to these groups. The current study uses the Language Independent Functional Evaluation (L.I.F.E.) to evaluate disability in a smaller Ghanaian coastal town to characterize the extent and nature of disability. **Method:** The L.I.F.E. is a video animated, language free scale modeled on the standard 10-item verbal/written Barthel Index functional assessment. Over a four-month period, the L.I.F.E. survey was given to members of the village of Anomabo in a preliminary survey which consisted of recruitment in an un-controlled manner, followed by a systematic, comprehensive survey of three neighborhood clusters. Basic demographics were also collected, along with the observer’s assessment of disability. **Results:** 541 inhabitants (264 in the preliminary survey and 277 in systematic survey) com-

pleted the L.I.F.E. Participants ranged from 7–100 years old (mean age 32.88, s.d. 20.64) and were 55.9% female. In the systematic study, 16.6% of participants had a less than perfect score on the L.I.F.E., indicating some degree of impairment. Stair climbing and bowel incontinence (both 7.2% of the population) were the most frequent functional deficits. Significant differences were found between age groups, but not between sexes, the preliminary and systematic survey, and study location ($\alpha=0.05$). **Implications/Impact on Rehabilitation:** The L.I.F.E. and this study methodology can be used to measure the prevalence of disability, even in isolated rural, non-English speaking communities with high illiteracy. Disability in this community was higher than the frequently cited estimate of 10%. African policymakers can use the L.I.F.E. to measure disability and thus more rationally allocate resources for medical rehabilitation.

No. 377

THE RELATIONSHIP BETWEEN IMPAIRMENT AND COMMUNITY PARTICIPATION: STUDY OF AMBULATION IN A COASTAL AFRICAN COMMUNITY

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Objective: The International Classification of Function metric of participation is not directly tied to ability. An understanding of the magnitude of discrepancy will guide strategies for medical and social rehabilitation. The current study uses the Ambulation Impairment Measure (AIM), a non-obtrusive observational technique to measure the actual participation of people with ambulation deficits in society that has previously been extensively investigated and systematically characterized for disability using the Language Functional Evaluation (L.I.F.E.). **Method:** The AIM involves observations to determine if an individual in a public place has ambulation ‘impairment’ (obvious severe deformity, atrophy, amputation, difficulty walking or use of an assistive device), ‘no impairment’, or ‘indeterminate’-not moving and without these physical observations. An experienced Ghanaian physiotherapist (GN) performed the AIM along the main highway and major dirt roads of Anomabo, Ghana, a small coastal village in Ghana. Findings were compared to results of a previous extensive survey (Kelemen) that included self-report of ambulation deficits on the L.I.F.E. **Results:** A total of 977 individuals were observed, 289 on the highway and 688 on dirt roads. 48% of persons were indeterminant. Four (0.8%) of persons with valid observations were found to have ambulation impairment on the AIM. This was significantly different, $\chi^2(1, n=903)=28.530, p<0.000$, from the actual percentage of 6.2% ambulation impairment found on the L.I.F.E. survey. **Implications/Impact on Rehabilitation:** In this open-air community, persons with ambulation impairments are less than 1/5 as likely to be seen participating in society compared to persons without ambulation impairment. To the extent that this ratio is replicated elsewhere, the failure to integrate African persons with disabilities into their communities represents a substantial and mostly reversible negative impact on the local economy.

No. 378

INTEGRATIVE APPROACH TO MUSCULOSKELETAL AND NEUROPATHIC PAIN: PRELIMINARY RESULTS

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Objective: 1) To evaluate feasibility of integrative medicine program to treat musculoskeletal and neuropathic pain. 2) To review the outcomes of the program for the first six months. **Method:** A convenience 6 month consecutive sample of patients with pain treated in a new integrative medicine program was included and

records analyzed retrospectively. Each patient was evaluated by physiatrist at the beginning of the program and prescribed a multi-modality treatment that included medical and rehabilitation interventions, acupuncture, and massage. Each patient completed Measure Your Own Medical Outcome Profile (MYMOP), a validated patient-centered assessment instrument able to track severity of primary and sary complaints, activity level, and well being. Data was tabulated and descriptive statistics analyzed. *Results:* Fifteen patients (6 males, 9 females) were included. The average age of the patients was 44 (SD 15). Diagnoses included myofascial pain (6), lumbosacral radiculopathy (4), musculoskeletal low back pain (3), osteoarthritis of hip or knee (3), rotator cuff tear (2), neuropathic pain (2), phantom pain (1), hip labral tear (1), cervical radiculopathy (1), pes anserine bursitis (1), patellofemoral syndrome (1). Numbers of patients whose pain lasted 0 to 3 months, 3 months to a year, and greater than a year were evenly divided. Modalities used included acupuncture (16), moxibustion (12), electrical stimulation or TENS (10), physical therapy (9), acupressure or massage (7), oral or transdermal opiates (4), oral or injectable corticosteroids (3), oral or transdermal NSAIDs (3), muscle relaxant (1), orthosis (1). Participants received a mean of 7 acupuncture treatments (SD 4.8). Seventy three percent of patients reported improvement in their primary complaint from initial evaluation to last visit. The average score for improvement of their primary complaints was 1 (on 6-point MYMOP scale). The average improvement per visit was 0.35. Sary complaint was identified by 69% of patients, and it improved in 82%. The average score for improvement of their sary complaints was 1.45, with a average improvement per visit of 0.2. Seventy five percent described activity level, and 67% felt it improved. The average improvement with activity level was 1.85. Eighty one percent of patients rated their well being, and 46% improved by the end of treatment. Patients with shorter duration of pain reported the greatest change, with the mean improvement of 3.4 from initial to final evaluation. *Implications/Impact on Rehabilitation:* Our results indicate that patients with musculoskeletal and neuropathic pain may benefit from acupuncture as part of an integrative multimodality program. Earlier treatment with acupuncture may yield the greatest results in regards to improvement of pain, activity level and patient well-being. Further studies need to incorporate larger more focused patient population.

No. 379

BILATERAL QUADRICEPS TENDON REPAIR: CHALLENGES IN PHYSICAL THERAPY

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Objective: Bilateral quadriceps tendon rupture is caused by a sudden quadriceps contraction with the knees flexed and feet fixed. Surgical repair is indicated. Healthcare practitioners rarely encounter the challenges of treating a patient s/p this diagnosis. The patient was a 51 y/o s/p fall and bilateral quadriceps tendon ruptures resulting in surgery. Patient was WBAT, allowed AROM-PROM for knee flexion and admitted to rehabilitation for gait training. Patient reported living alone in an apartment; 5/10 knee pain. Her goals were to flex her knees 90° and be discharged home independently. Patient with 30°/28° of active right/left knee flexion. MMT revealed 3-/5, 2+/5 and 3/5 for hip, hamstring and ankle musculature bilaterally. Berg Balance Score (BBS) was 7/56. Transfers were moderate assistance; ambulated 75 feet with RW, contact guard assistance and braces locked in extension. She had a good prognosis. *Method:* Treatment emphasized independence with transfers, ambulation, wheelchair mobility, ADLs, stairclimbing and home evaluation. Lower extremity strengthening and dynamic balance training was completed daily. Knee flexion was progressed with a goal of increasing 2° daily. She received scar tissue/patellar mobilization and massage daily. *Results:* Knee active/passive flexion improved to 65°/68° on the right and 70°/72° on the left lower extremities. MMT revealed 4/5 (hip/hamstrings) and 5/5 for ankle musculature

bilaterally. BBS was 30/56. She was independent with transfers, ambulation, wheelchair mobility, ADLs and stairclimbing. *Implications/Impact on Rehabilitation:* Patient achieved all goals except 90° knee flexion. Home evaluation ensured independence in the home environment. Protocols for this diagnosis differ in the literature. Literature suggests return of complete ROM; however weakness of the extensor mechanism may persist. Most patients return to work, but may have difficulty with sports. Aggressive knee flexion, strengthening and balance training should be promoted to improve outcomes following this surgery.

No. 380

MEASURE FOR QUANTIFICATION OF IMPROVEMENT AFTER ACUPUNCTURE TREATMENT: A CASE REPORT

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Objective: Physical Medicine and Rehabilitation Outpatient Clinic to see if biofeedback Measures can be used to quantify improvement after acupuncture treatment. *Method:* The patient was a 27-year-old Army veteran with history of post-traumatic stress disorder and mild traumatic brain injury presents with chronic mechanical low back and left patellofemoral syndrome. Case description: Prior to initiation of acupuncture treatments, patient reported back pain at 8/10 on the Visual Analog Pain Scale (VAS) and left knee pain at 6/10. Patient received 3 sessions of acupuncture for low back and left knee pain. Prior to the 3rd acupuncture treatment, biofeedback measures were done to assess heart rate (HR) variability, abdominal breathing, and skin conductance during rest, stressor and recovery. VAS was also documented before and after treatment. Biofeedback measures were done immediately after acupuncture treatment to assess for objective improvement. *Results:* Patient demonstrated improvement after the 3rd session of acupuncture. Improvement was seen in 1) HR variability recovery after stressor, 2) skin conductance, 3) pain scores, and 4) decrease respiratory rate with abdominal breathing. Patient reported 50% improvement in back and left knee pain immediately after 3rd acupuncture session. Overall improvement in pain scores since beginning of acupuncture treatment is 66–75%. *Implications/Impact on Rehabilitation:* In this case, there were significant improvements in all 4 measures. Currently, there are no objective measures of effectiveness for acupuncture. This case report shows potential for an assessment tool to quantify improvement. Conclusion: Future studies with larger sample sizes are needed to find an objective tool to measure effectiveness of acupuncture.

No. 381

THE REHABILITATION NEEDS OF PERSONS DISCHARGE FROM AN AFRICAN TRAUMA CENTER

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Objective: The study prospectively assesses the functional impairments and rehabilitation needs of Africans admitted to a regional trauma center. It also acts as a pilot study to demonstrate the practical use of the Language Independent Functional Evaluation (L.I.F.E.) software in an acute hospital setting. *Method:* A 5 page questionnaire was used to gather data on demographic data (age, sex, medical diagnosis, education, housing type, place of residency, occupation), cause of disability/injury, severity of disability or functional impair-

ment, and rehabilitation treatment received (type of rehab, frequency of treatment, duration of therapy, follow up therapy, equipment). Functional status on discharge was evaluated with the L.I.F.E. scale. **Results:** 84 consecutive consenting subjects were recorded. The predominant disability/injury of the respondents involved the lower extremities (70%), followed by upper extremities (23%). The mechanisms of injury were largely related to auto accidents (69%). Falls made up of 17% of these injuries and 14% were related to violence. Eleven subjects (13%) had major disabilities as measured by the L.I.F.E.. Only 14 (17%) received any rehabilitation therapy. In these patients, only physical therapy was provided, at a frequency of once a day for duration of less than a week for the majority. **Implications/Impact on Rehabilitation:** This study found that most persons admitted to a sophisticated trauma unit in Ghana are discharged without adequate rehabilitation services, and that the level of disability experienced by these people can be measured, even while they are still sick and in the hospital, using the L.I.F.E.. The implications are clear: African trauma systems must measure the long term outcome from their treatment and provide the inpatient medical rehabilitation services that are a standard of care for trauma victims elsewhere in the world.

No. 382

PERSISTENT LOW BACK PAIN, PELVIC GIRDLE PAIN AND FUNCTIONAL IMPAIRMENT IN A 6 MONTH POSTPARTUM WOMAN

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Objective: Osteitis Condensans Ilii (OCI), a benign condition of low back pain (LBP) typically affecting females, during or after pregnancy; although, it has also been found in young adults with non-pregnant females more often than males. Diastasis Symphysis Pubis (DSP) is an abnormal gap at the symphysis pubis joint. Normal separation of this joint is 4–5 mm. During pregnancy or post partum this gap will usually increase by 2–3 mm; up to 9 mm is considered physiological. A separation >9 mm is considered pathological and often becomes a source of pelvic girdle pain (PGP) in these women. **Method:** 34 y/o female presented 6 months postpartum with complaints of persistent LBP and PGP. It started in her 3rd trimester and progressively worsened. She required a wheelchair for mobility until 2 months postpartum. X-ray revealed a persistent DSP with a separation of 12 mm, OCI and possible sacroilitis. Despite aggressive conservative management, she remained functionally impaired with ambulation and ADLs due to her pain. **Results:** LBP and PGP are common symptoms experienced by pregnant women. OCI and DSP have both been closely associated to pregnancy and postpartum, as in our case; however, to our knowledge there are few cases in which both occur simultaneously, causing persistent pain, and leaving women functionally debilitated for more than 3 months postpartum. Both conditions have been shown to respond well to conservative treatment with pain management, NSAIDs and PT. **Implications/Impact on Rehabilitation:** It is uncommon for patients with a diagnosis of concomitant OCI and DSP to have pain and functional impairment persist past 3 months. Other inflammatory processes must be ruled out and if conservative management fails, patients may need to be referred for surgical intervention to treat either or both conditions. Further research may help identify risk factors for simultaneous development of these conditions.

No. 383

AN INTERESTING CASE OF MULTIPLE SCLEROSIS (MS) AND GULLIAN BARRE SYNDROME (GBS)

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United States of America

Objective: This is a case of a 47-year-old male with a 10-year history of MS and optic neuritis admitted to an acute rehabilitation unit for treatment of GBS. **Method:** The patient was diagnosed with optic neuritis and subsequently MS based on a single lesion on Magnetic Resonance Imaging (MRI). His vision improved and the patient was started on Betaseron injections which he continued until admission without any recurrences. Occasionally, the patient sustained paresthesias in his feet, but his exams and spinal MRI studies were negative. Three days prior to admission he experienced paresthesias similar to his previous episodes. However, two days later he was unable to transfer from sit to stand. He was initially diagnosed with myelitis and eventually GBS. The patient received 5 sessions of plasmapheresis and was transferred to the rehabilitation service. Electromyography demonstrated severe axonal polyneuropathy. On admission to rehabilitation, the patient had normal cranial nerves, 5-/5 strength proximally and 4-/5 distally in the upper extremities, 3-/5 psoas, 3-/5 knee flexion and extension and trace ankle dorsiflexion. He received a 5 day course of IVIG. At discharge the patient ambulated 100 feet with straight cane at a supervision level in the community, had increased lateral movement of the trunk and decreased heel strike bilaterally. **Results:** A negative spinal MRI, positive lumbar puncture for GBS, areflexia and positive electromyography established a diagnosis of GBS. **Implications/Impact on Rehabilitation:** The diagnosis of GBS in a patient with MS is unique and difficult to establish as the symptoms can present similarly. This situation is challenging diagnostically and therapeutically and Physiatrists must be able to differentiate the two conditions in order to provide the proper medical and rehabilitation treatments. There are no reported cases, to our knowledge of patients with a history of MS with new onset GBS.

No. 384

THERAPEUTIC INTENSITY AND FUNCTIONAL GAINS DURING INPATIENT REHABILITATION

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Objective: To study the effects of therapeutic intensity on functional gains for patients treated at an inpatient rehabilitation hospital (IRH). **Method:** The study subjects consisted of 592 patients discharged from an IRH in northern California in 2007. The therapeutic intensity was measured by average number of min of rehabilitation therapy per day, including physical therapy (PT), occupation therapy (OT), speech therapy (ST), and total treatment. Function was measured by Functional Independence Measure™ (FIM™), including motor, cognition, and total scores. General linear models were employed to study the association between therapeutic intensity and functional gains, controlling for confounding. **Results:** The study sample had a mean age of 60.5 years, and was 41.9% female, and 64.9% White. Two-thirds of patients had a diagnosis of stroke; 89.7% had one or more comorbid conditions. Median IRH stay was 20 days. The mean total therapy time was 185.3 min per day (PT 114.1, OT 42.8, and ST 32.3). The mean total functional gain was 25.3 (motor 18.4 and cognition 5.7). Patients who received total therapy of less than 3 h per day showed significantly lower total functional gain than those treated 3 h or longer. However, there was no significant difference in total functional gain between patients treated 3–3.5 h and over 3.5 h per day. Intensities of OT, PT, and ST were also significantly associated with corresponding motor and cognition functional gains. Young age, living alone pre-hospitalization, lower comorbidity scores, earlier admission to IRH, medical treatment, and longer IRH stay were independent predictors for functional improvement. **Implications/Impact on Rehabilitation:** The study showed significant effect of therapeutic intensity on functional gains during IRH stay and evidence of treatment intensity thresholds for optimal functional outcomes.

No. 385

IMPLEMENTATION OF CARDIAC REHABILITATION PROGRAM IN INDIA**Meeta Peer, MD***Temple University Hospital Philadelphia, USA/ Attending Physician
Moss Rehab Hospital Philadelphia, United States of America*

Objective: Implementation of Cardiac Rehabilitation Program in India. *Method:* Na. *Results:* Na. *Implications/Impact on Rehabilitation:* Implementation of Cardiac Rehabilitation Programs in India In the last few years there has been a sudden rise in the prevalence of heart disease in India. The World Health Organization estimates 60% of the world's cardiac patients in India is higher in the younger generation by 2010. Genetically the Indian populations are predisposed and vulnerable to cardiovascular disease due to the fact they are born with smaller coronary arteries. In general, even in the 21st Century the Indian population is poorly educated concerning cardiac illness and management. There is a lack of information and knowledge about cardiac rehabilitation and prevention, which can change their lifestyle and reduce morbidity and mortality. Implementation

of cardiac rehabilitation is essential and crucial in India. At present, there are very few hospitals in urban cities that offer cardiac rehabilitation programs. Fortunately, there is definite increased awareness of developing this program. In the city of Pune India, there is a state of the art, private 400 bed hospital that is in the process of developing a cardiac rehabilitation program in conjunction with the cardiology department. We are designing a multi-disciplinary program for cardiac and post-operative patients. The program is making gradually small but firms steps to become an integral part of cardiac care and rehabilitation. The goals of the program are to reduce future risk of heart disease by safe and effective exercise program after heart attack and cardiac surgery. This empowers the patients with complete knowledge of heart disease, complications and the prevention. The cardiac rehabilitation program is aimed at reducing risk factors; change in lifestyle, psychological support, and family education to prepare patients for a long and healthy life with return to work. In conclusion, in India as well as in other countries, the implementation of cardiac rehabilitation programs supervised by physicians, the cardiac rehabilitation team is vitally important. It will reduce the rising number of people suffering from the number one killer, heart disease, its complications and death.

PAIN MEDICINE

No. 386

12 YEAR EFFECTS OF PHYSIOTHERAPY-BASED REHABILITATION FOLLOWING DISC HERNIATION OPERATION: RESULTS OF A RANDOMIZED CLINICAL TRIAL***Gerold Ebenbichler¹; Silke Inschlag²; Gabriele Amtmann²; Verena Pflüger¹; Regina Stemberger¹; Martin Posch³; Klaus Novak⁴; Karl Ludwig Resch⁵****¹Physical Medicine & Rehabilitation, Vienna Medical University, ²Medical University of Vienna, ³Institute of Biomedical Statistics, Medical University of Vienna, ⁴Department of Neurosurgery, Medical University of Vienna, Vienna, Austria, and ⁵German Institute of Health Research, Bad Elster and Dresden, Germany*

Objective: Erdogmus et al (Spine 2007) provide 1 of only a few studies on the rehabilitative effects of a comprehensive physiotherapy intervention. The present study is a 12-year follow-up and aims at evaluating the long term effects of physiotherapy-based rehabilitation starting 1 week after lumbar disc surgery. **Method:** This study was a three-group, randomized, single blinded, controlled trial which took place at an outpatient department of PM&R. Of 120 patients following first-time, uncomplicated lumbar disc surgery who participated in the original study, 78 (65%) completed a 12 years follow-up examination. In the original study, patients were randomly assigned to “comprehensive physiotherapy”, “sham intervention” (neck massage), or no therapy. The main Outcome Measure was the German version of the “Low Back Pain Rating Score (LBPRS; Nuhr 2004). Sary parameters were patients’ overall satisfaction with treatment outcome and socioeconomic measures. **Results:** At 12 years after operation, the group undergoing “comprehensive physiotherapy” had significantly better functional outcomes as rated on the LBPRS than the untreated group (mean difference: -12.9 [95% CI: -2.9 ; -22.9]). In the subsequent analysis, the LBPRS outcome did not differ between physiotherapy and “sham” therapy (median: -2.7 [95% CI: -13.2 ; 7.8]). There was, however, a clinically relevant, almost significant difference between the sham therapy and no therapy (mean difference: -10.2 [95% CI: 0.36 ; -20.75]). Intention to treat analysis and per protocol analysis revealed similar results. No statistically significant between-group differences were found for the sary outcome parameters. **Implications/Impact on Rehabilitation:** A “comprehensive physiotherapy” intervention following lumbar disc surgery may produce long term health benefits over no intervention, but may not be superior to “sham”. One might speculate that “comprehensive physiotherapy” acted both psychologically and physiologically in these patients.

No. 387

LUMBAR SPINAL STENOSIS***Taslim Uddin, MD; M. Shahidur Rahman; Sujan Al Hassan****Department of PMR, BSM Medical University, Dhaka, Bangladesh*

Objective: The National Institute for Health and Clinical Excellence in the United Kingdom issued a guideline in 2006 on spinal distraction procedures for lumbar spinal stenosis. Other studies completed to date have limitations and many are not controlled to assess the efficacy of nonsurgical and surgical interventions in the treatment of spinal stenosis. This overview high lights early recognition, assessment and total care of spinal stenosis patients. **Method:** Most common symptom associated with lumbar spinal stenosis is neurogenic claudication – discomfort that radiates beyond the spinal area into the buttocks and frequently into the thigh and lower leg; it is exacerbated by lumbar extension

and improves with lumbar flexion. Laboratory Investigations are supportive and imaging studies of the spine are absolutely necessary to establish the correct diagnosis. Two measurements are used : Mid- saggital (AP) diameter and the inter pedicular (transverse) diameter of the spinal canal. On plain X-rays the lower limits of normal are usually taken as 15 mm for the ap and 20 mm for the transverse diameters. Plain X-rays have limitations because of identification of boundaries of the canal that can be more accurate on CT and MRI gives better soft tissue resolution; in any case anything less than 11 mm for the AP and 16 for the transverse is considered abnormal. **Results:** Clinical experience indicates that exercises performed during lumbar flexion, such as bicycling, are typically better tolerated than walking. Exercises that strengthen the abdominal musculature help patients maintain a posture of slight lumbar flexion and are worth trying. Use of lumbar corsets in patients with symptomatic spinal stenosis are controversial. **Implications/Impact on Rehabilitation:** It would be reasonable to refer the patient to physiatry who could suggest ways of modifying activities to avoid lumbar extension and show the patient exercises to strengthen the abdominal muscles. If the condition does not respond to these interventions, along with the use of analgesics or NSAIDs, epidural corticosteroid injections might be considered, although data on their efficacy are limited and inconsistent. The possibility of surgery should be discussed with the patient as well. If these more invasive therapies are being considered, imaging (generally an MRI scan) is warranted to evaluate the relevant anatomy. Patients should understand that nonoperative measures will probably result in slight-to-moderate improvement for a time and that surgery might be rapid relief of symptoms and improvement in functional status. However, symptoms may recur with either approach.

No. 388

THE EFFECT OF SPIRAL TAPING TECHNIQUE ON SEAMSTRESSES WITH LOW BACK PAIN: A RANDOMIZED PLACEBO-CONTROLLED TRIAL***Christiano Bittencourt Machado, PhD, PT; Carlos Alberto Vieira de Melo, PT; Carolina Coutinho Anselmo, PT; Fabiana Knupp Mafort, PT; Juliana da Silva Netto, PT***
Brazil

Objective: This work aims at evaluating the effect of the Spiral Taping (an alternative medicine technique) on seamstresses with low back pain, by means of a randomized blind-controlled trial. **Method:** Fifteen seamstresses (mean age: 34 ± 9 years old) reporting low back pain were recruited for this investigation, and they were randomly assigned to three groups: control group (CG), placebo group (PG) and Spiral Taping group (STG). The STG underwent just one intervention of the taping technique considering the called O-Ring Test, which determines tapes directions on the skin. The PG received the taping application in a random manner. No interventions were applied to CG. Pain level was blinded-assessed using a 10 cm Visual Analog Scale (VAS) before and after intervention (3-days in between). The Kruskal-Wallis test was performed to identify significant differences among groups ($\alpha=0.05$). **Results:** Subjects presented an average VAS score of 5.56 ± 1.71 cm before the intervention. The STG presented an average VAS score reduction of -5.94 ± 2.23 cm, whereas the PG and CG showed an increase of $+0.32 \pm 0.53$ cm and $+1.60 \pm 1.81$ cm, respectively. Spiral Taping reduced significantly the reported pain level ($p < 0.01$). **Implications/Impact on Rehabilitation:** The Spiral Taping technique, as a complementary and alternative medicine therapy, may reduce reported low back pain level in seamstresses and other seated workers, showing that it can be a promising low-cost therapeutic tool in daily rehabilitation practice, without causing any side effects.

No. 389

MEASUREMENT PROPERTIES IN PHYSICAL EXAMINATION OF THE UPPER EXTREMITIES FOLLOWING MOTOR VEHICLE RELATED INJURY

Dinesh Kumbhare, MD, MSc; William Parkinson, PhD; Suneel Upadhye, MD; Scott Branny, BSc; Erik Christenson, BSc; Mark Clebus, BSc; Brent Lammers, BSc; Jonathan Adachi, MD

Canada

Objective: This study was performed to examine measurement properties of commonly used assessment methods for patient having motor vehicle accident related pain and injury to the spine and shoulders. Assessment methods included movement ranges, tenderness to palpation (spinous processes, paraspinals, supraspinatus and biceps tendons, AC and SC joints), right-left difference in grip strength, and specialty shoulder tests (Hawkins-Kennedy, Cans, Speeds, Apprehension). **Method:** Inter-rater reliability was tested in the same session by 3 examinations of each patient using different clinicians and analysed using the intra-class correlation coefficient (ICC). Concurrent validity against the Neck Disability Index (NDI) was investigated using Pearson r correlations. Discriminant validity was approached by comparing the frequency distributions for each assessment technique between adults who had motor vehicle accidents and Grade II whiplash associated disorders ($n=11$) versus uninjured volunteers ($n=12$), with statistical significance established by t -tests. **Results:** ICC across raters, for ranges by goniometer, were: cervical (3 planes combined) = 0.97; shoulders (3 planes combined) = 0.93; tenderness (all structures combined) = 0.85; shoulder tests = 0.65; grip = 0.98 (all $p < 0.0001$). The NDI correlated moderately with cervical range (Pearson $r = -0.60$), tenderness ($r = 0.76$) and specialty tests ($r = 0.50$) but not with grip discrepancy ($r = 0.02$). T -tests comparing frequency distributions demonstrated good separation of injured and non-injured populations using cervical range ($p < 0.01$), shoulder range ($p < 0.001$), tenderness ($p < 0.001$) and shoulder tests ($p < 0.05$), but not grip discrepancy ($p < 0.67$). Tenderness showed the strongest Effect Size. **Implications/Impact on Rehabilitation:** The findings are consistent with a general pattern of high reliability and moderate validity of cervical range measurement, and contribute evidence suggesting good measurement properties for shoulder range by goniometer, tenderness by palpation, and the selected shoulder tests. The findings support the use of these measurement approaches for reliable and valid assessment of patients who have had motor vehicle accidents.

No. 390

SIX MONTH MUSCULOSKELETAL RECOVERY FOLLOWING MOTOR VEHICLE ACCIDENT RELATED INJURY

Dinesh Kumbhare, MD; William Parkinson, PhD; Joseph Cherian, MD; Frank Baillie, MD; Niv Sne, MD; R. Brett Dunlop, MD; Jonathan Adachi, MD

Canada

Objective: The objective is to provide interim results from an ongoing study on the natural history of soft-tissue pain following motor vehicle accidents. The study was prompted by the controversy surrounding this subject, which may be related, at least in part, to the paucity of physical examination data, how the examination changes over time, and to the type and range of other outcome indicators in the literature. **Method:** To date, nineteen adults (11 women, 8 men) were examined within 2 weeks and at 6 months following a motor vehicle accident. The clinical examination included goniometer ranges in the cervical spine and shoulders, and palpation tenderness (scaled 0, 1, 2). Range of motion was contrasted with normal values to examine impairment in 3 cervical planes and 3 shoulder planes. Outcome measures included, follow-up physical exam using standardized impairment scores, as well as a 0 to 6 numeric

pain scale and pain diagrams. Changes over time were analyzed by correlated t -tests. **Results:** All outcome measures except tenderness showed statistically significant improvements ($p < 0.05$). Mean acute neck pain was 3.4/6 (SD=1.4) with 25% of body surface in pain (SD=23%) and 2.3 of 11 points being tender (SD=1.7). Average improvements at 6 months were only 21% for pain, 30% for anatomical distribution, and mean tenderness worsened slightly from 2.8 (SD=3.1) to 3.1 positive anatomical points (SD=4.2). In the acute stage, 11/19 had impairment in all 3 cervical planes and 9/19 had impairment in shoulder flexion or abduction. At 6 months, this had improved to 8/19 and 4/19, respectively. Seven (37%) were not working at 2 weeks, but only 3 (16%) were off work at 6 months. Of these 3, 1 was not working prior to the accident, 1 had the only detected tear (close to full thickness supraspinatus) and 1 could not obtain modified work. **Implications/Impact on Rehabilitation:** Within the clinical range studied, the findings suggest that while improvement was detectable statistically, there was only modest clinical improvement in pain and movement, with best improvement in shoulder ranges. Despite only modest physical improvement, the majority of individuals returned to work. A larger sample is needed before this study could influence practice.

No. 391

THE EFFECT OF SEGMENTAL NEUROMYOTHERAPY ON MYOFASCIAL PAIN SYNDROME

Yanyan Yang, MD; Mouwang Zhou; Dai Li; Nan Liu; Li Gu
China

Objective: To study the effect of segmental neuromyotherapy (SNMT) on myofascial pain syndrome patients (MPS), and its influence on the patients' function recovery. **Method:** 32 MPS patients were involved in this study, 12 patients' range of motion (ROM) training of knee joints were delayed by the pain. All the patients received SNMT therapy, followed by normal functional rehabilitative training. 0–10 Numeric Rating Scale (NRS) were valued by the patients before and after SNMT therapy, and 1 week, 4 weeks, 3 months and 6 months after the treatment. To the patients whose ROM training were delayed by the pain, passive range of motion (PROM) were measured before and after SNMT therapy, and also 6 months after the treatment. **Results:** The average NRS marks were 7.57 ± 1.18 before SNMT therapy and 3.75 ± 1.9 immediately after, 2.55 ± 1.70 6 months after. Both of the latter changed significantly to the marks before SNMT therapy ($p = 0.000$ and 0.044 separately). To the patients whose ROM training were delayed by the pain, the average ROM before SNMT therapy was 97.50 ± 30.11 degree and 107.92 ± 29.11 immediately after the treatment, 135.83 ± 7.02 6 months after the treatment. Both of the latter changed significantly $p = 0.001$ and 0.000 separately. **Implications/Impact on Rehabilitation:** This study proves that SNMT has immediate and long-term effects on MPS. To the patients who have pain-related ROM limitation, SNMT can help to develop the PROM immediately. So, we can say, this technique can be practiced not only in the "normal" pain patients, but also in those whose function need be developed in time.

No. 392

THE EFFECTS OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION ON NEURONAL NITRIC OXIDE SYNTHASE IN THE DORSAL ROOT GANGLIA AND ASTROCYTES IN THE SPINAL CORD IN RATS WITH EXPERIMENTAL NEUROPATHIC PAIN

Tiecheng Guo, MD; Jingfei Xu, MD
China

Objective: To explore the cellular and molecular mechanisms through which repetitive transcranial magnetic stimulation (rTMS)

relieves neuropathic pain with a neuropathic pain model established in rats. *Method:* A total of 28 rats were divided into a sham-operation group and a test group, and the test group in turn was divided into a sham-rTMS group, a 1Hz group and a 20 Hz group after a neuropathic pain model had successfully been established surgically. rTMS was applied to the M1 region contralateral to the pain once daily for 10 consecutive days with a circular coil over the M1 area's projection on the skull surface. Stimulation was administered at 1 Hz or 20 Hz to the corresponding groups. Behavioral tests, including tests for mechanical allodynia and heat hyperalgesia, were performed with all the rats on the day before and 3 days after the surgery, as well as the day after the last (genuine or sham) rTMS treatment. The expression of nNOS and GFAP were examined in DRG and lumbar spinal cord, respectively, by using immunohistochemical technique. *Results:* rTMS at 20 Hz applied to the primary motor cortex (M1) contralateral to the pain once daily for 10 consecutive days was found to reduce over-expression of neuronal nitric oxide synthase (nNOS) in dorsal root ganglia, and glial fibrillary acidic protein (GFAP), specific activation markers for astrocytes in the spinal cord while mechanical and thermal hyperalgesia were significantly relieved. rTMR at 1Hz, however, showed no such effects. The degree of pain relief and the expression of nNOS and GFAP were negatively correlated. *Implications/Impact on Rehabilitation:* The results suggest that high-frequency rTMS can relieve neuropathic pain through down-regulating the overexpression of nNOS and inhibiting the activity and proliferation of astrocytes in the dorsal horns of the spine.

No. 393**A STUDY OF ULTRASOUND-GUIDED INJECTION TREAT FROZEN SHOULDER**

Sheng Bi, MD, PhD; Luo Yukun Lijun
China

Objective: To investigate the clinical effects of frozen shoulder treated by ultrasound-guided injection. *Method:* Thirty-three patients received this treatment with ultrasound guided injection of triamcinolone acetonide 40 mg, 2% lidocaine 5 ml. VAS and Constant & Murley were used to assess before treatment, and review within 7–14 days after treatment. Four cases dropped out, and completed a full assessment of 29 cases. Paired *t*-test was used for statistical analysis, significance level was $p < 0.05$. Patients dropped out were treated by intention to treat *Results:* After ultrasound-guided injection for frozen shoulder, VAS decreased from 6.8 ± 1.9 to 3.5 ± 2.3 ($p < 0.01$); Constant & Murley shoulder function score increased from 33.7 ± 12.0 to 45.2 ± 12.2 ($p < 0.01$). *Implications/Impact on Rehabilitation:* Ultrasound-guided injection on frozen shoulder obtained better clinical efficacy. It is a kind of promising treatment in pain medicine.

No. 394**GAIT CHARACTERISTICS OF REHABILITATION TREATMENT IN PATIENTS WITH KNEE OSTEOARTHRITIS**

Shuyun Jiang, PhD; Min Fang, PhD; Lixi Chu; Gaofeng Zhu
China

Objective: This research aims to develop more effective treatment and more objective evaluation measure by evaluating the lower extremity walking function rehabilitation of patients with knee osteoarthritis and discussing the rehabilitation effect of multiple treatments including manipulation and therapeutic exercise while viewing function recovery more important than pathology changes physically. *Method:* By employing the 3D Gait Analysis System (Motion Analysis Corporation, USA), 81 examples of knee osteoarthritis patients were observed before and after therapeutic exercise and/or manipulation, then their changes on a) walking ef-

iciency, such as step length, velocity, stance phase, and b) balance capability, such as double support time, step width were compared and analyzed. *Results:* It is showed that there were improvements on several indexes, such as velocity, double support time, etc. on both two groups, in one of which patients are treated by therapeutic exercise only and in another they are treated by two measures, as is statistically significant. At the same time, it is concluded that there is better improvement on step length on patients who take the manipulation and therapeutic exercise than that on ones who take therapeutic exercise only. *Implications/Impact on Rehabilitation:* It is demonstrated that manipulation affects passively while therapeutic exercise affects in the opposite way. Also, the treatment combining both could improve lower extremity walking function and the knee joint stability of knee osteoarthritis patients remarkably. As a worthwhile remedy, this combination will improve the walking efficiency and balance capability of patients, also their walking ability and Quality of life of knee osteoarthritis patients.

No. 395**EFFECT OF A HYDROTHERAPY SESSION IN PAIN OF AMBULATORY PATIENTS**

Juliana Rangel-Leon, MD; Maria Leonor Rengifo-Varona; Juan Bernardo Hoyos-Gutierrez
Colombia

Objective: To determinate the effect of a hydrotherapy session in perception of pain in ambulatory patients. *Method:* All patients with pain of any etiology, who assist at the hydrotherapy service of the Clinica Universitaria Teletón (CUT) during a work-week were evaluated, to determinate the visual analog scale (VAS) at the beginning and ending at the session, age, pain evolution time and hydrotherapy techniques. *Results:* A total of 56 patients assisted at hydrotherapy service of CUT during a work-week, 40 had chronic pain, were 22 men and 18 women, with time evolution average of 10 and 9 months, a mean age of 51 and 47 years, respectively; compromising musculoskeletal system 26/40, soft tissues and tendons 12/40, with VAS at the beginning of 5/10 and at the end of 2/10 each group, and central nervous system 2/40 with VAS at the beginning of 7/10 and at the end of 4/10. Only one man with rotator cuff injury had a VAS at the beginning of 7/10 and at the end of 8/10; in the others cases, the patients had a significative decrease in VAS after a session of hydrotherapy. Techniques used were Whirlpool-tank 19, pool-hydrotherapy 10, affusion-shower 9, Hubbard-tank 1 and tub 1. *Implications/Impact on Rehabilitation:* This report shows a decrease in two points in 39/40 patients in VAS after a session hydrotherapy, becoming an alternative for the treatment of pain, doing a longer treatment and seeing the response across the time. In our country are not studies of the efficacy of hydrotherapy in the management of pain; this is a useful technique, available in our clinic, for the treatment of pain of different etiologies. It is a first approach to our community, and it is necessary to do other studies to confirm in a large population our finding.

No. 396**HAND COMPRESSION SYNDROME CAUSED BY ERGONOMIC BAD POSITION WHILE WORKING ON COMPUTER**

Renata Cop, MD; Tatjana Cikac, MD; Silva Potrebica, MD; Zvonko Kejla, MD; Dalibor Drugovic, MD
Croatia

Objective: To show patient of younger age group with compression syndrome in dominant hand caused by computer usage. Furthermore, to show diagnostics, modes of treatment and the importance of ergonomic adaptation while working on the computer. *Method:* 24 patients having clinical manifestation of nervus medianus or nervus ulnaris, during the clinical examination questionnaire on professional activities and on the position of the dominant hand

and radiological work up and EMNG diagnostics have been made. Medical treatment was three-fold: medications, physical therapy-kinesiotherapy, laser therapy and ultrasound and by ergonomic adaptation of the workplace surface. *Results:* 24 patients have been included in the study, of it 21 women and 4 men, in the age from 27 to 32, all have been working for 5 years, at average about 8 h daily on their personal computers. Clinical status – compression syndrome of nervus medianus had 21 patients and 3 patients had compression of nervus ulnaris. Questionnaire analysis on professional position of dominant hand showed predilective-flexed-compression of hand position and forearm in relation to the workplace surface and keyboard and computer mouse. *Implications/Impact on Rehabilitation:* Conclusion: the appearance of dominant hand compression syndrome caused by working on the computer, requires apart from medication therapy and physical therapy necessary ergonomic adaptation of the workplace surface, then the adaptation of the keyboard and the computer mouse. The entire approach leads to the improvement in the clinical manifestation.

No. 397

ELECTROMYOGRAPHIC EFFECT OF TENS ON PATIENTS SUFFERING FROM LOW BACK PAIN – A PILOT STUDY

Evren Atabas, MD

Germany

Objective: Chronic low back pain (LBP) is associated with elevated muscle tension of the Muskulus Erector Spinae. This tension can be measured by surface electromyography (sEMG) and used for evaluation of therapy success. Transcutaneous electrical nerve stimulation (TENS) is one of many therapy options in the treatment of chronic LBP. While it reduces evidently pain sensation the question arises what kind of effect it could have on muscle tissue of patients suffering from LBP. *Method:* In this pilot investigation 10 patients (age 47.9 ± 9.1) with chronic LBP were treated once with HAN STIM (Schwa-Medico, Germany). Subjective sensation of LBP was measured by a visual analogue scale (VAS) with a range from 0 to 100 before treatment and immediately after treatment. Additionally muscle tension was measured before and after treatment by sEMG (SinfoMed, Hürth). Four electrodes were placed paravertebral of the lumbar spine. The intensity was regulated by the patient himself. The session lasted thirty min. Inclusion criteria was chronic LBP for at least 6 months. Exclusion criteria included pregnancy, neuro-muscular disorders, muscle atrophy, leg pain, a history of back pain and pacemaker. *Results:* After treatment a reduction of muscle tension from 50.86 ± 36.91 to 27.25 ± 19.64 ($p < 0.002$) microvolt could be observed. The VAS was reduced from 7.3 ± 1.06 to 4.4 ± 0.9 ($p < 0.0001$). *Implications/Impact on Rehabilitation:* HAN STIM leads to fast reduction of pain sensation. Additionally positive effects on muscle tension can be observed. Further investigation will follow in order to evaluate these findings and compare these results with other electrotherapeutic treatment strategies like midfrequency electrotherapy.

No. 398

THE IMMEDIATE ANALGESIC EFFECTS OF MANIPULATIVE COMPRESSION ON KNEE OA PAIN

Masaaki Nakajima, PT, PhD; Atsuko Hirohata; Yuki Miyake; Ryuji Kobayashi, PhD; Yasushi Sanenobu; Ryoko Yamaoka; Mika Okuda; Dolly Kelepecz, PhD
Japan

Objective: The main problem in knee osteoarthritis (OA) is pain around the knee. We have successfully developed a manipulative technique that effectively eliminates knee OA pain. Here we demonstrate the efficacy of this technique for the treatment of knee OA pain. *Method:* Ten knee OA patients participated in this study.

The ages of the subjects ranged from 60 to 87 years. Manipulative compression by hand was performed all over the lower-limb muscles of the patients. The lower-limb muscles were strongly compressed within the range in which the patient does not feel pain, and each compression was held for 20 s. Each manipulative compression was performed in linear sequence throughout the lower limb that was experiencing pain. The following evaluation items were recorded before and after this therapy: visual analogue scale (VAS) for the evaluation of pain and muscle stiffness; muscular hemodynamics; oxygen saturation of muscular tissue (StO_2); and total Hb. The evaluated site of muscle stiffness and hemodynamics is gastrocnemius. *Results:* VAS was reduced from 47.8 ± 20.0 mm to 8.4 ± 9.6 mm (mean \pm SD). Muscle stiffness was reduced from 7.9 ± 4.0 to 2.8 ± 1.8 . StO_2 increased from $61.4 \pm 6.2\%$ to $66.2 \pm 4.9\%$. Total Hb stayed stationary. *Implications/Impact on Rehabilitation:* Our research suggests that the approach of using manipulative compression on lower-limb muscles is effective against knee OA pain. It would appear that the analgesic efficacy of this technique is due to the deprivation of pain sensation by pressure stimulus and the elimination of pain-producing substances from the muscles through the increase in muscular blood flow. This technique does not require special tools and it is easy to perform. In particular, this technique has important clinical implications in that it can rapidly relieve agonizing pain in knee OA patients.

No. 399

PAIN MEASUREMENT OF STROKE PATIENTS BY SKIN IMPEDANCE

Kenji Kagechika, MD

Japan

Objective: To examine whether it is possible to evaluate of the pain by the measurement of the change in the skin impedance in patients with stroke. *Method:* The skin impedance obtained from the electrode applied to the hand was measured, and it made comparative study of the value before and after the pain treatment. The patients with omalgia and the low back pain in paralyzed side were done the hyperthermia of hot pack and the xylocaine intramuscular injection, and visual analogue scale was compared additionally before and after treatment as sight scale. *Results:* For the patients with omalgia and the low back pain, the difference was admitted in the individual value that was able to be put in the resting state, and the change was seen in response to the state of their posture. Impedance decreased with the exacerbation of the pain, and it has increased with the improvement of the pain sensation. The larger the improvement of the pain sensation was, the smaller increases of impedance when the low back pain was improved by the effect of the hyperthermia. *Implications/Impact on Rehabilitation:* The pain is a subjective phenomenon, and it is changeable. The objective evaluation is difficult because there are extremely a lot of troubles that cause the pain. The improvement of the pain and the change in the skin impedance were in the correlation. It was suggested that a quantitative evaluation of the pain sensation was possible though it was thought the change of the pain took place through the autonomic nerve system.

No. 400

INFLAMMATION OF ANTERIOR SUPRAPATELLAR FAT PAD – CASE REPORT

Sabrina Pimentel; Moura Gonçalves; Vieira de Melo, Carlos Alberto; Fernando Parada
Portugal

Objective: To present a clinical case of inflammation of anterior suprapatellar fat pad as an unusual cause of anterior knee pain. *Method:* Case report of a 45-year-old male patient with progressive anterior knee pain aggravated by kneeling and prolonged standing and refractory to rest and conservative measures. *Results:* After

having identified the inflammation of anterior suprapatellar fat pad as the cause of anterior knee pain and after having performed an ultrasound-guided injection of the fat pad with corticosteroid and local anaesthetic, the patient was free of symptoms. *Implications/Impact on Rehabilitation:* The case report highlights that inflammation of anterior suprapatellar fat pad is an option that should be considered in the differential diagnosis of anterior knee pain.

No. 401

USEFULNESS OF ULTRASONOGRAPHY FOR DETECTING LOCAL TWITCH RESPONSES OF MYOFASCIAL TRIGGER POINTS IN THE LOW BACK MUSCLES

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Republic of Korea

Objective: The first aim of this study is to assess the usefulness of ultrasonography for detecting local twitch responses (LTRs) of myofascial trigger points (MTrPs) in deeply located low back muscles compared with superficially located upper trapezius muscles. The second aim of this study is to investigate the clinical importance of eliciting LTRs during trigger point injection for pain reduction. *Method:* Forty-one patients (15 men, 26 women; mean age, 51.8 ± 11.8 year; range, 26–72 year) with MTrPs in the upper trapezius muscle and sixty-two patients (31 men, 31 women; mean age, 56.8 ± 11.9 year; range, 33–86 year) with MTrPs in the erector spinae or quadratus lumborum were included in this study. One investigator performed the trigger point injections with observing LTRs on ultrasonography and the other investigator observed LTRs visually during the procedure. Both investigators counted the number of LTRs. Subjective pain intensity was assessed by a visual analogue scale (VAS) before and immediately after trigger point injection. *Results:* In the upper trapezius muscles, all the LTRs were detected with both ultrasonographic and visual inspection. In the low back muscles, ultrasonography detected the 196 LTRs from the visually-undetected 849 LTRs (23.1%). When all the LTRs in both upper trapezius and low back muscles were analyzed, the ability of ultrasonographic detection significantly increased in the deeply located muscles ($p < 0.001$). The alleviation of VAS in the LTR(+) group was more significant than in the LTR(-) group after injection ($p < 0.001$). *Implications/Impact on Rehabilitation:* Ultrasonographic examination was more sensitive for detecting LTRs of MTrPs than visual inspection, especially in deeply located muscles. These findings suggest that ultrasonography guidance may improve the therapeutic efficacy of trigger point injection for the MTrPs of deeply located muscles in patients with MPS.

No. 402

THE EFFECT ON FOS EXPRESSION IN RAT SPINAL CORD FOLLOWING STIMULATION TO DORSAL ROOT GANGLION BY PULSED RADIOFREQUENCY

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Objective: To reconfirm the relationship between the Fos expression and the pulsed radiofrequency (PRF) which very few articles have reported. *Method:* Thirty-four male Sprague-Dawley rats were enrolled: 8 for lumbar 3rd dorsal root ganglion (DRG) stimulation, 4 for L3 and L4 DRGs, 5 for C5 and C6 DRGs, 8 for sham L3 DRGs, 5 for sham L3 and L4 DRGs, and 4 for sham C5 and C6 DRGs. Without

laminectomy, each lumbar DRG was stimulated with PRF for 2 min 2 times with 42°C. Sham group was stimulated with PRF electrode but without any stimulation. Three hours after the stimulations, spinal cord was thin sectioned for immunohistochemistry and Fos expression was calculated. Individual sections were digitized with 4,096 gray levels using a computer assisted image analysis system. With laminectomy, cervical DRGs was stimulated with the same method of lumbar DRGs. Sham stimulation was applied to the sham group. *Results:* No significant difference of Fos expression was observed on dorsal horn of rat in operated site, 3 h later after operation, between the PRF and sham group in lumbar DRGs and the PRF and sham groups in cervical DRGs. *Implications/Impact on Rehabilitation:* By defining the mechanism of PRF, be the help to treat patient with pain.

No. 403

THE EFFECTIVENESS OF EXTRACORPOREAL SHOCK WAVE THERAPY ON MYOFASCIAL PAIN SYNDROME

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Objective: This study evaluate the effect of extracorporeal shock wave therapy on patients suffered with chronic low back pain from myofascial pain syndrome. *Method:* 43 patients with chronic low back pain were selected and classified into two groups, control (21 patients) and study group (22 patients). There was no significant difference between two groups in age, height, body weight, visual analogue scale, medical outcomes study short form-36 and Oswestry disability index before in this study. Control group received conventional rehabilitation therapy including heat and electrical therapy with therapeutic exercise. Study group received additional eight session of extracorporeal shock wave therapy (0.10–0.15 mJ/mm² FED, 1000 impulse, 4Hz, weekly). All patients were assessed improvement of back pain using visual analogue scale, medical outcomes study, Oswestry disability index, β -endorphin before treatment and at 8 weeks. *Results:* Before the treatment, two groups showed no significant difference in each value. After 8 weeks treatment, the study group showed significant improvement in visual analogue scale, medical outcomes study, Oswestry disability index and β -endorphin level than control group ($p < 0.05$). *Implications/Impact on Rehabilitation:* It seems that extracorporeal shock wave therapy would be useful as a additional tool of rehabilitation in patients with chronic low back pain due to myofascial pain syndrome.

No. 404

THE EFFECT OF EXTRACORPOREAL SHOCK WAVE THERAPY IN MYOFASCIAL PAIN SYNDROME

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Objective: To investigate the effect of the extracorporeal shock wave therapy (ESWT) in myofascial pain syndrome. *Method:* Twenty-four myofascial pain syndrome patients (9 men, 15 women; age 48.6 ± 12.8 years; duration 10.9 ± 4.22 months) were recruited. They were randomly divided into two groups. In ESWT group ($n = 12$), ESWT was applied to the most painful trigger point. Six hundred pulses of 0.03 mJ/mm² and two thousand pulses of 0.05 mJ/mm² at 180 pulse per min were applied using Dornier AR2 (Donier MedTech, Kennesaw, USA). In conventional physical therapy (PT) group ($n = 12$), hot pack was

applied to scapular region for 30 min, then, transcutaneous electrical nerve stimulation (TENS; 20 Hz, 10–50 mA) was applied to the same region for 15 min. ESWT was performed twice a week, for 2 weeks. Conventional PT was applied three times a week, for 2 weeks. Before and after treatment, pain was checked by visual analogue scale (VAS), socio-psychologic factor by Korean SF-36, and subjective stresses by Goldberg General Health Questionnaire (G-GHQ). *Results:* Before treatment, 1) VAS, Korean SF-36 and G-GHQ were not significantly different between both groups ($p > 0.05$). After treatment, 2) Pain was more reduced in ESWT group than in PT group ($p < 0.05$). 3) Korean SF-36 was decreased in both groups, however, there was no significant difference between both groups ($p > 0.05$). 4) G-GHQ of each group was not significantly different before and after treatment ($p > 0.05$). *Implications/Impact on Rehabilitation:* ESWT would be an effective therapeutic modality for the reduction of pain and improvement of quality of life in myofascial pain syndrome.

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No. 405

THE EFFECT OF REGULAR EXERCISE PROGRAM ON NEUROPATHIC PAIN IN SCIATIC NEUROPATHY RAT MODEL

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Objective: To investigate the effect of regular exercise program on neuropathic pain in sciatic neuropathy rat model. *Method:* Thirty-six male Sprague-Dawley rats underwent sciatic nerve crush injury using a needle holder with an intensity of grade two click for 30 s at 1 mm proximal to the branching site of sciatic nerve. Thirty rats developed neuropathic pain on hind paw were randomly assigned into 5 groups: (A) control group ($n = 6$); (B) swimming group ($n = 6$); (C) low intensity (mean speed of 8 m/min) treadmill exercise group ($n = 6$); (D) moderate intensity (11 m/min) treadmill exercise group ($n = 6$); (E) high intensity (14 m/min) treadmill exercise group ($n = 6$). Swimming or treadmill exercise was performed 20 min a day, 5 days a week, for 4 weeks. Motor function of sciatic nerve was measured by sciatic function index (SFI). Withdrawal frequency of affected hind paw to innocuous mechanical stimuli using Touch Test Sensory Evaluator™ (North Coast Medical Inc., Canada) and withdrawal latency to heat using Plantar Test® (Ugo Basile, Italy) were measured at 1st, 3rd, 7th, 14th, 21st, 28th day after the onset of regular exercise program. Histopathological study for sciatic nerve and brain derived neurotrophic factor (BDNF) immunohistochemistry for spinal cord were conducted. *Results:* SFIs significantly increased in all treadmill exercise groups compared to control group ($p < 0.05$). Withdrawal frequencies significantly decreased in moderate intensity treadmill exercise group compared to control group ($p < 0.05$). Withdrawal latencies significantly delayed in swimming exercise group compared to control group ($p < 0.05$). Histopathological study for sciatic nerve showed more regenerating fibers in the exercise groups. BDNF in the spinal cord was more expressed in the exercise groups. *Implications/Impact on Rehabilitation:* Regular exercise program, especially moderate intensity treadmill exercise and swimming exercise would be helpful for the improvement of neuropathic pain after peripheral nerve injury.

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No. 406

THE RELATIONSHIP BETWEEN MEDIAL LONGITUDINAL ARCH AND SONOGRAPHIC EVALUATION OF PLANTAR FASCIITIS - PRELIMINARY STUDY

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Objective: To investigate the relationship between medial longitudinal arch and sonographic evaluation of plantar fasciitis. *Method:* This study evaluated 21 patients with ipsilateral plantar fasciitis who had heel pain not more than 12 months. The medial longitudinal arch was assessed as calcaneal-first metatarsal angle using weight-bearing lateral foot roentgenograms. The thickness of the proximal plantar fascia was determined from sagittal sonograms of both feet and thickness ratio was obtained from symptomatic plantar fascia thickness divided by asymptomatic fascia thickness. The relationship between arch angle and fascial thickness ratio was investigated using correlations. Qualitative parameters such as decreased echogenicity, intrafascial rupture, and calcification of plantar fascia were also noted. *Results:* The mean arch angle was 129° and mean fascial thickness ratio was 1.50. There was no significant correlation between arch angle and fascial thickness ratio in patients with ipsilateral plantar fasciitis ($r = 0.056$ and $p = 0.808$). Mean plantar fascia thickness was measured 4.6 mm in symptomatic heel, 3.1 mm in asymptomatic heel and there was a statistically significant difference between symptomatic and asymptomatic plantar fascia thickness. We found hypoechoic fascia in all patients but one, intrafascial rupture in 1 patient, and perifascial effusion in 3 patients (14%) who had arch angle above 130 degrees. No fascial calcification was identified. *Implications/Impact on Rehabilitation:* The medial longitudinal arch was not associated with the sonographic severity of plantar fasciitis.

No. 407

PROFESSIONAL CHRONIC LOW BACK PAIN IN DENTAL MEDICINE

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Romania

Objective: Low back pain has been defined as the pain and discomfort arising in the lumbar region, with or without nerve root involvement, mostly of mechanical cause induced by the injury of the tissues and/or vertebral structures (intervertebral discs, ligaments, vertebral pedicles). Lately, low back pain has become more and more common among dental surgeons, having a strong impact both on their professional activity and on their everyday life. To identify the underlying conditions that lead to the occurrence of low back pain in dental surgeons and establishing the best prophylactic and therapeutic measures in recuperation, revealing the importance of an early complex sustained medical rehabilitation. *Method:* The study was conducted in one year period, and focused on thirty dental surgeons, aged between 26 and 55 years, suffering from chronic low back pain. They were selected from a group of 237 dentists from Timisoara included in a screening program of chronic low back pain by a special designed questionnaire. Five assessments were performed: an initial assessment (a complex clinical exam, low back pain during and after professional activity – Visual Analogue Scale (VAS), lumbar spine X-ray-profile, pelvis X-ray, lab investigations: ESR, quantitative CRP), three intermediate assessments (complex clinical exam, VAS) at one/three/six months, and a final assessment (complex clinical exam, VAS, lumbar spine X-ray-profile) at 1 year. The 30 subjects were divided into three homogeneous groups and differential treatment was applied on each plot according to their agreement and compliance: group 1- drugs; group 2- drugs and physiotherapy in a medical unit; group – drugs, physiotherapy in a

medical unit, home special medical gym programme and lumbar orthosis during labour. *Results:* Professional chronic low back pain in dental surgeons is closely related to the number of working hours/day, the number of years in exercising the profession, the exercise taken in the spare time, while therapeutic success depends on the complexity of the treatment and on patient compliance. *Implications/Impact on Rehabilitation:* Dental surgeons suffering from professional chronic low back pain who received complex treatment of recuperation had a significant improvement in quality of life, even including the disappearance of recurrence.

No. 408

**THE TREATMENT WITH OXYGEN OZONE
IN THE LUMBAR DISK HERNIATION – CASE
PRESENTATION**

Adriana Dragan, MD; Gilda Mologhianu, MD

Romania

Objective: This poster presents a particular case of severe lumbar disk herniation treated successfully only with oxygen ozone. *Method:* The poster presents the case of a 44-year-old man with disk herniation at L5–S1 level with a 12 mm detached fragment and compression on S1 right root. He only received 15 treatments of oxygen ozone in a period of one month and the improvement appeared after the first injection of oxygen ozone. *Results:* At the end of the 15 sessions the patient had no symptoms and after one year the situation is yet unchanged; he has been able to work and continue his daily activities with no restrictions. *Implications/Impact on Rehabilitation:* The oxygen-ozone treatment can be an alternative for the “classical” treatment of the lumbar disk herniation that has no adverse effects and only two contra-indications: hyperthyroidia and favism.

No. 409

**CLINICAL EFFECTS OF ULTRASOUND THERAPY
IN KNEE OSTEOARTHRITIS IMPROVE AT 2
WEEKS AFTER THE END OF TREATMENT**

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Romania

Objective: The aim of this study was to evaluate the effects of US therapy on pain and joint function in absence of supplementary therapeutic intervention at 2 weeks after the end of treatment. *Method:* 60 patients, diagnosed with knee OA according to American College of Rheumatology criteria, stage 1–3 on frontal knee radiography, have been enrolled in a prospective case-control study. The 30 patients of the experimental group were treated by ultrasound therapy $850 \pm 5\%$ KHz, 0.5 W/cm^2 , continuously, on the OA knee for 5 min, 30 J/cm^2 dose, 10 sessions. Pain on visual analogue scale (VAS), WOMAC score (WS) and Lequesne index (LI) were evaluated prior to, at the end of and 14 days after the end of therapy. SPSS software version 17 was used for statistical analysis. *Results:* At the end of therapy a statistically significant decrease of pain in VAS, WS and LI was observed ($p < 0.05$). This improvement persisted and was amplified 14 days after the end of treatment ($p < 0.05$) for all parameters. Improvement of VAS and LI was statistically significant compared to control group for the 2 evaluations performed after the treatment. A statistically significant improvement of WS compared to control was observed only 14 days after the end of treatment ($p < 0.05$). *Implications/Impact on Rehabilitation:* Ultrasound therapy is efficient in the knee OA management and its effects not only persist, but are even more important at 14 days after the end of treatment. This finding suggests that clinical effects of US therapy are generated by biochemical or immunological changes in joint tissues that continue and are amplified after the end of treatment.

No. 410

**MAIN TARGETS FOR REHABILITATION IN
PATIENTS WITH LOW BACK PAIN**

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Russia

Objective: To study health related quality of life in patients with low back pain (LBP) for setting the major goals for their rehabilitation. *Method:* We examined 182 in-patients with moderate to severe LBP in Ufa, Russia: group 1 consisted of 106 patients of neurology and internal medicine wards ($n=106$) at the university hospital, group 2 included 76 patients from neurosurgical and orthopedic wards at a municipal hospital. We used Spielberger inventory for measuring anxiety and validated Russian version of SF-36 for quantifying different parameters of health related quality of life. *Results:* The groups were very similar: the ages (47.8 ± 1.6 and 46.5 ± 1.7 years respectively, $p=0.46$), body mass index (26.7 ± 0.6 vs. $26.7 \pm 0.8 \text{ kg/sq.m}$, $p=0.98$), the rate of smoking (30.1% vs. 27.6%, $p=0.68$), and personal anxiety results (47.6 ± 0.9 vs. 45.6 ± 1.3) did not differ. There were more women in group 1 (62% vs. 46%) and more patients with acute LBP (22.1% vs. 6.6%). All components of tested quality of life were significantly impaired in all our patients, but the most debilitating in both groups were role factors: “Role Physical” scores (18.0–34.0 vs. 18.5–34.8 –95% CI, $p=0.98$) were the lowest in “Physical Health” domain, and “Role Emotional” scores (27.3–45.7 vs. 37.2–55.3 –95% CI, $p=0.05$) – among “Mental Health” measures. *Implications/Impact on Rehabilitation:* Limitations in usual role activities were shown to be the most important for perception of wellness in patients with LBP in our study. Multidisciplinary biopsychosocial rehabilitation (MBR) program was compared with usual care for LBP earlier (E. Lang et al., 2003; N. Dufour et al, 2010). It was shown recently that LBP at a given time impacts on the risk of limited physical and social functioning many years later (A. Thelin et al., 2008). Our data provides some additional background for more extensive and early application of MBR for patients in Russia.

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No. 411

**HEADACHE AS A MEDICAL AND SOCIAL
PROBLEM IN THE ELDERLY: WHAT
REHABILITATION IS NEEDED?**

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Russia

Objective: 1) To study prevalence of headaches in patients admitted to Neurology Ward at the University Hospital in Ufa, Russia in 2010. 2) To study health related quality of life in patients with primary headaches. *Method:* We analyzed every case of headache as the dominant complaint of in-patients at Neurology Ward and used Russian version of MOS SF-36 for assessment of quality of life in patients with primary headaches. Since there is no formal definition for an “older person” by WHO, we used the age of official retirement in Russia as the cut-off point: 55 years for women and 60 years for men. This research was supported by Russian Ministry of Education and Science (Contract #P1256). *Results:* Headache was the first complain for 268 elderly patients out of 1429 in-patients (18.8%) in 2010 – this means that half of our patients with headaches are elderly. The population of Russia is old, having 26.4% of retired people (Kandaurova T, 2008), and according to statistical prognosis this number will increase. Most of elderly patients had chronic tension type headache. Our earlier study showed that this type of primary headaches is the most debilitating among others impairing not only physical, but also social component of health related quality of life (Akhmadeeva L. et al., 2008). “Social functioning” rate for patients with chronic tension type headache was 45.0 (out of 100, SEM=2.7, SD=20.9) which is almost twice as low as in

healthy controls (87.6, SEM=2.0, SD=11.0). *Implications/Impact on Rehabilitation:* Both medical and social rehabilitation should be considered for patients with headaches, especially for the elderly, who are already more vulnerable and often ignored.

No. 412

SONOTHERAPY IN THE TREATMENT PATIENTS WITH DEGENERATIVE CHANGES OF THE HIP JOINT

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Serbia

Objective: Occurrence of pain disorders caused by the degeneration of the hip joints is a common cause of significant movement constraint. These disorders we observed in elderly patients, focused on the rehabilitation of people with degeneration of the hip joints. *Method:* The patients were included in the study, according to their ailment, the results of clinical examination, the radiological image. There were two groups of patients with degenerative disorder of the hip joint. Both groups were treated with magnetic fields and kinesiotherapy. In the other group, the treatment was completed with sonotherapy, 1.5 w/cm 3.5 min. The treatment in both groups lasted four weeks. *Results:* The assessment of the results of the treatment was based on the Visual Analog Scale of Pain VAS. *Implications/Impact on Rehabilitation:* The improvement with patients with sonotherapy, was significant, which could be statistically shown.

No. 413

LOW LEVEL LASER THERAPY FOR TREATMENT FOR PAIN FROM CARPAL TUNNEL SYNDROME

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Objective: Study's aim was to examine the effects of Low level laser therapy (LLLT) to decrease pain sensation and impact on increasing transmission rate n. medianus by patients with carpal tunnel syndrome (CTS). *Method:* This study included 35 patients with the diagnosis of the CTS, among them the registered changes were 51 hands. Diagnosis of CTS is made on the basis of signs, symptoms and electro-diagnostic tests. Randomized patients with CTS to LLLT (trial group (TG)) or sham laser (control group (CG)). Patients from the TG were treated with GaAs laser of 150mW, 830nm and 600Hz. The points were treated with a dose of 3 J and the total energy was 24 J. The patients were given the 22 therapies for 4 weeks. The parameters of adherence were monitored by clinical examination: monitoring of the history obtained subjective parameters - the painful sensation and objective parameters - motor and superficial sensibility. The assessment of pain sensation was estimated before and after therapy. *Results:* The subjective feeling of pain sensation in the TG was reduced after the treatment. Clustering of the responses (moderate pain and severe pain to no pain) the statistical significance was $p < 0.01$ ($p < 0.001$ for left hand groups TG). The subjective feeling in the CG without the statistical significance ($p > 0.05$). Student *t*-test of dependent samples was used to determine whether there have been significant changes in the values of the tested parameters before and after therapy. A statistically significant decrease was noted in values of the parameter distal latency (DL) in TG patients, the right hand ($p < 0.05$). In the CG the average value of the observed parameter did not change. *Implications/Impact on Rehabilitation:* LLLT is more effective in improving CTS symptoms and median nerve functions than is placebo.

No. 414

DOES LOW LEVEL LASER THERAPY (LLLT) AFFECTS DISEASE ACTIVITY SCORE IN RHEUMATOID ARTHRITIS? PLACEBO CONTROLLED DOUBLE -BLIND INVESTIGATION

Olivera Ilic Stojanovic, MD, PhD; Milica Lazović, MD, PhD
Serbia

Objective: The use of LLLT in rheumatoid arthritis (RA) patients applied to a relatively small number of studies, mainly inadequately designed, while placebo-controlled did not exist. The Disease Activity Score (DAS28), extensively validated during clinical trials and daily clinical practice in patients with RA, has never been used in LLLT studies. *Method:* In a randomised, placebo-controlled double-blind investigation we examined the effect of pulsed infrared LLLT on the activity of RA using the DAS 28 index in comparison with the functional activity score Health Assessment Questionnaire (HAQ). According to ACR criteria, 136 patients belonged to the elementary and 29 to the placebo-control group (sham laser). *Results:* The elementary group showed significantly decreased values of DAS 28 ($p < 0.01$) but these increased in the placebo group ($p < 0.01$). *Implications/Impact on Rehabilitation:* This placebo-controlled investigation proved that LLLT, under optimal chosen irradiation parameters, decreases the DAS28 score and improves HAQ outcome even in high activity RA patients.

No. 415

ULTRASOUND-GUIDED NEUROMA BLOCK FOR TREATMENT OF INTRACTABLE STUMP PAIN

Jeong-Hyeon Mun, MD

South Korea

Objective: Pain is very common problem in amputee, especially, neuroma pain after upper extremity amputation is difficult to treat and tend to recur even after surgical removal. *Method:* 41 year-old male patient in our case study underwent above-elbow amputation due to crushing injury of left upper extremity at work. At admission, he rated his stump pain using a visual analogue scale (VAS) 10, and the pain did not respond to pharmacologic intervention, transcutaneous nerve stimulation, bandage therapy, mirror therapy, local anesthetics and corticosteroid injection. The neuroma between muscles that could not be removed by surgery was treated by sono-guided injection of alcohol. *Results:* Three days after injection, the pain of amputation stump was improved by VAS 3. *Implications/Impact on Rehabilitation:* We report that we experienced improvement of neuroma pain and phantom limb pain by sono-guided neuroma injection of alcohol in posttraumatic above-elbow amputation patient.

No. 416

CHANGES ON QUALITY OF LIFE AND DEPRESSION AFTER TAKING WHOLE BODY HYDROTHERAPY VS LOCAL HOT PACK TREATMENT TO PATIENTS WITH CHRONIC PAIN

Han Eun Young, MD; Sang Hee Im, MD, PhD

South Korea

Objective: Patients with chronic pain have gone through difficulty induced by depression and low quality of life. Hydrotherapy is considered as a common treatment method to reduce pain, however, there is few study using it for curing depression and enhancing the quality of life. Therefore, the objective is to figure out the effects of hydrotherapy toward pain, depression and quality of life in the use of whole body whirlpool vs. local hot pack treatment and to globalize the proven effects of local hydrotherapy in Jeju island. *Method:* From 1st December, 2009 to 31st July, 2010, 44 patients with pain during more than 3 months were enrolled. Twenty-one patients were randomly assigned to local hot pack group and another twenty three patients to whole body whirlpool group. All patient were received 30 min treatment three times a week in the period of 2 weeks and were assessed visual analogue pain scale (VAS), Beck depression index, Anxiety scale, WHO quality of life scale (WHOQOL-BREF)

and ADL functions (Korean Modified Barthel Index; K-MBI) respectively before and after treatment. *Results:* Pain (VAS) of all patients has been significantly improved after taking whole body hydrotherapy with local water of Jeju island, and pain score in whole body whirlpool group has been dramatically decreased as compared to local hot pack group ($p < 0.05$). And there are additional improvements in terms of anxiety scale, WHOQOL-BREF in whole body whirlpool group ($p < 0.05$). *Implications/Impact on Rehabilitation:* It is a preliminary study to identify the effects of Jeju local water on dealing with pain, anxiety and quality of life among patients with chronic pain. We expect our study to contribute to globalize spa therapy using local water in Jeju island.

No. 417

EFFECT OF SEMICIRCULAR FOREARM BRACE ON LATERAL EPICONDYLITIS

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Objective: To verify the effect of newly developed semicircular forearm brace which gives focal counterforce perpendicularly on muscle belly of wrist extensor. *Method:* The dominant hand of 24 (12 males, 12 females) healthy subjects were tested. Two types of forearm braces (focal semicircular type and broad pneumatic type) were examined. The brace was applied at extensor carpi radialis brevis (ECRB) with 5 cm distal to lateral epicondyle and two surface electrodes were attached on proximal and distal part of brace respectively. By quantitative electromyography (qEMG), mean amplitudes of isometric maximal voluntary contraction of ECRB before and after applying each braces were recorded and analysed. *Results:* Mean amplitudes of focal semicircular brace and broad pneumatic brace were reduced significantly than no brace ($p < 0.05$). Reduced percentage of mean amplitude was higher at focal semicircular brace than broad pneumatic brace ($p > 0.05$). There was no significant difference between proximal and distal mean amplitudes with each braces. *Implications/Impact on Rehabilitation:* Using focal semicircular forearm brace with education for appropriate apply could be helpful in reducing pain to patients with lateral epicondylitis.

No. 418

EFFECTIVENESS, TOLERANCE AND SATISFACTION OF EXTRACORPOREAL SHOCK WAVE THERAPY IN CALCIFIC TENDINOSIS OF SHOULDER

José Antonio Mirallas-Martínez, MD; Neus Guardiola-Beltrán; Santiago Pina-Buded; María Alexandra Mendoza-Latorre; María Teresa Sabater Querol; Adela Beltrán-Vives

Spain

Objective: Extracorporeal Shock Wave Therapy (ESWT) is an increasingly popular therapeutic approach to the treatment of a number of soft tissue complaints. Benefit has been demonstrated in calcific tendinosis of rotator cuff. The objective is to study the effectiveness, tolerance and satisfaction of the ECSWT, in patients with calcific tendinosis of shoulder. *Method:* Between 14 february, 2002 and 31 January, 2011, we prospectively studied 139 consecutive adults patients with calcific tendinosis of shoulder, treated with ESWT, 1 session for week, 4 weeks. All were assessed before each treatment and one month, after completion of therapy. *Results:* 150 subjects, 113 (75.3%) were women and 37 (24.7%) men, of 48.9 ± 7.6 years old. The side was right in 82 (54.7%) and left in 68 (45.3%). The mean duration of symptoms was 2.7 ± 3.2 years. They had previously been treated with: medication 123 (82.0%), steroid injection 70 (46.7%), electrotherapy 86 (57.3%), sonotherapy 86 (57.3%),

Cyriax 33 (22.0%), thermotherapy 47 (31.3%), kinesitherapy 74 (49.3%), and others 27 (18.0%) patients. The interval between the last treatment and the ECSWT was 3.7 ± 7.4 months. The energy density was 0.79 ± 0.20 mJ/mm², with 2,224.3 ± 739.05 impulses. At 1 month after the ECSWT, the evaluation resulted in significant improvement in pain (65.9% less in activity) and active articular rank (31.8° more in abduction). The limitations in daily living activity, sporting and working activity that existed initially in 150 (100%), persisted in 19 (12.7%) and 27 (18.0%), respectively. The calcifications that existed in 139 (100%), persisted in 57 (38.0%). The tolerance was good without important pain in 135 (70%), without sary effects of interest. *Implications/Impact on Rehabilitation:* Energy used, number of shots and pain comparative with others are respectively: 0.60 mJ/mm²/0.79 mJ/mm², 2,224.3/1000, and 65.9%/21%–84%. Of 957 articles of musculoskeletal pain treatment with ESWT, were included 9 with calcifying tendonitis of shoulder (effectiveness 9); 4 with not calcifying tendonitis of shoulder (effectiveness 1, doubt 3). Obtaining evidence is often complicated, so that the physician often receives contradictory results. ESWT must be considered before surgical treatment in patients with calcifying tendonitis of shoulder, refractory to conventional physical and rehabilitation-medical treatment. ECSWT in calcific tendinosis of shoulder are well tolerated, and shows a significant effectiveness for pain relief, functional restoration and calcifications lithotripsi, with a mean satisfaction of 8.3 ± 1.9 (0–10).

No. 419

EFFECTIVENESS, TOLERANCE AND SATISFACTION OF EXTRACORPOREAL SHOCK WAVE THERAPY IN LATERAL EPICONDYLITIS

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Spain

Objective: The lateral epicondylitis, in most cases is a result of repetitive movements that require the forearm muscles to be engaged. It is a common workplace or athletic injury. The objective is to study the effectiveness, tolerance and satisfaction of the extracorporeal shock wave therapy (ESWT) in lateral epicondylitis. *Method:* Between 28 may 2002 and 25 January 2011, we prospectively studied 68 consecutive adults patients with lateral epicondylitis, treated with ECSWT, 1 session for week, during 4 weeks. All were assessed before each treatment and one month, after completion of therapy. *Results:* Of the 68 subjects, 46 (67.6%) were women, and 21 (30.9%) men, of 47.1 ± 7.6 (30–73) years old. The side was right in 53 (77.9%) and left in 13 (19.1%). The mean duration of symptoms was 10.6 ± 10.9 months. They had previously been treated with: medication 56 (82.3%), steroid injection 46 (68.6%), electrotherapy 44 (64.7%), sonotherapy 44 (64.7%), Cyriax 33 (48.5%), thermotherapy 13 (19.1%), kinesitherapy 27 (39.7%) and other 11 (16.2%). The interval between the last treatment and the ECSWT was 2.0 ± 2.6 months. The energy density was 0.30 ± 0.12 mJ/mm², with 1189.72 ± 373.75 impulses. At 1 month after the ECSWT, the evaluation resulted in significant improvement in pain of 76.3% less in activity and active articular rank of 6° more. The limitations in daily living activity, sporting and working activity that existed initially in 68 (100%), persisted only in 2 (2.9%) at the month. The tolerance was good without important pain in 58 (85.3%) and without sary effects of interest. *Implications/Impact on Rehabilitation:* There is conflicting evidence regarding ESWT for chronic tennis elbow. Energy used, number of shots and pain comparative with others are respectively: 0.30 mJ/mm²/0.27 mJ/mm², 1189.7/1000, and 76.3%/48%–92%. With current studies heterogeneous in terms of duration of the disorder, type, frequency and total dose of ESWT, period of time between ESWT, type of management and control group, timing of follow-up and outcomes assessed, a pooled meta-analysis of ESWT for lateral epicondylitis was considered inappropriate. A meta-analysis of data from 28 randomised controlled trials

(RCT), was not statistically significant in favour of ESWT for the treatment of lateral epicondylitis, or the general physical therapy. ECSWT in lateral epicondylitis, are well tolerated, and shows a significant effectiveness for pain and relief, functional restoration, with a mean satisfaction of 8 ± 2.3 (0–10).

No. 420

EFFECTIVENESS, TOLERANCE AND SATISFACTION OF EXTRACORPOREAL SHOCK WAVE THERAPY IN PLANTAR FASCIITIS

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Spain

Objective: Plantar fasciitis pain is severe and can cause loss of time from work, sometimes leading to total and/or partial disability. The aim is to study the effectiveness, tolerance and satisfaction of extracorporeal shock wave therapy (ECSWT) in plantar fasciitis. **Method:** Between 24 February, 2002 and 31 January 2011, we prospectively studied 135 consecutive adults patients with plantar fasciitis, treated with ECSWT, 1 session for week, 4 weeks. All were assessed before each treatment and one month, after completion of therapy. **Results:** 135 subjects, 82 (60.7%) were women, and 53 (39.3%) men, of 50.6 ± 10.9 years old. The side was left in 68 (50.4%) and right in 66 (48.9%). The mean duration of symptoms was 1.4 ± 2.3 years. They had previously been treated with: medication 91 (67.4%), steroid injection 109 (80.7%), electrotherapy 47 (34.8%), sonotherapy 72 (52.3%), Cyriax 34 (25.2%), thermotherapy 15 (11.1%), kinesiotherapy 52 (38.5%) and others 36 (26.7%). The interval between the last treatment and the ECSWT was 1.9 ± 2.4 months. The energy density was 0.41 ± 0.15 mJ/mm², with 1,460.5 \pm 551.7 impulses. At 1 month after the ECSWT, the evaluation resulted in significant improvement in pain (79.5% less in activity) and active articular rank ($6^\circ \pm 11^\circ$ more). The limitations in daily living activity, sporting and working activity that initially existed in 135 (100%), persisted at the month in 9 (6.7%) and 11 (8.1%) respectively. The fasciitis that existed in 20 (14.8%) disappeared. The spur that existed in 56 (41%) persisted. The tolerance was good without important pain in 95 (70.4%) and without sary effects of interest. **Implications/Impact on Rehabilitation:** Energy used, number of shots and pain comparative with others are respectively: 0.41 mJ/mm²/0.45 mJ/mm², 1460/2000, and 79.5%/21%–84%. ESWT is increasingly used for plantar fasciitis, but limited evidence supports its use. A meta-analysis of data from six randomised-controlled trials (RCT), that included a total of 897 patients was statistically significant in favour of ESWT for the treatment of plantar heel pain but the effect size was very small. Of 17 articles included of fasciitis treated with ECSWT: effectiveness 12, not 4 and doubt 1. A sensitivity analysis including only high quality trials did not detect a statistically significant effect. Obtaining evidence is often complicated, so that the physician often receives contradictory results. At present there is evidence for the effectiveness of ECSWT in plantar fasciitis. ECSWT in plantar fasciitis, are well tolerated, and shows a significant effectiveness for pain relief, functional restoration, with a mean satisfaction of 8.1 ± 2.0 (0–10).

No. 421

TREATMENT OF CHRONIC WHIPLASH ASSOCIATED DISORDERS WITH BOTULINUM TOXIN-A: A PILOT STUDY

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Spain

Objective: Cervical whiplash injuries are common subsequent to a motor vehicle accident. The symptoms become chronic, for unknown reasons, in 15–30% of them and defy most forms of musculoskeletal therapy. Botulinum toxin could be useful in selected cases in which soft tissue injury predominates. Recent evidence suggest that BTX-A can reduce nociceptive activities of sensory neurons in animal models by inhibiting release of certain neuropeptides. We investigated BTX-A as therapy in patients with chronic WAD (whiplash associated disorders grade 2). **Method:** Prospective, randomized, double-blind, placebo-controlled study compares outcome measures in 36 patients with chronic WAD-II caused by a motor vehicle accident. One-half of the patients received 40–100 UI BTX-A diluted in 1 ml saline while the other half received just saline (1 ml). Outcome measures included total subjective pain based on visual analog scale, objective total range of neck motion (ROM) measured with zebriis (Achen, Germany) and SF 36 as assessment of quality of life. Follow-up assessments were carried out at 2 and 4 weeks, 3 and 6 months post-treatment. **Results:** Fifteen subjects receiving BTX-A and sixteen receiving saline completed the study. The treatment group was significantly improved from preinjection levels in pain at 2 weeks and flexion at 4 weeks. BTX group showed a trend toward improvement in reduction in the presence of contractures. **Implications/Impact on Rehabilitation:** There is conflicting evidence relating to the use of BTX in the treatment whiplash, but it does appear that-is useful in selected patients.

No. 422

CHRONIC IDIOPATHIC ANAL PAIN

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Objective: To describe two cases of chronic idiopathic anal pain or idiopathic anal pain resistant to pharmacological and surgical treatments. **Method:** Two cases of chronic idiopathic anal pain. One 45-year-old male and a 50-year-old female that also suffered from incontinence to gas and liquid stool. Both had undergone anal sphincterotomy (internal anal sphincter). We confirmed the existence of a painful syndrome at the level of the pelvic floor muscles (*levator ani* and *obturator internus*) and the *piriformis*. In addition to continuous pain that interfered with their activities of daily living (ADLs) and social activity. Initial VAS was 5/10, in the first case and 8/10 in the second. Home treatment was prescribed postural indications and self-stretching posture of gluteal and piriformis muscles. The treatment followed at the PMR ward consisted of 10 sessions two days a week: 1) Contract-relax exercises of the *m. Levator ani*. 2) Stretching of *m. piriformis* and *m. obturatorius internus*. 3) Manual Therapy techniques (as described by Thiele and Maigne) aiming relaxation of the affected muscles. 4) Pulsed Ultrasound in perianal region (1w/cm², 5 min). **Results:** After treatment, both patients referred occasional pain (VAS 1.5/10), and could perform ADLs without limitation. After one year follow up, patients maintained clinical improvement and they keep practicing the exercises and ergonomics standards prescribed. **Implications/Impact on Rehabilitation:** The anal pain, perianal and perineal chronic disorders are poorly defined, which include anal pain fugax, coccygodynia, levator ani syndrome, descending perineum syndrome, and pudendal neuralgia. They often are intractable. One option to consider, before subjecting these patients to surgical treatment, should be the existence of myofascial origin anal pain syndromes, since many of these chronic pain will improve with a correct diagnosis and non-aggressive treatments as physical therapy.

No. 423

PAIN AMONG ELDERLY WITH A GENDER PERSPECTIVE: FINDINGS FROM THE SNAC-STUDY**Lena Sandin Wrangler, MD¹; Mikael Rennemark, PhD²; Johan Berglund, MD, PhD³**¹Department of Rehabilitation, Blekinge Hospital, Karlskrona, ²Department of Health Sciences, Division of Geriatric Medicine, Lund University, and ³School of Health Science, Blekinge Institute of Technology, Karlskrona, Sweden

Objective: Chronic pain is a high-cost health problem that causes much suffering. The aim of this study was to analyze pain among the elderly focusing on gender, distribution and intensity of pain, sleep disturbance, depression and use of health care providers. **Method:** The sample includes 769 individuals with pain out of a 1,402 individuals, from the Swedish SNAC (Blekinge) database. This sample of elderly people from different (10) age cohorts (60–96 years) is being followed over time. All data were collected from physical examination, patient records and a questionnaire addressing if living alone, current pain and areas of worst pain, sleep and depression. Analyses were conducted with a statistical computer package (SPSS v.17.0). **Results:** More than half of the women with pain, 283 (59.1%) $p < 0.004$, and somewhat fewer of the men, 128 (48.7%), used drugs for their pain. Other treatments such as physiotherapy, heat/cold therapy were prescribed (sometimes in combination with drugs) to 64 (13.4%) women and 24 (9.1%) men. Almost half, 128 (48.7%), of the men received no treatment for their pain compared with 178 women (37.2%). Women were treated more often ($p < 0.004$). Elderly with pain were overrepresented in consulting GP's $p < 0.004$ and primary care nurses $p < 0.034$. Women, both with pain $p < 0.004$, and without pain $p < 0.007$ were more often in use of community service than men. Women with pain had more often contact with rehabilitation team $p < 0.037$. **Implications/Impact on Rehabilitation:** Conclusion: The present study shows that about 55% of the elderly had pain during the four weeks preceding the questionnaire and 84% of the subjects rated their pain as high as moderate/severe. The study shows that sleeping problems follow the same pattern in the whole population, i.e. women have more problems in general and that women with pain report more sleeping problems than the rest. Three quarter of reported problems to fall asleep belong to the group with pain. This even if taking the fact into account that this group uses more sleeping pills. The elderly should be advised to consult their General Practitioners (GPs) about their pain and complaints about sleep and mood. This might, however need special information campaigns in order to persuade the GPs to be less reluctant to prescribe treatments other than drugs.

No. 424

COMPLEX REHABILITATION TREATMENT OF CHRONIC PELVIC PAIN SYNDROME IN NON-SPECIFIC ADNEXITIS PATIENTS IN BALNEOLOGY CLINIC "KUYALNIK"**Alexander Zelinsky, DSc, MD, PhD; Volodymyr Bushansky, MD; Volodymyr Artyomenko, MD, PhD**

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Objective: The severe chronic pelvic pain syndrome along with adhesions formation is common for patients with chronic non-specific adnexitis. The aim of our research was to ground and work out the complex rehabilitation treatment of patients with chronic pelvic pain syndrome due to the chronic non-specific adnexitis using diadynamic currents and treatment mud of "Kuyalnik" resort. **Method:** During 2008–2010 we observed the effectiveness of the proposed complex treatment in 128 women aged 24–32. The clinical state, psychological and emotional spheres, vegetative tonus, ovarian function, hypophyseal activity, regional hemodynamic, pelvic organs anatomy and uterine tubes contractility were examined. Mud therapy was performed by the insertion of vaginal and rectal mud

tampons 37–38°C, every day simultaneously with diadynamics current on hypogastric region with previous mud application. Duration 10–15 min, 10–12 procedures. **Results:** The results estimation was worked out directly after treatment course and in 3 and 6 months later. It was determined: pelvic pain syndrome severity decrease in all patents; chronic pelvic pain syndrome disappeared in 64 from 94 women; rehabilitation of uterine tubes patency in 39 women from 67; hemodynamic parameters improvement in 109 from 128 patients. Along with reconstruction of LH ovulation peak in 42 from 64, luteal phase normalization in 98 from 112, significant endometrium proliferative activity improvement up to 10–12 mm. During first year after the complex treatment 41 women conceived without ovulation inductors. **Implications/Impact on Rehabilitation:** The obtained results give us the ground to use the proposed complex rehabilitation treatment of chronic pelvic pain syndrome in patients with non-specific chronic adnexitis definitely before usual laparoscopic surgery (to avoid it at all in a lot of cases) and also to decrease use of ovulation inductors.

No. 425

PLATELET-RICH PLASMA FOR CHRONIC TENDINOPATHIES**Ricardo Colberg, MD; Kenneth Mautner, MD; Gerard Malanga, MD; Joanne P. Borg-Stein, MD; Jonathan Drezner, MD; Kimberly G. Harmon, MD; Aisha S. Dharamsi, MD; Eugene Roh, MD; Samuel Chu**
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Objective: This is a multi-center case-series report. To contact patients from four academic hospitals' outpatient clinics in four different states that were treated for chronic refractory tendinopathy with ultrasound-guided platelet-rich plasma injections and provide a questionnaire in order to analyze the satisfaction of patients with the injection and their functional outcome after the treatment. The study addressed the question: is platelet-rich plasma an effective way of managing chronic tendinopathies that have been refractory to conventional therapeutic modalities? **Method:** Male and female adults between the ages of 18 and 75 years with a diagnosis of chronic tendinopathy refractory to conventional treatments that received a platelet-rich plasma injection were identified by the attending physicians, invited to participate in the study, signed the Consent Form and the HIPAA Patient Authorization Form, and answered the questionnaire. The primary outcome measurement was the perceived improvement in pain after the PRP injection. Sary outcome measurements were the following: total number of PRP injections received, the difference in VAS (Visual Analog Scale from 0 to 10, 0 for no pain and 10 for worst pain) before and after the procedure, the assessment of functional pain determined by the Nirschl Phase scale, the overall satisfaction with the PRP procedure, and would they recommend PRP to someone else. **Results:** This study is currently underway and so far, 99 patients have been contacted. Over 300 patients are expected to reply by March 1, 2010. Mean and standard deviations were calculated for each outcome measurement and were compared with data obtained from other published investigations that used PRP for chronic tendinopathies. Preliminary results indicated that 70% of patients are moderately to completely better in their subjective pain. Using the Visual Analog Scale for pain, patients have experienced an improvement of pain from average 7.5 before the injection to 2.7 after the procedure, with a standard deviation of 1.8, and an average elapsed time for replying the questionnaire of 8.2 months. 79% of patients indicated that they are satisfied with the procedure, and 86% of patients would recommend the procedure to someone else. **Implications/Impact on Rehabilitation:** PRP provided significant pain relief for chronic tendon injuries, defined as a moderate to complete perceived improvement of pain after PRP. In addition, most patients experience a reduction of pain by 50% or greater. With this study, better understanding of the satisfaction of patient with PRP injections as a minimally invasive treatment for chronic tendinopathies was gained, offering

musculoskeletal physicians an alternative for managing cases of chronic refractory tendinopathies.

No. 426

EFFECTS OF CHRONIC OPIOID USE ON OXYGEN SATURATION WHILE SLEEPING: A RETROSPECTIVE PILOT STUDY

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Objective: To evaluate whether patients taking opioid medications for the treatment of chronic pain experience clinically significant respiratory depression while sleeping. *Method:* The electronic medical records of chronic pain patients, at the Eastern Virginia Medical School Spine Center of Physical Medicine & Rehabilitation, were reviewed between July 1, 2008 and June 30, 2009. Twenty six patients (17 females, 9 males) who underwent a pulse oximetry sleep study met the inclusion criteria. The data was analyzed using descriptive statistics to evaluate the following variables in the sample: age, gender, duration of opioid use, and pure opioid use vs polypharmacy. Due to the dichotomous nature of the variable of interest, occurrence of oxygen desaturation, a simple percentage was calculated of how many patients experienced oxygen desaturation <90% for >5 min. *Results:* All patients were on both opioids as well as other medications. Eleven (42.3%) of the 26 patients experienced a desaturation <90% for >5 min during their pulse oximetry sleep study. *Implications/Impact on Rehabilitation:* A well-known side effect of opioid medications is respiratory depression. Whether this side effect is significant in chronic pain patients while sleeping, when respiration naturally slows, has not been well studied. Repeated oxygen desaturation during sleep, whether due to central or obstructive causes, could potentially increase the risk for an anoxic brain injury; depression; myocardial infarction or stroke. A significant number of chronic pain patients taking long-term opioids in this study did experience clinically significant oxygen desaturation while sleeping. This could potentially increase the risk of anoxic brain injury, depression, myocardial infarction, or stroke. Given the retrospective nature and lack of controls in this study, we are limited in determining the exact cause of the oxygen desaturation. This study highlights the fact that more research is clearly warranted.

No. 427

DIFFERENCES IN PAIN SEVERITY OF BACK AND LOWER EXTREMITIES BETWEEN NEUROGENIC CLAUDICATION AND VASCULAR CLAUDICATION PATIENTS

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Objective: The clinical presentation is thought useful in differentiating neurogenic and vasogenic claudication, however these have not been studied in an objective comparative way. *Method:* 54 patients (40 offered surgery for neurogenic claudication and 11 with positive ankle-brachial index and claudication) between the ages of 55 and 87 were recruited to participate in this study. Demographic information and self reported pain in the back, thighs, calves, and feet on a 1 to 5 scale with 5 being the worst pain was collected for pain while sitting relaxed and while walking as far as they can. Self reported maximum walking distance without stopping along with recovery time and strategy was also collected. *Results:* While walking, back and thigh pain were significantly higher in the neurogenic patients (back $\chi^2 [1, n=46]=17.301, p=0.000$, thigh $\chi^2 [1, n=45]=10.721, p=0.001$). Pain while sitting was also significantly higher for the neurogenic patients (back pain $\chi^2 [1, n=51]=8.734, p=0.003$; thigh pain $\chi^2 [1, n=48]=9.565, p=0.002$). No significant differences in

pain were observed for sitting and walking between the groups in the calves and feet ($p>0.05$). There was also no significant group differences between patients that could walk more than 100 feet and those that could walk less than 100 feet, though recovery strategies differed significantly between groups, $\chi^2 (3, n=54)=13.982, p=0.003$. Neurogenic patients preferred sitting down while vascular patients could both sit or stand to make their pain go away. *Implications/Impact on Rehabilitation:* Neurogenic claudication patients experience more severe pain in their back and thighs while both sitting and walking in comparison to vascular claudication patients. While there are no significant differences in their self reported maximum walking distances without stopping, neurogenic patients must sit in order to recover.

No. 428

CONCORDANCE EFFECT IN LUMBAR EPIDURAL STEROID INJECTION

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Objective: To determine the prognostic value of injection phase concordance on pain reduction among patients undergoing LESI, and to assess how pain reduction translates into improvement in activity level and reduced medication consumption. *Method:* A total of 59 patients who underwent LESI due to lumbosacral radiculopathy were evaluated. Under fluoroscopic guidance, patients were injected 2cc 0.9NS and 2cc depomedrol. Data were collected prospectively. Patients with no provocation were excluded from the study. Forty-four patients (75%) had provocation, and these subjects were divided according to the presence or absence of concordance. Twenty-eight patients experienced concordance. Two weeks following the injection, patients were asked what percentage of their pain the injection took away. In addition, patients were asked about change in activity level and analgesic consumption. *Results:* Upon provocation with LESI, patients with concordance experienced an average 55.4% pain reduction, and those without concordance showed a 37.4% pain reduction. Using an unpaired *t*-test analysis, there was no statistically significant difference in pain reduction between concordant and discordant groups ($p=0.1102$). However, improvement in activity level was found to be significantly associated with percent pain reduction using an unpaired *t*-test analysis ($p<0.0001$). Pain reduction was 14% for patients who did not improve their activity level and 70% for those who did improve their activity level. Similarly, reduction in medication consumption was significantly associated with pain reduction ($p<0.0001$). Patients with reduced medication consumption experienced a pain reduction of 73%, while those with no change in consumption had a pain reduction of 22%. *Implications/Impact on Rehabilitation:* No statistically significant difference in pain reduction was present in patients in the concordance group following a LESI. Based on these results, concordance does not influence a patient's pain reduction. It is most important to reduce the patient's pain in order to ensure a reduction in medication consumption as well as improvement in activity level and participation in rehabilitation program.

No. 429

FIVE YEAR RETROSPECTIVE ANALYSIS OF TREATMENTS FOR DISCOGENIC LOW BACK PAIN

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Objective: Examine long-term outcomes for patients with discogenic low back pain evaluating presentation and treatment options, as well as establish efficacy of the overall management. *Method:* A five-year retrospective study of patients with disc-related low back pain from a practice affiliated to a teaching hospital. Fifty-nine patients

with complaint of low back pain with history, physical exam and imaging studies consistent with discogenic low back pain, were selected. Baseline Visual Analog Scale (VAS), Roland Morris and Satisfaction Scores were recorded from initial visit and compared with follow-up scores at a minimum of five years. *Results:* Fifty-one patients, 24 (47%) females and 27 (53%) males, were included. Age ranged from 26 to 46 years. Eighty-four percent had good long-term (average follow-up of 5.73 years) outcomes and were satisfied with treatment, with an average of 6.95 points improvement in VAS scale and increased of 13.28 points on Roland Morris functional scale. Majority (53.5%) of patients with good outcomes experienced mostly leg pain while 62.5% of patients with poor outcomes experienced mainly back pain. Nine underwent surgery (7 had good outcome). Two patients did poorly after surgery, one had residual axial pain and one had residual scar tissue surrounding the S1 nerve root with leg pain. All patients that underwent surgery had a L5–S1 disc extrusion into the lateral recess. Forty-eight percent of patients with good results carry on with a maintenance exercise program and only 7% are on pain medication, while only 37.5% of patients with poor outcomes continue to exercise and 37.5% are still on medications. *Implications/Impact on Rehabilitation:* No studies have longitudinally assessed symptom control and functional ability on patients with discogenic pain over five years. This study provides data regarding success rates on various treatments helping us gain knowledge of efficacy of current management options and negative prognostic factors.

No. 430

CONCORDANCE EFFECT IN LUMBAR TRANSFORAMINAL EPIDURAL STEROID INJECTION

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Objective: Chronic back pain represents a significant health problem in the United States. Different pathologies may lead to epidural inflammation that also inflames the spinal nerves causing back and radicular pain. Injection of steroids into the epidural space serves to decrease this inflammatory process. There is scarce information regarding the effect of injection phase provocation and concordance on the patient's overall outcome after receiving a spinal injection. The objective is to determine the prognostic value of injection phase concordance on percent pain reduction among patients undergoing lumbar transforaminal epidural steroid injection (TFESI). In addition, to assess how pain reduction translates into patient's improvement in activity level and reduced analgesic consumption. *Method:* A total of 39 patients who underwent TFESI due to lumbosacral radiculopathy were evaluated. Under fluoroscopic guidance, patients were epidurally injected 2cc 0.25% bupivacaine + 80 mg dexamethasone, TV=4cc. Data was collected prospectively. Patients with no provocation were excluded from the study. Subjects were divided according to the presence or absence of concordance. 25/39 patients that underwent TFESI had concordance. Two weeks following the injection, patients were asked about pain reduction, activity level and analgesic consumption. *Results:* Upon provocation with TFESI, patients with concordance experienced an average of 55.4% pain reduction, and those without concordance showed a 65.9% pain reduction. Using an unpaired t-test analysis, there was no statistically significant difference in pain reduction between the groups ($p=0.3206$). Meanwhile, improvement in activity level and reduction in analgesic consumption were found to be significantly associated with percent pain reduction ($p<0.0001$ and $p<0.0003$, respectively). *Implications/Impact on Rehabilitation:* No statistical significant difference in percent pain reduction was present on patients in the concordance group following a TFESI. Based on these results, concordance does not affect a patient's pain reduction. It is most important to adequately reduce the patient's pain in order

to ensure an improvement in activity level as well as reduction in medication consumption.

No. 431

STATIC MAGNET THERAPY FOR FIBROMYALGIA AND MYOFASCIAL PAIN: NEITHER FOOLPROOF NOR FOOL'S GOLD

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Objective: Being that pain of fibromyalgia is, to some degree, a complex psychical phenomenon, an integrative approach in management that takes patient response into consideration is important. Alternative therapies are being increasingly sought by patients, especially when pain is unresponsive to conventional management. Our goal is to present a case series of persistent fibromyalgia and myofascial pain syndrome that have responded well to static magnetic therapy. We seek to initiate discussion and dialogue on the possible mechanisms by which improvement of symptoms occurred. *Method:* Subjects: In the case series are four females, between ages 35–54, all diagnosed with fibromyalgia more than 10 years ago, who were having persistent symptoms despite prolonged treatment, including trials of various established pharmacologic regimens, acupuncture, chiropractic adjustments, and massage therapy. Subjects were encountered through the local fibromyalgia support group and occupational health clinic. Timeline of symptoms and various treatment modalities was obtained from each patient. Intervention: Bipolar magnets were statically held or banded for each session, for 10–14 h/day. *Results:* Persistent pain gradually improved, on average, by 6 points, over the course of 3 years with static magnetic therapy. Inter-individual differences were present and were subjectively attributed to duration of exposure to the magnet. *Implications/Impact on Rehabilitation:* For fibromyalgia pain that is persistent despite conventional management, static magnetic therapy may serve as a useful adjunct. This physical modality, on which there is scant scientific evidence, deserves mechanism-guided investigation in the future.

No. 432

DIFFERENCES IN DESCRIPTORS OF PAIN IN NEUROGENIC VERSUS VASCULAR CLAUDICATION

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Objective: To determine differences in how persons with neurogenic or vascular claudication describe their pain experience. *Method:* 40 subjects with lumbar spinal stenosis, 15 subjects with a peripheral vascular disease, and 36 asymptomatic volunteers were recruited and screened as part of the larger Michigan Spinal Stenosis Study II. All subjects completed the McGill Pain Questionnaire, in which they circled adjectives that best described their pain experience in separate categories: sensory, affective, evaluative, and four miscellaneous categories. Each word was assigned a numerical value in order to quantify pain descriptions. A one way analysis of variance was utilized to determine differences. *Results:* Evaluative pain was significantly higher in the group with spinal stenosis ($M=2.63$, $SD=1.60$) compared to the vascular group ($M=1.47$, $SD=1.60$, $p=0.016$). Radiating pain was also significantly higher for the neurogenic group ($M=1.48$, $SD=1.43$) compared to the vascular group ($M=0.533$, $SD=1.25$, $p=0.029$). There were no significant differences in sensory, affective, or other miscellaneous components of pain between the two symptomatic groups. The neurogenic group reported higher scores in all categories of pain except cold miscellaneous pain when compared to the asymptomatic group. The vascular group reported higher pain scores than the asymptomatics in one miscellaneous category, as well the sensory and evaluative

categories. *Implications/Impact on Rehabilitation:* Lumbar spinal stenosis is commonly encountered by rehabilitation clinicians, yet it can be challenging to determine whether or not an individual is truly experiencing claudication from spinal stenosis based on a physical examination. Therefore, it is important to ascertain the different ways patients with neurogenic or vascular claudication experience pain, as this may aid clinicians in differentiating between the two conditions that cause these symptoms. We have shown that individuals with neurogenic claudication consistently report a higher degree of evaluative and radiating miscellaneous pain compared to individuals with vascular claudication.

No. 433

COMPARATIVE STUDY OF THE TOPICAL TREATMENT WITH ETOFENAMATO COMBINED WITH IONTOFORESIS VERSUS FONOFFORESIS, FOR HANDLING OF THE POST SURGERY PAIN

Franco Yadira, MD, Msc; Arcángel Lopez, MD; Franco Antonio, MD

Titular Universidad de Oriente, Bolívar, Venezuela

Objective: To know if there is a difference in the effectiveness of the topical treatment of Etofenamato combined with electroterapia in case of Iontoforesis versus fonoforesis, in the handling of the

postsurgery pain patients who enter to Fisiátric treatment. Ciudad Guayana, Bolívar, Venezuela. 2010. *Method:* Prospective, descriptive and comparative study. The studied population corresponded to 80 patients who entered to post surgery rehabilitation. A sample of 40 cases was selected. These patients had somatic pain and fulfilled the criterion of inclusion in ages included between the 15 and 65 years. This sample was divided in two groups: Group A (20 cases) was treated with topical etofenamato 10% with the technique of Iontoforesis, 3.0 mA during 10 min time and a Group B (20 cases) these patients were treated with topical etofenamato 10% with the technique of Sonoforesis with 1 w/cm², direct current during 10 min. *Results:* Of the population in study 25 cases correspond to masculine sex and 15 cases to feminine sex, the time of evolution between the surgical treatment and its entrance to rehabilitation varied between 72 h and 10 weeks. The cases that entered with less time of evolution showed significant improvement in the first and fifth day of treatment. There was no significant relation between the type of surgical technique and the handling of the pain. As well there was no significant difference between the two modalities of electrotherapy. *Implications/Impact on Rehabilitation:* The first goal of treatment in the post surgery rehabilitation is the handling the pain as well as the reduction of inflammation, improvement of the function and sanguineous irrigation. This study is a contribution to the specialist in physical medicine and rehabilitation in the knowledge of application of medication and its effectiveness combining it with different modalities of electroterapia in handling of the pain.

PEDIATRIC REHABILITATION

No. 434

FAMILY RECURRENCE IN NEURAL TUBE DEFECTS

Myrtha Vitale, PhD; Diego García, MD

Argentina

Objective: 1) Present a family with four daughters, all of them carrying different Neural Tube Defects (NTD). 2) Evaluate the recurrence of NTD in the patients registered in our data base of the “Instituto de Rehabilitación Psicosfísica” of Buenos Aires City, Argentina, from 1962 to 2010. **Method:** In the Spine Bifida Clinic (SBC) in 2010 we evaluated two sisters, 21 and 5 years old with Myelomeningocele (MMC) L3–4. As they had two sisters with 14 and 6 years old, apparently normal, we checked their spines with RX and found spine bifida (SB) in L5 in both of them. We detect no other previous history of NTD in the rest of the family. According to these results we decided to review the recurrence of NTD in our patients. **Results:** The result of the research in 881 patients of our SBC, showed 38 cases (4.31%) of recurrence with the following distribution: Parents/siblings with SB: 7 (18%); Siblings with MMC: 8 (21%); Siblings with anencephaly: 2 (6%); Uncles/cousins with SB: 6 (15%); Uncles/cousins with MMC: 15 (40%). These results are similar with the rest of the literature (4%). **Implications/Impact on Rehabilitation:** It is well known to provide a correct genetic advise to a family with one child with a NTD but it is really important to study with an Rx the normal siblings because if we find a SB, the recurrence could increase.

No. 435

STREETER SYNDROME

Myrtha Vitale, PhD; Diego García

Argentina

Objective: Present an association of Neural Tube Defect (NTD) with Amniotic Band Syndrome (ABS). Update from the available literature the Streeter Syndrome. **Method:** Present a 7-year-old girl to the Clinic of Spina Bifida (Instituto de Rehabilitación Psicosfísica de Buenos Aires) with Myelomeningocele L3–4 (MMC) associated with: a left leg amputation above the knee, partial amputation of the third and fourth fingers of the left hand, a disital band in the fifth finger of the same hand and a cleft palate. She was already been operated of the cleft palate and removed a rudimentary foot of the distal left femur in Paraguay. **Results:** The ABS was recognized as early as 300 BC but this complex disorder, 1 case per 10,000–15,000 population, was described by Streeter in 1930. Depending in the severity of the constriction, the defect could be as minimal as a cosmetic band or extended if this defect occurs in the third and fourth gestational week, causing different NTD. **Implications/Impact on Rehabilitation:** Recognize the existence of this rare association of ABS, NTD and cleft palate.

No. 436

DEVELOPMENT OF ICF CORE SETS TO BE USED FOR PATIENTS WITH NEURAL TUBE DEFECTS

Myrtha Vitale, PhD; L. Bidegain; S. Bozzo; N. Duce; M. de los A. Freire; J. Gangemi; V. Giambastiani; M. del Gomez R.; G. Innocenti; S. Macchiaver; V. Michienzi; C. Miralda; G. Orille; A. Sáez; L. Santamarina; M. del C. Solano, PT; Verónica Kazah

Argentina

Objective: To report on the results of the consensus process integrating evidence from preliminary studies to develop the first version of a Comprehensive ICF Core Set for patient with

neural tube defects. **Method:** This study followed three steps: 1) From August 2009 to March 2010: review the actual literature to develop Core Sets and discussion among the professionals of the Spine Bifida Team, the relevants characteristics of the problem in all the areas at different ages: Physiatrie, Physical Therapist, Occupational Therapist, Speech Therapist, Psychologist, Learner Therapist and Social Worker. 2) From march to august 2010: first round selection of the categories and the tools to evaluate them, realizing not to evaluate twice the same category by different areas avoiding unclear results. The first version of Core Sets included 534 (31%) from 1,721 of the entire volume of the ICF-CY. 3) From August 2010 to January 2011: s round selection; as they were many categories and pretending to be practical tools in clinical practice. Only 263 categories (15.3%) were selected (comprehensive core sets). Four age groups were considered: 0–2, 3–5, 6–12 and 12–20, according the physical, mental and cognitive child development. This study was conducted at the Psychophysical Rehabilitation Institute of Rehabilitation in the Spine Bifida Clinic in Buenos Aires, Argentina. **Results:** Number of Categories included in the Comprehensive ICF Core Set (263): Body Functions: 89; Body Structures: 23; Activities and Participation: 124; Environmental Factors: 27. Lists of ICF-CY categories that are considered relevant and typical for specific condition by national experts could be created. This is an important step towards identifying ICF Core Sets for patients with neural tube defects and should be include as few categories as possible. **Implications/Impact on Rehabilitation:** 1) Comprehensive core sets practical and useful for the description of functioning and disability of patients with NTD. 2) Common and comprehensive understanding of functioning of pediatric rehabilitation team.

No. 437

IMPORTANCE OF EARLY TREATMENT IN CHILDREN WITH NEUROLOGICAL RISK

Djurđica Stevanovic-Papic, MD; D. Dragić; B. Marjanović; A. Serdar; V. Šolaja-Košćica; G. Mirković
Bosnia and Herzegovina

Objective: To indicate the importance of early treatment in children with neurological risk. **Method:** Clinical study was done in Rehabilitation Institute Banjaluka. It included 139 children, grouped according to chronological age at the beginning of treatment. Group A: 22 children, below 3rd month; Group B: 75 children between 3rd and 9th months; Group C: 42 children between 9 and 18 months. Clinical assessment of all children included detailed history and neurokinological examination (primitive reflexes, postural reaction, muscle tone, achieved level of motor development). **Results:** Harmonized development was achieved in 17 children (77.27%) in the group A; in 4 children (18.18%) there was improvement with minimal motor dysfunction while CP developed in one child (4.54%). In group B normal development was achieved in 47 children (62.67%), in 21 child (28.00%) there was significant improvement with minimal neurological dysfunction while CP developed in 7 children (9.33%). In group C there was no normalisation of development. In 14 children (33.33%) there was improvement with minimal neurological dysfunctions while CP developed in 28 children (66.67%). Best results were achieved in group A where treatment started before three months of age. The applied techniques of comprehensive stimulations supported normal development in the period when brain plasticity is highest. Such result was expected as it correlates with generally accepted reports in literature. **Implications/Impact on Rehabilitation:** Study results signify the importance of an early treatment of children born with risk. Also, these results indicate the necessity to establish the register for risk newborns along with continuing education of all team members and cooperation among key players.

No. 438

TREATMENT OF IDIOPATHIC SCOLIOSIS WITH CHENEAU BRACE***Dobrinka Dragić, MD; Đurđica Stevanović-Papić; Zoran Bjelogrić; Branislava Marjanović; Vladimira Šolaja-Košćica; Gabrijela Mirković****Bosnia and Herzegovina*

Objective: To establish the impact of conservative treatment of scoliosis with Cheneau brace on cessation of the curve progression, curve correction and avoidance of surgery. **Method:** In clinical study we followed treatment of 50 children diagnosed with idiopathic scoliosis, all over 20 degrees as measured by Cobb. Scoliosis of other causes were not considered. Team for scoliosis in the Institute "Dr. Miroslav Zotović" u Banjaluka prescribed and applied Cheneau brace to all children followed in the study. Data about sex, age and menarche for girls were recorded and followed through a questionnaire. Diagnostic process included clinical examination, anthropometric measurements and X-rays of total spine. Analysis included X-ray at beginning of treatment, without brace, during treatment in brace and after 2 years, without brace. Time elapsed between radiological evaluation varied, depending on age, clinical finding and brace functionality. **Results:** In this study in 30 children (60%) we achieved the primary objective of conservative treatment – we stopped the progression of scoliosis curve. In 15 children (30%) there was correction of curve which was preserved during 2 years while treatment still continues. In 4 children only (18%) there was progression of scoliosis curve but children are still in conservative treatment. Only 1 child had a surgery as scoliosis curve progressed rapidly but to note – referral for treatment was late. **Implications/Impact on Rehabilitation:** Treatment of idiopathic scoliosis is complex and demanding but application of Cheneau brace makes this treatment less uncertain if we know that in 98% of cases spine surgery can be avoided. **Key words:** scoliosis, Cheneau brace.

No. 439

HOW WELL DO HEALTH CARE PRACTITIONERS PREDICT OUTCOME IN PEDIATRIC TRAUMATIC BRAIN INJURY?***Vithya Gnanakumar, MD¹; N. Poonai²; L. Pearlman²; R. Taranik²; C. Campbell^{2,3}****¹Department of Physical Medicine & Rehabilitation, The University of Western Ontario, ²Department of Pediatrics, Schulich School of Medicine and Dentistry, and ³Clinical Neurological Sciences and Epidemiology, The University of Western Ontario, Canada*

Objective: 1) To determine how accurately pediatric acute care clinicians (intensivists, neurologists, neurosurgeons, neuroscience nurse practitioners) and rehabilitation physicians (physical medicine and rehabilitation physicians) predict outcome in moderate and severe pediatric brain injury. 2) To identify differences in prediction accuracy between the two groups. 3) To identify the variables clinicians use to prognosticate in pediatric TBI. **Method:** Retrospective patient data was used to create summaries (demographics, injury mechanism, GCS, clinical parameters, and neuroimaging) of the first 24-h of hospitalization for 39 actual patients with known outcomes. 28 Canadian clinicians (acute care clinicians ($n=14$) and rehabilitation clinicians ($n=14$)) were asked to predict mortality and outcome (Glasgow Outcome Scale). **Results:** In this ongoing study, twelve responses (7 acute, 5 rehabilitation) are available. Glasgow coma scale, vital signs, and neuroimaging are most frequently used for prognostication. Overall, 85% (393/461) predictions of early mortality, and 51% (229/448) predictions of GOS at hospital discharge are accurate. Given three choices for each case (confident, somewhat confident, not confident), clinicians are 'confident' about 35% (156/441) of their predictions. **Implications/Impact on Rehabilitation:** This study provides information about prediction patterns in pediatric

TBI from differing health care team members. Such knowledge is relevant for team members as they work together to provide consistent messages to families about prognosis. This data allows for comparison of prediction accuracy between acute care and rehabilitative TBI specialists.

No. 440

LIMB AMPUTATION AS COMPLICATION OF PREMATURITY***Maria Espinoza, MD; Barbara Colvin; Pamela Molina***
Chile

Objective: Vascular insufficiency of a peripheral limb is a serious complication that can occur in newborn infants, specially premature who undergo vascular procedures. The aim of this study is to detect, in our population (Teleton Santiago), those children who became amputee as a complication of prematurity; describe their characteristics, in relation to the demography of the group and also about the direct cause of amputation; and their evolution along time. **Method:** Teleton database revision between years 1990 and 2009 detected nine premature children with acquired amputation in newborn period. Clinical records of these children were reviewed looking for characteristics of pregnancy and birth, prematurity complications, other associated diagnostics, cause and age of amputation, age of derivation to our Institute, age of prosthetic indication and acceptance of the prostheses, and presence other secuelae attributable to prematurity. **Results:** All nine children detected were born in different hospitals. All of them were born under 30 weeks (between 25 and 28 weeks). All but one (89%) had birth weight under 1,000 grs. All of them suffered multiple prematurity complications. One child was amputee due to septic complication, and the others secondary to complications derivated of vascular procedures. All children had unilateral amputations. Two children were amputated in lower extremities (one tranfemoral, one transtibial) and seven in upper extremities (only one transhumeral). All of them were derived to Teleton under one year of age, and all except one received their prostheses under one year of age. Four children (44%) developed neurological compromise attributable to prematurity. **Implications/Impact on Rehabilitation:** There are few antecedents of this complication of prematurity in literature. Taking this investigation as a base, we can work in prevention of vascular complications in premature children. We noticed that a high percentage of our affected children developed neurological damage, what in combination with amputation, increases disability and creates the need of making an approach for these cases different to the given to other amputee children.

No. 441

THE STUDY OF CHARACTERISTIC AND CORRELATION IN SOCIAL LIFE ABILITY FOR CHILDREN WITH SPASTIC CEREBRAL PALSY***Kaishou Xu, MD; Lu He; Jianning Mai; Jinling Li; Xiaokun Jin; Lijuan Wang****China*

Objective: To study the characteristic and correlation of social life ability for children with spastic cerebral palsy (SCP). **Method:** One hundred and 54 children with SCP 1 to 12 years of age, and their caregivers were assessed with the social life ability scale for infant-junior middle school student. According to ages, gender, types of paralysis, level of gross motor function classification system (GMFCS) of children with SCP, the situation, characteristic and correlation of social life ability in children with SCP was performed by nonparametric test, multivariate analyses, pearson and spearman analyses. **Results:** The children of having normal social life ability in early childhood group were more than preschool group and school-aged group ($p<0.05$). The difference of children quantities who had normal social life ability was statistically significant among GMFCS groups ($p<0.05$), as well as among hemiplegia, diplegia,

and quadriplegia groups ($p < 0.05$). All 6 domains scores of social life ability was statistically significantly different among 3 aged groups ($p < 0.05$), and 4 GMFCS level groups ($p < 0.05$). The difference in self-help, locomotion, occupation, and socialization domains scores was statistically significant among 3 types of paralysis groups ($p < 0.05$). The standard scores were correlated with age ($r = -0.223$, $p = 0.005$) and GMFCS level ($r = -0.479$, $p = 0.000$). *Implications/Impact on Rehabilitation:* With the increase of age, the social life ability improves better. However, compared with the same ages normal children, the gap is more obvious. The social life ability for children with SCP is associated strongly with activity limitation. However, the most activity limitation children do not always have the poorest performance whereas they have good ability in communication and self-direction domains.

No. 442

EFFECT OF MOTOR IMAGINARY THERAPY COMBINED WITH ELECTROMYOGRAPHIC BIOFEEDBACK THERAPY ON ANKLE DORSIFLEXION IN HEMIPLEGIC PATIENTS AFTER STROKE

Ye Xm, MD

China

Objective: To explore the effect of motor imaginary therapy combined with electromyographic biofeedback therapy on ankle dorsiflexion in hemiplegic patients after stroke. *Method:* Forty-nine hemiplegic patients were divided into interventional group (IG) and control group (CG). Common rehabilitation therapy was used in both EG and CG. Motor imaginary therapy combined with electromyographic biofeedback therapy were used in IG, but were not used in CG. Both two groups were assessed by using FMA, BBS, FAC and MBI at admission and after two months. *Results:* After two months, patients in both EG and CG scored significantly better in FMA, BBS, FAC and MBI, and proportion of patients who could walk independently also increased significantly in both two groups, but patients in EG improved more significantly compared with CG. *Implications/Impact on Rehabilitation:* Motor imaginary therapy combined with electromyographic biofeedback therapy had good effect on improving ankle dorsiflexion in hemiplegic patients after stroke.

No. 443

EFFECT OF CLEARING THE GOVERNOR VESSEL AND REFRESHING THE MIND NEEDLING ON HEAD SPECI AND CT SCANNING OF CHILDREN WITH CEREBRAL PALSY

Zhenhuan Liu, MD

Cerebral Palsy Rehabilitation Centre, Nanhai Affiliated Hospital for Women and Children, Guangzhou University of Chinese Medicine Guangdong, China

Objective: To investigate action and value of acupuncture in Cerebral Palsy rehabilitation. *Method:* 100 spasm cerebral palsy patients from 2 to 7 years old were randomly divided into two groups. Acupuncture group: 50 patients were treated with head acupuncture and body acupuncture; Rehabilitation-training group: 50 patients were treated with physical therapy of Bobath and Vojta methods. *Results:* The total effective rate acupuncture and rehabilitation-training group were obvious higher than that of rehabilitation-training group. After treatment the DQ value of rehabilitation-training + acupuncture group were higher than that of rehabilitation group ($p < 0.01$). In acupuncture and rehabilitation-training group were higher than that of rehabilitation group ($p < 0.01$). In acupuncture and rehabilitation-training group, improvement rate of brain dysphasia, brain atrophy in skull CT and recovery normal rate of skull SPECT were obvious higher than that of rehabilitation-training group ($t = 4.731$ $t = 5.971$ $p < 0.01$). *Implications/Impact on Rehabilitation:* Acupuncture can obviously increase cerebral blood flow (CBF) and improve cerebral

cell metabolism, promote partial or complete compensation of cerebral function and the restoration and function of plasticity of cerebral tissue in children with cerebral palsy.

No. 444

THE CLINICAL OBSERVATION OF THE CURATIVE EFFECT OF RELIEVING SPASTICITY FOR CEREBRAL PALSY TREATED BY VIBROACOUSTIC THERAPY

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Objective: To observe the curative effect of vibroacoustic therapy by relieving spasticity for cerebral palsy. *Method:* 36 cases of cerebral palsy were treated by vibroacoustic therapy and listened to the Jiao Music for 30 min, we scale the adductor angle and popliteal fossa angle and foot dorsiflexion angle before and after for three times, To produce as an average figure. muscular tone in addition, including calculate the CSS. *Results:* No examinee has bad reaction. We find that the score of the Cars measurement is obviously discrepancy before and after the vibroacoustic therapy. $p < 0.05$ and the angles of most of the children is improved after the treatment. *Implications/Impact on Rehabilitation:* Vibroacoustic therapy can obviously relieve the spasticity for cerebral palsy, accordingly improve their limb functions.

No. 445

THE RELATIONSHIP BETWEEN INTELLIGENCE DEVELOPMENT AND LEVEL OF GMFCS IN CHILDREN WITH CEREBRAL PALSY

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Objective: To investigate the level and structure of intelligence of children with cerebral palsy (CP). To analyze the relationship between intelligence development with severity degree (GMFCS). *Method:* 108 children with CP were assessed using Gesell Developmental Scale (GDS) and Gross Motor Function Classification System (GMFCS) to test their developmental quotient (DQ) and severity degree (GMFCS), and the relationship between intelligence development with severity degree (GMFCS) were analyzed. *Results:* 101 children were found with mental retardation among 108 cases (93.5%). Score of motor behavior (29.08 ± 18.05) was the lowest and score of language behavior (37.96 ± 23.45) was the highest. Severity degree (GMFCS) of children with CP was negative correlated to their score of GDS-DQ ($p < 0.01$). *Implications/Impact on Rehabilitation:* Most children with CP have mental retardation. Their structure of intelligence is abnormal. Their motor behavior is the worse and the language behavior is the best. Severity degree (GMFCS) influence intelligence development. More serious of gross motor function in children with CP, more damage to intelligence.

No. 446

CLINICAL STUDY OF CHINESE MASSAGE COMBINED WITH MUSIC THERAPY IN TREATMENT OF CEREBRAL PALSY

Zhenhuan Liu, PhD

China

Objective: Clinical observation of traditional chinese massage combined with music therapy to improve lower limbs' range of motion

(ROM) and to reduce score of composite spasticity scale (CSS) in children with cerebral palsy (CP). *Method:* Traditional Chinese massage was performed to children with CP, such as to attack vital points of DU meridian, to tonify qi of kidney and spleen, pinching massage, footplate massage, and segmental massage. Background music was played at the same time. Course of treatment was 30 days. ROM of ankle-joint and hip-joint, score of CSS was measured before and after the treatment. *Results:* 286 children with CP participated. 106 cases showed significant effect (37.40%), 172 cases showed progress (59.16%), and 8 cases had no-effect (2.84%). Significant improvement were found after treatment for ROM of ankle-joint (before: 105.64 ± 12.66 ; after: 76.58 ± 9.89), and ROM of hip-joint (before: 119.89 ± 25.47 ; after: 158.99 ± 18.66) ($p < 0.01$). Score of CSS was significantly lower after treatment (before: 12.39 ± 2.56 ; after: 7.069 ± 2.97) ($p < 0.01$). *Implications/Impact on Rehabilitation:* Traditional Chinese massage combined with music therapy can regulate qi and blood, solute muscle contracture and spasm, so as to rectify scissors gait and talipes, to improve gross motor function of children with CP. It is a therapy of convenience, economy and benefit. **Key words:** Cerebral palsy (CP); Traditional Chinese Massage; Music Therapy; Range of Motion (ROM); Composite Spasticity Scale (CSS).

No. 447**THE CLINICAL APPLICATION AND EVALUATION OF INFANTILE MASSAGE IN PREVENTION OF CEREBRAL PALSY****Zhenhuan Liu, PhD**

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No abstract to publish.

No. 448**THE STUDY ON QUALITY OF LIFE OF CHILDREN WITH CEREBRAL PALSY****Zhenhuan Liu, MD; Qingmei Lin; Yong Zhao; Meimei Ma; Ruiping Wan**

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Objective: To study the quality of life of children with cerebral palsy. *Method:* With the PedsQL4.0, 113 children with cerebral palsy were studied, and 52 children with common illness and 314 normal children were also studied and compared. With the PedsQL of school functioning, the children of these three groups who had been to school or kindergarten were also studied and compared. *Results:* The score of physiology functioning, communication functioning and total score of PedsQL in children with cerebral palsy were lower than those in the children with common illness and normal children. The difference has statistic significance. The score of emotional functioning in children with cerebral palsy was only lower than that in the normal children, the difference has statistic significance. The score of school functioning in children with cerebral palsy was significant lower than that in children with common illness and normal children ($p < 0.01$). *Implications/Impact on Rehabilitation:* The quality of life of children with cerebral palsy is much lower than children with common illness and normal children. The illness

has sever effect on the school functioning of children with cerebral palsy. Therefore, the whole improve of quality of life is the goal for the rehabilitation of children with cerebral palsy.

No. 449**CLINICAL RESEARCH ON IMPROVING THE BRAIN MICROCIRCULATION OF CHILDREN WITH CEREBRAL PALSY BY ACUPUNCTURE****Zhenhuan Liu, PhD**

Nanhai Affiliated Hospital for Women and Children, Guangzhou University of Traditional Chinese Medicine Guangdong, China

Objective: To investigate the therapeutic action and value of acupuncture in Cerebral Palsy rehabilitation. *Method:* 150 spasm cerebral palsy patients from 1.5 to 7 years old are randomly divided into three groups. Acupuncture group (group A): 50 patients are treated with head acupuncture and body acupuncture; Rehabilitation-training group (group B): 50 patients are treated with physical therapy of Bobath and Vojta methods. Acupuncture add rehabilitation-training group (group C): In this group 50 patients are investigated. *Results:* The total effective rate of group A and group C are obvious higher than that in group B ($p < 0.01$). The improve rates of CT brain dysphasia and atrophy in group A and C are significantly higher than that in group B ($p < 0.05-0.01$). The recover to normal rates of ECT brain blood stream in group A and C are obviously higher than that in group B ($p < 0.01$). The results of TCD after therapy are better than those before therapy in group A [PI: 1.19 ± 0.19 and 1.10 ± 0.16 ; VP: (132.92 ± 17.14) cm/s and (139.63 ± 14.64) cm/s] and group C [PI: 1.18 ± 0.24 and 0.91 ± 0.19 ; VP: (131.84 ± 15.93) cm/s and (139.68 ± 15.66) cm/s] ($p < 0.01$). *Implications/Impact on Rehabilitation:* Acupuncture can obviously increase cerebral circulation, improve cerebral cell metabolism, promote partial or complete compensation of cerebral function and the restoration and function of plasticity of cerebral tissue in children with cerebral palsy.

No. 450**RELIABILITY AND VALIDITY OF THE PEDIATRIC QUALITY OF LIFE INVENTORY VERSION 4.0 GENERIC CORE SCALE IN YOUNG CHILDREN****Nong Xiao, MD; Jianying Yan; Xue Yang**

Department of Rehabilitation center, Children's Hospital of Chongqing Medical University, Chongqing, China

Objective: Examine the reliability and validity of the Chinese translation of the Pediatric Quality of Life Inventory Version 4.0 (PedsQLTM4.0) Generic Core Scale for 2- to 7-year-old Chinese children. *Method:* The instrument was administered by interviews in two groups: 218 healthy children and 119 patients with cerebral palsy, as well as their respective parents or caregivers were included in this study. The reliability and the validity of PedsQL were computed. Reliability was assessed by Cronbach's alpha. Construct validity was assessed using exploratory factor analysis and by exploring the intercorrelations between and among the 4 PedsQL subscales for children and their parents. *Results:* Internal consistency reliability alpha coefficients (Cronbach's coefficient alpha) of the PedsQLTM 4.0's total scale score for all the parent proxy reports were exceeded the minimum reliability standard of 0.70. Most self-report scales and approached or exceeded the minimum reliability standard of 0.70. Children with cerebral palsy scored less than healthy children for all scales except for the child self-reports Emotional Functioning scale. Factor analysis showed results in general support the hypothesized factor structure of the original version. The correlation between the child self-reports and the parent proxy reports mainly exceed the preferred intra-class correlation of 0.40 (except for school functioning scores and total

score). *Implications/Impact on Rehabilitation:* The parent proxy-reports of the Chinese translation of the PedsQLTM 4.0 may be used in assessing the Health-related quality of life (HRQOL) for 2- to 7-year-old children in China.

No. 451**RELIABILITY, VALIDITY AND SENSITIVITY OF THE PEDSQL CEREBRAL PALSY MODULE**

Nong Xiao, MD; Xue Yang; Jianying Yan

Rehabilitation Centre, Children's hospital of Chongqing Medical University, China

Objective: This investigation examines the reliability, validity, and sensitivity of Chinese version Pediatric Quality of Life Inventory (PedsQL) 4.0 Generic Core Scales and 3.0 cerebral palsy (CP) Module in pediatric CP. *Method:* The study sample was comprised of 126 parents of children with CP between the ages of 2 and 12 years including 18 child-respondents 5–12 years of age. Mean age of the 87 males (69.0%) and 39 females (31.0%) was 4 years 1 month (SD 2y 2mo). The sample included children with monoplegia ($n=15$, 11.9%), hemiplegia ($n=28$, 22.2%), diplegia ($n=64$, 50.8%), and quadriplegia ($n=19$, 15.1%). *Results:* Reliability was demonstrated for the PedsQL 4.0 Generic Core Scales ($\alpha=0.86$ child, 0.89 parent) and 3.0 CP Module ($\alpha=0.91$ child, 0.96 parent). The PedsQL 4.0 Generic Core Scales distinguished between healthy children and children with CP. Construct validity of the 3.0 CP Module was supported through an analysis of the intercorrelations among the Generic Core Scale scores with CP Module Scale scores. Sensitivity of the PedsQL was demonstrated among children with different diagnostic categories. *Implications/Impact on Rehabilitation:* The findings provide support for the measurement properties of the Chinese version PedsQL 4.0 Generic Core Scales and 3.0 CP Module in pediatric CP.

No. 452**THE ESTABLISHMENT MONITORING NETWORK OF HIGH-RISK INFANTS WITH CEREBRAL PALSY IN CHINA**

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Objective: To grope for the way and the methods to establish the monitoring network for high-risk infants with cerebral palsy in China. *Method:* According to the distribution of the 6 greater administrative areas of China and the population, 15 institutions of 13 provinces participated in this research. There are about 13,700 high risk brain injuries infants among 100,000 live birth neonates who were born in 2009. Among these high risk brain injuries infants, 4,969 infants had been monitored systematically by Gesell Developmental List, 52 items of nervimotion measure for infants, nervous reflex, muscle tone measure and brain MRI for 1–2 years. 1,113 children had been interfered early by sensory and motor developmental methods. *Results:* Ninety children were diagnosed cerebral palsy after the two-year follow-up, which is 6.5% of total high-risk infants in 2009 and 1.8% of the infants who were monitored. There were still 76 children that diagnosed other development disorder. *Implications/Impact on Rehabilitation:* Monitoring the infants with the high risk factors which are harmful to their brain should start from their birth. We suggest that neurodevelopmental conditions should be assessed and followed up when the local maternity and child care institutions carry out the routine physical development examinations. The incidence of disability following cerebral palsy could be reduced if the intervention for movement and intelligence disorders is carried out earlier.

No. 453**EFFECT OF NERVE REHABILITATION INSTRUMENT ON LOWER EXTREMITY FUNCTION IN CHILDREN WITH SPASTIC DIPLEGIC CEREBRAL PALSY**

Jing Gao, PhD

China

Objective: To investigate the effect of nerve rehabilitation instrument on lower extremity function in children with spastic diplegic cerebral palsy (CP). *Method:* 24 spastic diplegic CP children were randomly divided into the treatment group and control group with 12 cases in each group. All children were treated with physical therapy, massage and cerebral circulation therapy, while those of the treatment group were added electromyographic biofeedback therapy with EMG-electrical stimulation. The Modified Ashworth Scale was performed to evaluate the muscle tone of the lower limbs, and other clinical evaluation which included the range of passive movement and the motor function with the gross motor function measure (GMFM). *Results:* The lower extremity function of all children in two groups were improved ($p<0.01-0.001$) and the effect of the treatment group were superior to those of the control group ($p<0.05-0.01$). *Implications/Impact on Rehabilitation:* The electromyographic biofeedback therapy with EMG-electrical stimulation can decrease the muscle tone and improve the range of passive movement, as well as improve the motor function of the lower extremity.

No. 454**DIFFERENT ANGLES WEDGE CORRECTION EFFECTS ON LOWER EXTREMITY RANGE OF MOTION OF CHILDREN WITH SPASTIC CEREBRAL PALSY**

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Objective: To observe the effects of different angles wedge correction on motion impact of lower extremity range in children with spastic cerebral palsy and select the best treatment angle. *Method:* Randomly selected 60 children with spastic cerebral palsy who can stand under help and cooperate with the trainers as the observe group. Take another 20 healthy children of the same age as the control group. Children in observe group and control group take control hip position and independent position positive standing (ankle dorsiflexion) on the different angles wedge-shaped plate (5°, 10°, 15°, 20°), measured the knee angles. *Results:* The knee angles of control hip position and independent position shows no significant difference ($p<0.05$) in observe group and, knee angles in the control hip position were smaller than that in independent position, the difference shows significant ($p<0.05$) in control group, when ankle dorsiflexion standing on different angles wedge-shaped plate. The knee angles and hip angles in the observe group were significantly larger than the control group ($p<0.05$) when ankle dorsiflexion standing on 5° and 10° wedge-shaped plate; but the knee angles and hip angles in these two groups showed no significant difference ($p<0.05$) when standing on 15° and 20° wedge-shaped plate. *Implications/Impact on Rehabilitation:* When use wedge-shaped plate for ankle dorsiflexion training, the best angle of the wedge-shaped plate was a slightly larger than the largest passive ankle dorsiflexion angle at knee extension position. This training methods especially fit for children of spastic cerebral palsy with knee flexion.

No. 455

THE CLINICAL STUDY OF FINGER-ACUPUNCTURE MASSAGE THERAPY ON THE FINE MOTOR FUNCTIONS OF 40 CHILDREN WITH CEREBRAL PALSY

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Objective: To observe the effects of finger-acupuncture massage therapy on the fine motor functions of children with cerebral palsy. **Method:** 40 patients were randomly divided into two groups of treatment group and control group, each group had 20. Patients in the control group were treated with only rehabilitation training including PT and OT, while those in the treatment group received the treatment of finger-acupuncture massage therapy addition to the rehabilitation training. All patients were assessed before and after one training period of 3 months. The evaluating item was Peabody developmental motor scale-fine motor from Peabody Develop Mental Motor Scale 2. **Results:** There was no statistically significant difference ($p < 0.05$) between the two groups before the treatment. There was a significantly difference ($p < 0.001$) of fine motor quotient (FMQ), grasp capacity index and capacity index of visual-motor integration both in the treatment group and the control group after one training period compared with before treatment. There was also a difference ($p < 0.05$) of fine motor quotient (FMQ), grasp capacity index and capacity index of visual-motor integration with the better results of the treatment group than the control group after treatment. **Implications/Impact on Rehabilitation:** Combination of rehabilitation training and finger-acupuncture massage therapy can play a unique advantage. Therefore, the finger-acupuncture massage therapy is worth further study and clinical application.

No. 456

THE EFFECTS OF SENSORY INTEGRATION THERAPY TO CHILDREN WITH SPASTIC CEREBRAL PALSY IN GAIT

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Objective: To explore the effects of sensory integration therapy to children with spastic cerebral palsy in gait. **Method:** 60 children with spastic cerebral palsy were divided into two groups in pairs according to their gender, age, body height, body weight and clinical classification. 30 cases in experimental group (20 diplegia, 10 hemiplegia): they took routine rehabilitation including physical therapy, massage and exercise therapy and professional sensory integration therapy. 30 cases in control group (20 diplegia, 10 hemiplegia): They only took routine rehabilitation treatment for 3 months. Before and after rehabilitation treatments, we analyzed their gait with their footprints. **Results:** 1) After the course of treatment, walking foot length of both sides of children with diplegia, walking foot length of paralyzed side of children with hemiplegia, walking base and velocity of all the children were improved ($p < 0.05$). 2) The heel-strike of both sides of children with diplegia and that of fine side of children with hemiplegia did not show much changes ($p > 0.05$). 3) After the course of treatment, walking foot length of both sides, walking base and velocity of experimental diplegia group showed significant difference with that of control diplegia group ($p < 0.05$), while the heelstrike of both sides didn't. 4) Walking foot length of

paralyzed side, walking base and velocity of children with hemiplegia in experimental group showed significant difference with that of children with hemiplegia in control group ($p < 0.05$), while the heelstrike of both sides and the walking foot length of fine side did not. **Implications/Impact on Rehabilitation:** The pattern using both routine rehabilitation and sensory integration therapy was more effective than traditional methods.

No. 457

THE CLINICAL STUDY ON THE EFFECTS OF COMPUTER GAMES ON THE WRIST AND HAND MOTOR FUNCTION OF CHILDREN WITH SPASTIC CEREBRAL PALSY

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Objective: To observe the effects of computer games on the wrist and hand motor function of children with Spastic cerebral palsy and provide scientific evidence for computer games on the hand function impairment of children with cerebral palsy. **Method:** Forty patients were made 20 pairs, randomly divided into two groups, treatment group and control group. Patients in the control group were treated with simple rehabilitation training, while those in the treatment group received the treatment of computer game and the rehabilitation training. All patients were assessed before and after 3 months. ROM of wrist and pinch strength, grasp strength were also evaluated. **Results:** There was significant difference ($p < 0.05$ or $p < 0.001$) of ROM of the wrist, index of grip strength, index of pinch strength in two groups after one training period. And the difference ($p < 0.001$) of grip strength index was significant between the treatment group and the control group after treatment. There was insignificant difference ($p > 0.05$) of the wrist ROM, index of pinch strength between the treatment group and the control group after treatment. **Implications/Impact on Rehabilitation:** Computer game combined with rehabilitation training and rehabilitation therapy alone can both improve fine motor functions of children with cerebral palsy and the combination of computer game therapy can play a unique advantage, which making a greater degree of improvement of grip strength, but have no effect about the wrist ROM and index of pinch strength.

No. 458

EFFICACY OF TRADITIONAL CHINESE DRUG FUMIGATION AND BATH ON SPASTIC DIPLEGIA CEREBRAL PALSY

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Objective: To observe efficacy of Traditional Chinese Drug Fumigation and Bath on muscle tone, gross motor function of children with spastic diplegia cerebral palsy. **Method:** 60 children with spastic diplegia cerebral palsy were selected and divided into two groups, each group had 30 cases. The experimental group were treated with Traditional Chinese Drug Fumigation, Bath and rehabilitation training. The control group were treated only with rehabilitation training. Applied Modified Ashworth (MAS), Gross Motor Function Measurement (GMFM-88), B-mode ultrasonic diagnostic equipment to evaluate muscle tone, gross motor function and quadriceps femoris muscle thickness (MTQ). Data were analyzed by $X \pm S$ and t -test with SPSS17.0. **Results:** 1) Comparison before and after treatment: MAS descended significantly in both groups ($p < 0.01$), GMFM-88 rised significantly

in both groups ($p < 0.01$), and MTQ raised significantly in both groups ($p < 0.01$). 2) Contrast between experimental group and control group: Before therapy, MAS, GMFM-88 and MTQ all had no obvious difference between the two groups ($p > 0.05$). After therapy, experimental group had more significant effect with MAS; descending more obviously ($p < 0.05$), GMFM-88 rising more predominance ($p < 0.05$) and MTQ raising more patency ($p < 0.05$) than that of control group. *Implications/Impact on Rehabilitation:* Traditional Chinese Drug Fumigation, Bath and rehabilitation training both can reduce muscle tone, facilitate motor function development, but the effect of Traditional Chinese Drug Fumigation, Bath and rehabilitation training surpasses that of only rehabilitation training.

No. 459

THE CLINICAL CHARACTERISTICS AND REHABILITATION ASSESSMENT OF HIGH-RISK INFANT WITH CEREBRAL PALSY IN 0–6 MONTHS

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China

Objective: To investigate the clinical characteristics and rehabilitation assessment of high-risk infant with cerebral palsy in 0-6 months to provide the basis for the early rehabilitation intervention. *Method:* The retrospective studies of the clinical datas was used to study the risk factors, brain imaging, electroencephalogram (EEG), brainstem auditory evoked potential (BAEP) of high-risk infant with cerebral palsy in 0–6 months, to assess the developmental level by rehabilitation assessment scales and Bayley scales of infant development. *Results:* The most common of risk factors is neonatal asphyxia, followed by premature birth, intracranial hemorrhage, hyperbilirubinemia, and low birth weight. Most (91.55%) high-risk children have abnormal neuroradiological findings, with ventricular system expansion being the most common abnormality. There may be different degrees of developmental disorders in brain wave and auditory system found by the EEG and BAEP. The rehabilitation assessment results showed that the activities of daily living was descended commonly in high-risk infant, with different levels of gross motor and fine motor retardation. *Implications/Impact on Rehabilitation:* Maked detailed analysis to the clinical characteristics and rehabilitation assessment of high-risk infant with cerebral palsy in 0–6 months could provide the basis for individual rehabilitation program, which was conducive to the recovery of diseased infant.

No. 460

THE OBSERVATION OF THE THERAPEUTIC EFFECTS ON SPASTIC CEREBRAL PALSY IN CHILDREN AFTER ACUPUNCTURE AND MANIPULATION AT THE SHU AND HE ACUPOINTS VERSUS ROUTINE ACUPOINTS

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Objective: To treat children with spastic cerebral palsy using acupuncture and manipulation at the Shu and He points through a combination of rehabilitative training, and to compare the effects with routine acupuncture and manipulation. *Method:* Sixty children with spastic cerebral palsy were selected from the Rehabilitation Center for Cerebral Palsy, Department of Pediatrics, Liaoning Affiliated Hospital of University of Traditional Chinese Medicine from May 2005 to February 2008. There were 38 boys and 22 girls, aged 10 months to 4 years old, muscle strength ranging from grade I to grade IV. The children were randomly divided into a treatment group ($n = 30$) and a control group ($n = 30$). The treatment of acupuncture and manipulation at the Shu and He points was performed in the

treatment group. The conventional method of acupuncture was performed in the control group. The treatment duration was one month and every 3 months an assessment was done. Therapeutic efficacy was evaluated using gross motor function measurements (GMFM), as well as activity of daily living (ADL) scale before and after treatment. Informed consent for the therapeutic program was obtained from the relatives of all enrolled children. The study was approved by the hospital ethical committee. *Results:* After all the treatment, the treatment group compared with the control group, ADL and GMFM scores was statistically significant ($p < 0.01$). *Implications/Impact on Rehabilitation:* Acupuncture and manipulation at the Shu and He acupoints can significantly ameliorate motor function deficits and movement disabilities in children with spastic cerebral palsy. The therapeutic efficacy at these acupoints is better than routine acupuncture and manipulation.

No. 461

CLINICAL RESEARCH OF SPASTIC CEREBRAL PALSY ON THE MASSAGE FOR RELAXING SPASTIC MUSCLES AND STIMULATING THE ANTAGONISTIC MUSCLE

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China

Objective: To observe the clinical effectiveness of the treatment for excessive ankle plantar flexion on spastic cerebral palsy by using the traditional massage treatment and the massage of relaxing spastic muscles and stimulating the antagonistic muscles. Quest the massage to raise the clinical effectiveness of treating spastic cerebral palsy. *Method:* To divide the children with excessive ankle plantar flexion on spastic cerebral palsy randomly into 2 groups. The observation group were treated by the massage of relaxing spastic muscles and stimulating the antagonistic muscles and the control group by traditional massage treatment. Then evaluate the before and after treatment for the cases' Clinic Spasticity Index (CSI) and foot dorsiflexion. *Results:* Both of CSI and dorsiflexion of the two groups of cases had improved comparing before and after treatment effectiveness within groups ($p < 0.05$). But compare the total effective ratio among the internal of each group, the effective rate of the treatment group was higher than the control group ($p < 0.05$). The treatment effect is in the converse ratio with the ages. *Implications/Impact on Rehabilitation:* The efficacy of treating excessive ankle plantar flexion on spastic cerebral palsy by using the massage of relaxing spastic muscles and stimulating the antagonistic muscles is better than that of the traditional massage, and also the younger, the better.

No. 462

COLOMBIAN EXPERIENCES WITH BOTULINUM TOXIN TYPE A IN CHILDREN WITH CEREBRAL PALSY

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Objective: The purpose of this clinical trial was to analyze the application of botulinum toxin in children with cerebral palsy and its impact on the spasticity control. *Method:* This is a descriptive, retrospective and prospective study of patients with cerebral palsy from the Misericordia Hospital in Bogota Colombia South America. The instrument or evaluation was the clinical history and the Modified Ashworth Scale that is used to measure muscle tone. It was applied before the application of botulinum toxin, and eight and thirty days after the infiltration to evaluate changes. The evaluation was made by two persons in an independent way. All patients were receiving physical therapy that was not interrupted during this study. Patients or their parents signed informed consent about the infiltration which was made under sedation and anaesthesia. Test T for related samples

was applied to each one. Epi info 2000 3.2.4 was used, and SPSS 17. **Results:** 110 patients with cerebral palsy (men with age range 1.6 to 16.5 years) were treated with botulinum toxin type A. 68% were quadriparetic, 24% were hemiparetic spastics, and the 5% were dystonic. All patients were evaluated with the Modified Ashworth Scale before, and 8 and 30 days after the application. 100 Units of botulinum toxin type A was applied to 98 patients and 500 units to 67 patients. The average of infiltrations by patient was of 2 with a minimum of a 1 and maximum of 6 in 2 patients. botulinum toxin was injected within muscles selected by clinical evaluation. The average of units administered was of 400 units for toxin of 100 units, and 800 for toxin of 500 units. The diminution of the spasticity was documented in all patients through careful measurement of Asworth before the procedure and after 15 days. It was made by the square test χ^2 and T with p 0.004. The statistical measurement for the Asworth after one month with square method χ^2 , shows remarkable and significant differences with one p 0.0000. It was not significant differences on the Ashworth scale in patients dealt with botulinum toxin type A 100 units and botulinum toxin 500 units. Sary complications after the application of the toxin were not demonstrated in this research. **Implications/Impact on Rehabilitation:** It is important treatment in cerebral palsy, in children there is not a lot of experiences about the products, and the research have an important number of patients.

No. 463

BOTULINUM TOXIN A" AS A TREATMENT TO CONTROL SIALORRHEA IN CHILDREN WITH CEREBRAL PALSY

Doris Valencia Valencia, MD

Colombia

Objective: The purpose is to measure the efficacy of the botulinum toxin A in the treatment of sialorrhoea in order to reduce disability and disagreeable symptom that can adversely affect feeding and socialization of the children with cerebral palsy. **Method:** This is a prospective pseudo experimental study in 46 patients with diagnosis of cerebral palsy. All patients received infiltrations with botulinum toxin type A: two points of 10 units in parotids, and one point of 15 units in submandibular. They were applied bilaterally, guide by ultrasound and under general anesthesia. It applied a qualitative scale previous to the application of the toxin, and 15 days 3 months, 6 and 9 months later to the infiltration. That scale measured the behavior of the children, as far as number of used bibs, feeding, intensity and frequency of the sialorrhoea. Epi info 2000 3.2.4 was used. **Results:** 46 children with diagnosis of cerebral palsy with ages between 13 and 17 years were studied; 18 males and 12 females. All children had significant changes in the number bibs used before and after the application. It was relevant the mother's perception about diminution of salivation, and progress in the feeding. **Implications/Impact on Rehabilitation:** This study suggests that botulinum toxin A concerning the parotids and submandibular glands in patients with Cerebral Palsy can reduce, in a significant way, salivary flow during 36 weeks. There were no significant adverse side-effects and it was remarkable success on patients' and families' quality of life.

No. 464

PHYSICAL TESTS FOR ASSESSING WALKING ABILITIES WITH MOBILITY AIDS IN CHILDREN WITH CEREBRAL PALSY

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Objective: To establish the sitting position abilities of children with cerebral palsy (CP) that are able to use mobility aids, since mobility aids prescription for children with CP is an empirical practice and is based on the subjective assessment of children's abilities for using walkers, crutches or canes. **Method:** Thirty children with CP that employed mobility aids for walking at least 5 m were assessed. This group was compared with 40 children with CP that were able to attain sitting position but were not able to walk using mobility devices. Ages ranged from 4 to 18 years in both groups. Both groups were assessed with GMFM-66's items 23 to 37 all related to the sitting domain of the scale. Linear discriminant analysis was used to identify those items of the GMFM-66 sitting domain that were more useful to differentiate both groups. With the chosen items, a score was estimated (sum of three items; values ranged from 0 to 12). Its diagnostic accuracy was assessed with a ROC curve. A musculoskeletal evaluation that included tone, lower limbs range of movement, selective control of ankles and upper limbs functionality was also performed. **Results:** With linear discriminant analysis, three items showed the greatest differences between groups: item 27 (sit on mat: touches toy placed 45° behind child's left side, returns to start); item 32 (sit on mat with feet in front: attains 4 point over left side) and item 35 (standing: attains sitting on small bench). 81.8% of cases were correctly classified (Wilk's lambda=0.44). In ROC curve, the area under the curve was 0.92. A score of 5 showed a sensitivity of 79% and a specificity of 87% for using mobility aids for walking. **Implications/Impact on Rehabilitation:** In children with CP, assessment with three simple clinical tests for the sitting position abilities could predict a successful ability for walking with external aids.

No. 465

VALIDATION INTO SPANISH OF THE GROSS MOTOR FUNCTION CLASSIFICATION SYSTEM FOR CHILDREN WITH CEREBRAL PALSY

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Objective: To assess the gross motor function classification system (GMFCS) Spanish version's reliability, criterion validity and construct validity. **Method:** In a sample of children with cerebral palsy (CP), a structured assessment was performed using the GMFCS, the gross motor function measure (GMFM-66) and the type and distribution of CP. Presence of comorbidities (seizures, visual or hearing impairments), muscular tone according to the modified Ashworth scale, orthoses and surgery interventions were also registered. The study was carried out in two successive phases. First, GMFCS's reliability was assessed in 104 children with CP comparing the evaluations of a physiatrist and a physical therapist. Then, 168 children with CP were evaluated with all the clinical tests. GMFCS's criterion and construct validity were assessed by the association between GMFCS levels and the GMFM-66 scores, type and distribution of CP, spasticity, comorbidities (seizures, visual or hearing impairments), and orthoses and multiple surgery interventions. **Results:** GMFCS's reliability was high with a correlation coefficient of 0.9. In the main sample of patients, a significant correlation (-0.9) was found between GMFCS levels and GMFM-66 score. Bilateral involvement, comorbidities, severe spasticity, orthoses and multiple surgery interventions were more frequent in GMFCS levels IV and V. **Implications/Impact on Rehabilitation:** GMFCS Spanish version is a reliable instrument, with adequate criterion validity and an appropriate correlation with the constructs that underlies the definition of CP such as spasticity, seizures and visual or hearing impairments.

No. 466

BOTULINUM TOXIN IN PRETERM INFANTS, CASE REPORT FOR USE IN SIALORRHEA

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Objective: To evaluate the effectiveness of botulinum toxin type-A 100 units (Botox) in the management of sialorrhea in preterm infants. **Method:** It was evaluated in a child with a history of hypoxic-ischemic encephalopathy secondary to cardiac-respiratory arrest after extubation, who showed severe salivation and swallowing disorders with episodes of desaturation due to the difficulty in handling secretions. It was proposed to use of botulinum toxin type-A (BTA) as a therapeutic intervention to reduce salivation. Informed parental consent was obtained and authorization of the attending pediatric neurologist. Ultrasound was used with 10 MHz linear transducer to identify the bilateral submandibular and parotid glands, determining its location, size and depth. Asepsis and antisepsis of the intervention area was done and the transducer was covered with sterile material. Ketamine analgesia was started at 2 mg/kg/day. It was made the application of BTA in the parotid and submandibular glands bilaterally, using doses of 1 U/kg/gland, dilution in 1 cc, one point of application for each gland, under ultrasound guidance. **Results:** It was applied BTA 100 units in a premature of 32 weeks gestation, 59 days chronological age, corrected age of 3 days, weight at time of application 2,930 g. The patient had significant reduction of sialorrhea 48 h after application, objectified by 75% reduction of secretions in the collector, need 70% less daily aspirations, improved in fluid balance and oxygen saturation. There were no adverse reactions, side effects or signs of botulism associated with BTA application. **Implications/Impact on Rehabilitation:** This is the first report in which the application of botulinum toxin type-A (Botox) shown to be useful and safe in preterm infants who have an indication for its use, expanding the age range in which we can use this medicine with good results.

No. 467

THE USE OF VIRTUAL REALITY FOR MOTOR REHABILITATION IN CHILDREN WITH NEUROLOGICAL IMPAIRMENT

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Colombia

Objective: To assess the utility of virtual reality in the rehabilitation of children with hemiparesis searching the improvement of motor patterns and range of movement of the upper limb as main outcomes. **Method:** Upper limb motor function before and after the intervention as well as the parental perception of improvement in the functionality of the limb was assessed in a series of 9 children with hemiparesis. The sports software game of Nintendo Wii, where children had to use their upper limb, was used. The MACS scale, spasticity according to the modified Ashworth scale, joint mobility and upper limb motor patterns pre and post-intervention were used for the assessment. **Results:** In the MACS scale, the patients trend to keep their initial status at the end of the intervention. However, a significant statistical improvement was found in the shoulder's adduction ($p = 0.022$), elbow's extension ($p = 0.01$) and forearm's supination ($p = 0.04$). In the same way, a statistically improvement in spasticity of the shoulder's movement was found according to the modified Ashworth scale. Also, their parents perceived an increase and improvement in the use of the limb in basic and daily activities. **Implications/Impact on Rehabilitation:** It is essential to make further research on the applicability of virtual reality as a therapeutic and as innovative technological assistance for the motor rehabilitation of children with neurological injury.

No. 468

ASYMMETRIC SKULL DEFORMITY IN CHILDREN WITH CEREBRAL PALSY: ITS FREQUENCY AND RELATION TO POSTURAL ABNORMALITIES AND DEFORMITIES

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Japan

Objective: Clinically, we often observe asymmetric skull deformity (ASD) in children with relatively severe cerebral palsy (CP), and this could contribute to the development and aggravation of postural abnormalities and limb and spinal deformities. The objective is to perform a cross-sectional survey among children with CP to find out the frequency of ASD and its relation to clinical parameters. **Method:** Based on clinical experience, we developed a 10-item checklist for ASD, postural abnormalities and deformities. A pilot study revealed its satisfactory inter-rater reliability ($\kappa > 0.8$). We then recruited participants from 2 day-rehabilitation programs for handicapped children and 1 hospital for multiply-handicapped children. We assessed them using the checklist, and analyzed the frequency of ASD and its relationship to gross motor function classification system (GMFCS), postural abnormalities and deformities. **Results:** The participants were 110 children with CP aged 1 to 18 years, and 90% of them belonged to the spastic type. ASD was observed in 44 children (40%), 24 showing right and 20 showing left flat occipital deformity. The frequency of ASD was significantly related with GMFCS (0% in GMFCS 1 to 3, 43% and 58% in GMFCS 4 and 5). The ASD was also significantly related with the patterns of asymmetric posture and deformities. That is, children with right flat occipital ASD tended to show predominantly rightward facial direction and right side dominant asymmetric tonic neck reflex, left convex scoliosis, right-side-elevated pelvic obliquity and left-sided hip dislocation. Those with left flat occipital ASD demonstrated the reverse tendency. **Implications/Impact on Rehabilitation:** ASD is frequent in children with CP and is closely related with asymmetric posture and deformities. This information may be useful to develop effective intervention methods to prevent and/or ameliorate the problem.

No. 469

FIBROTENDINOUS BAND CAUSING NEUROGENIC THORACIC OUTLET SYNDROME IN ADOLESCENT WITH BILATERAL CERVICAL RIBS

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Objective: Report a case of true neurogenic thoracic outlet syndrome (TOS) caused by a fibrotendinous band in an adolescent with bilateral cervical ribs who was submitted for surgical treatment. **Method:** A 13-year-old female with weakness and decreased dexterity at her right dominant hand, decreased sensation at medial upper limb and 4–5th palmar digits with atrophy at right thenar, hypotenar and intrinsic hand areas. Benedictian sign was positive with decreased manual muscle testing at right wrist/finger flexors and intrinsic hand muscles. Electrodiagnosis (EDX) suggested right median and ulnar nerves incomplete damage. Imaging showed bilateral cervical ribs and edema at the inferior trunk of the right brachial plexus.

A supraclavicular approach was done with findings of a fibrous tissue from the cervical rib on C7 to T1, impinging the inferior trunk. Dissection of the fibrous tissue and neurolysis of the brachial plexus trunk was performed. *Results:* Our patient belongs to 1% of patients with true neurogenic TOS and objective findings of lower trunk involvement associated with a cervical rib or a fibrous band. Twenty percent of patients have spontaneous onset of symptoms, as in our case. Surgical evaluation was requested based on findings of significant neurological deficits and good results after removal of cervical ribs as per previous reports. However, 8 months after surgery only mild improvement in subjective sensory function was noticed with no changes in atrophy or muscular strength, and no sensory or motor improvement at EDX. *Implications/Impact on Rehabilitation:* Although TOS is rare in children, there is a high incidence of cervical ribs in children with TOS. We consider that if an adolescent presents with numbness, intrinsic hand muscles atrophy, and impaired dexterity, a work up and evaluation for possible neurogenic TOS is warranted in order to avoid permanent damage to injured nerves and musculature.

No. 470

PROSTHETIC FITTING AT THE AGE OF 20 MONTHS FOR A BOY BORN WITH LEFT CONGENITAL HEMIPELVECTOMY

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Republic of Korea

Objective: Children with lower limb deficiencies face many of functional limitations especially confronted with developing normal gait pattern. Most of all, congenital hemipelvectomy have rarely been reported and is major challenge for all of rehabilitation team as well as patient. The following case will describe our experience of prosthetic fitting at the age of 20 months for a child born with congenital hemipelvectomy. *Conclusion:* This boy born with hemipelvectomy can walk after fitting prosthetic leg and be growing up with appropriate motor function. It is necessary to regular follow up for lengthening pylon and widening socket to adjust growing of patient and readjust alignment of body during growth period. *Method:* This boy was seen initially at the Department of Rehabilitation Medicine of Chungnam National University Hospital at the age of 18 months. He was the 2nd baby of identical twin. The initial examination revealed: 1) aplasia of left pubis, 2) dysplasia of left ileum and ischium, 3) whole deficiency of left lower limb. At the age of 20 months, the boy was fitted with his first prosthesis. This consisted of a socket with pelvic belt, Canadian hip joint, locked knee joint and SACH foot. *Results:* After fitting prostheses, the boy developed good standing balance and started to step forward in the first few weeks. The boy have been seen every 3 months for lengthening the pylon to adjust to grow and socket readjustment. He has been in gait training sessions in physical therapy and has developed a good gait. According to gait analysis, stride is lengthened, cadence are decreased, and gait symmetry is improved. Later articulated hip and knee joints will be added and gait training will be continued. *Implications/Impact on Rehabilitation:* This is the first report of independent prosthetic walking at the age of 20 months in congenital hemipelvectomy. Early prosthetic fitting in congenital major lower limb loss is encouraged.

No. 471

ROLE OF TIBIAL COUNTER-ROTATOR (TCR) IN CHILDREN WITH INTERNAL TIBIAL TORSION

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Republic of Korea

Objective: Internal tibial torsion is one of the major causes of intoeing gait which seems to be more common especially in the oriental

floor sitting culture than in the western. Not all transverse plane abnormality in gait is improved spontaneously as a child grows. Cosmesis in gait is demanded more in the community recently. Medical attention for the severe internal tibial torsion in children is needed. *Method:* Tibial counter-rotator (TCR) was developed and applied as a dynamic night splint while child is sleeping. The appliance is designed to keep the knee bent in 90 degrees while the shoe plate can be gradually rotated externally to passively rotate the tibia outwards. Twenty children with internal tibial torsion were included in this study. Transmalleolar angle was measured as a clinical index of internal tibial torsion, CT to measure tibial torsion angles and computerized clinical gait analysis was performed to evaluate gait. These evaluations were done before TCR application and after the course of TCR program. The improvement of internal tibial torsion in these children was analyzed. *Results:* Most of the children in this study showed significant improvement in visual gait analysis, transmalleolar angles, CT and computerized clinical gait analysis after 6 months of TCR application. There was no rejection by the child nor unexpected side effects from the appliance. *Implications/Impact on Rehabilitation:* TCR might be a useful clinical tool in children with severe internal tibial torsion exceeding 10 degrees of transmalleolar angle. Application for the children with spastic cerebral palsy and internal tibial torsion should be investigated carefully before justification as the relationship with the spasticity is not evaluated yet.

No. 472

INCENTIVE TECHNIQUES AND AIRWAY CLEARANCE THERAPY IN TEENAGERS WITH CYSTIC FIBROSIS

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Objective: The purpose of this study is to demonstrate the efficiency of a complex rehabilitation programme in teenagers with cystic fibrosis. *Method:* This prospective study was conducted for 3 months, in the Romanian National Cystic Fibrosis Centre. We included 40 patients (aged between 14 and 18 years), randomized in 2 groups. The control group (20 patients), was treated using classic physiotherapy techniques (active cycle of technical breathing, autogenic and postural drainage, flutter-therapy). For the study group (20 patients) we additionally used respiratory incentive therapies (consisting in inspiratory and expiratory muscle training using computer assisted systems), 3 times per week during the 3 months intervention. Before and after the treatment we have evaluated the functional respiratory parameters (FEF25–75%, FEV1, FVC). Despite close supervision of the rehabilitation programme there was a dropout rate of 20% (4 patients) in the study group and 15% (3 patients) in the control group, mainly due to exacerbations of the chronic disease. The statistical processing of data was made with the help of statistical software (Graph PadPrism), using paired *t*-test for comparing the data before and after the intervention and unpaired *t*-test for data comparison between groups. *Results:* After 3 months of intervention we noticed significant improvements regarding functional respiratory parameters in the study group: 12.2% increase in FEF25–75% ($p=0.03$); 14.4% increase in FEV1 ($p=0.001$); and 12.8% increase in FVC ($p=0.041$); Although we did not find significant differences between groups at baseline in regard to studied parameters, we found significant differences after 3 months of study regarding FEF25–75% ($p=0.026$) and FEV1 ($p=0.033$). *Implications/Impact on Rehabilitation:* Incentive techniques are an effective intervention in order to improve respiratory function in young patients with cystic fibrosis. Combining incentive therapy with airway clearance techniques leads to significant improvements in respiratory function, which is one of the most important factors for optimizing quality of life in young patients with cystic fibrosis.

No. 473

EFFECT OF THE FOOT ORTHOSIS FOR IDIOPATHIC JUVENILE SCOLIOSIS***Kipi Yu, MD****South Korea*

Objective: To know the change of Cobb's angle in idiopathic juvenile scoliosis patients with pelvic inequality after custom molded foot orthosis was applied. **Method:** We retrospectively reviewed the medical data of all patients who had been prescribed custom molded foot orthosis without heel lift in our institution from 2005 to 2009 and 10 scoliosis patients was chosen. They were Adam's forward bending test positive and had 1) inequality of RCSPA ($\geq 2^\circ$), 2) different pelvic height (≥ 5 mm), 3) direction of the vertex of the curve which is related with incline of the pelvis and 4) Cobb's angle $\geq 10^\circ$. Radiologic findings of whole spine AP and RCSPA were measured before and after treatment and it was compared. Five females and five males were included in this study. Their mean age was 7.76 ± 3.72 years. Their mean period of wearing orthosis was 14.4 ± 3.03 months. **Results:** Initial average Cobb's angle of $18.12 \pm 3.40^\circ$ were significantly reduced to $15.35 \pm 4.28^\circ$ ($p < 0.05$). Initial difference of height between right and left iliac crest of 1.15 ± 0.31 cm reduced to 0.70 ± 0.43 cm ($p < 0.05$) and angle of pelvic inequality of $3.43 \pm 0.86^\circ$ reduced to $2.25 \pm 0.85^\circ$ ($p < 0.05$). Initial difference of RCSPA between right and left of $3.7 \pm 0.95^\circ$ decreased to $1.6 \pm 0.70^\circ$ ($p < 0.05$) and initial angle of hump $7.3 \pm 2.0^\circ$ were changed to $7.1 \pm 1.20^\circ$ ($p > 0.05$). **Implications/Impact on Rehabilitation:** The custom molded foot orthosis was effective for idiopathic juvenile scoliosis patients who had different pelvic height caused by inequality of RCSPA. Idiopathic juvenile scoliosis patient could have functional scoliosis component, so correction of pelvic inequality using custom molded foot orthosis is one of the trial methods in idiopathic juvenile scoliosis management.

No. 474

STANDARDIZATION OF EVAPORATION TECHNIQUE FOR HYPERHIDROSIS USING DIGITAL INFRARED THERMOGRAPHY***Seong Hoon Kim, MD****South Korea*

Objective: In 2009, we already reported the data of patients with hyperhidrosis using evaporation technique with digital infrared thermography (DITI). However, there is no statistical report of normal data using evaporation technique as an accurate diagnostic standard for diagnosis of hyperhidrosis. **Method:** Total of 43 healthy subjects (M: F = 34:9, Mean age: 25.04 ± 3.76) were participated for this study. We checked temperature from the palm, axilla, foot and forehead before and after evaporation by fan for 3 min in 24°C room temperature. **Results:** Mean temperature decrement of whole body of normal subjects showed $1.15 \pm 0.57^\circ\text{C}$ compare with $2.79 \pm 1.39^\circ\text{C}$ in hyperhidrosis patients group of former study. Mean temperature decrement showed $1.19 \pm 0.13^\circ\text{C}$ in forehead area and $1.02 \pm 0.13^\circ\text{C}$ in the foot area. In the axilla and palm areas, mean temperature decrement showed $1.97 \pm 0.36^\circ\text{C}$ and $0.57 \pm 0.29^\circ\text{C}$, respectively. **Implications/Impact on Rehabilitation:** For the diagnosis of hyperhidrosis, we suggest that the temperature decrement should be over 2°C in the evaporation technique by DITI. Exceptionally, the standards of temperature decrement in the axilla should be over 2°C in the same technique. Seasonal temperature variation did not affect body temperature difference.

No. 475

EARLY INTERVENTION IN CRISPONI SYNDROME: A CASE REPORT***Mercedes Martínez Moreno, MD; Eische Abdel-Muti; Ana Borobia; Susana Moraleda****Spain*

Objective: Crisponi syndrome (CS) is a severe autosomal recessive condition that is phenotypically characterized by neonatal-onset paroxysmal muscular contractions as well as craniofacial and skeletal manifestations, camptodactyly, hyperthermia and sudden death in most cases. Surviving patients usually present slow regression of the dystonic symptomatology in the first years of live and develop a severe progressive kyphoscoliosis requiring bracing therapy or corrective surgery. We report the case of a patient with Crisponi syndrome and perform a review of the literature on it. **Method:** A 21-month-old boy diagnosed of having a Crisponi Syndrome is reported. He was referred to our Pediatric Rehabilitation Unit from the Neonatology department when he was 1 month-old. In the first clinical visit he had the inability to suck and swallow due to facial and bulbar weakness. He also showed excessive startle and trismus-like facial contractions when crying or being handled. In orthopedic examination he showed camptodactyly of the third and fourth fingers of both hands. His range of motion of both elbows was limited in extent, so as were the knees, he also had talo-valgus feet. **Results:** An early interventional programme was started with physical therapy following the Vojta principle, night splints hands and oral therapy to improve sucking difficulties. He presented a delay in the psychomotor development, starting crawling at the age of 12 months and achieved independent walking at the age of 18 months. At the moment, the child is able to manipulate but still shows clinodactyly of the right hand. However in language skills he has an essential expressive delay, but his comprehension is adequate. Although he has had some hyperthermal crisis these have been gradually disappearing with time. **Implications/Impact on Rehabilitation:** Crisponi Syndrome is a rare condition. Early Interventional Programs are needed to minimize the psychomotor development delay due to clinical features of the syndrome, especially those related to orthopedic disorders.

No. 476

PROSTHETIC FITTING IN CONGENITAL BELOW-ELBOW DEFICIENCY IN CHILDREN. IS IT WORTH IT?***Mercedes Martínez Moreno, MD; Eugenia Noguera López; Ejesie Alfonso Barrera; Susana Moraleda Pérez; Celia López Cabarcos***
Spain

Objective: The main objective of this study is to analyze the results of prosthetic treatment in children with congenital below-elbow deficiency in a single center Department of Physical Medicine and Rehabilitation. **Method:** From the database Department of Physical Medicine and Rehabilitation of our institution we selected all pediatric patients attended from January 2005 to December 2010 with congenital below-elbow deficiency. The clinical records were reviewed and data referring to patient's clinical characteristics, side and level of the limb deficiency and type of prosthesis used were collected. We developed a prospective questionnaire in order assess the patterns of prosthesis use, its value in the activities of daily living (ADL), as well as parents' satisfaction with their child's prosthesis. **Results:** A total of 30 children with below-elbow deficiency were analyzed. Of these, 20 were girls and 10 were boys. The most common level of agenesis was the distal portion of the forearm and the most frequently side affected was the left one. 86.7% of the children have prosthetic fitting and 63.3% are currently using a myoelectric prosthesis. Of these patients, 84.2% have had passive prosthesis first and then continued with myoelectric prosthesis and 15.7% have only used myoelectric prosthesis from the beginning of the process. The average use, up to date, of the myoelectric prosthesis is 29.9 months. Children using the myoelectric prosthesis usually wear it more than 8 h a day and use it for most of ADL including getting dressed, eating, playing indoors and outdoors, performing bimanual activities and even riding bicycle. Parents were satisfied with all aspects of the myoelectric prosthesis except cosmetic glove and battery durability; and a 100% of them would recommend it use for other patients. **Implications/Impact on Rehabilitation:** In our experience the use of a myoelectric prosthesis for children with congenital below-elbow deficiency facilitates ADL and is an accepted and recommended treatment by the children's parents.

No. 477

THE TRUNK APPEARANCE PERCEPTION SCALE (TAPS): A NEW TOOL TO EVALUATE SUBJECTIVE IMPRESSION OF TRUNK DEFORMITY IN PATIENTS WITH IDIOPATHIC SCOLIOSIS

**Judith Sánchez Raya, MD; Esther Pagés, MD, PhD;
Jose María Climent, MD; Joan Bagó, MD, PhD**
Spain

Objective: Outcome assessment in idiopathic scoliosis should probably include patients' perception of their trunk deformity in addition to self-image. This can be accomplished with the Walter Reed Visual Assessment Scale (WRVAS). Nevertheless, this instrument has some shortcomings: the drawings are abstract and some figures do not relate to the corresponding radiological deformity. These considerations prompted us to design the Trunk Appearance Perception Scale (TAPS). **Method:** Patients with idiopathic scoliosis and no prior surgical treatment were included. Each patient completed the TAPS and SRS-22 questionnaire and underwent a complete radiographic study of the spine. The magnitude of the upper thoracic, main thoracic, and thoracolumbar/lumbar structural curves were recorded. The TAPS includes 3 sets of figures that depict the trunk from 3 viewpoints: looking toward the back, looking toward the head with the patient bending over and looking toward the front. Drawings are scored from 1 (greatest deformity) to 5 (smallest deformity), and a mean score is obtained. **Results:** A total of 186 patients (86% females), with a mean age of 17.8 years participated. The mean of the largest curve (C_{MAX}) was 40.2°. The median of TAPS sum score was 3.6. The floor effect was 1.6% and ceiling effect 3.8%. Cronbach's alpha coefficient was 0.89; the ICC for the mean sum score was 0.92. Correlation coefficient of the TAPS mean sum and C_{MAX} was -0.55 ($p < 0.01$). Correlation coefficients between TAPS mean sum score and SRS-22 scales were all statistically significant, ranging from 0.45 to 0.52 ($p < 0.05$). **Implications/Impact on Rehabilitation:** The TAPS is a valid instrument for evaluating the perception patients have of their trunk deformity. It shows excellent distribution of scores, internal consistency, and test-retest reliability, and has good capacity to differentiate the severity of the disease. It is simple and easy to complete and score, the figures are natural, and a new frontal view is included.

No. 478

THE IMPACT OF INPATIENT REHABILITATION: A CASE OF AN ADOLESCENT WITH SPINA BIFIDA AT 2-YEAR FOLLOW-UP

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Objective: The multidisciplinary care team plays an integral role in the care of children with special healthcare needs (CSHCN). This case of an 18-year-old boy with spina bifida is examined 2 years post-admission to an acute inpatient rehabilitation unit (IRU). Spina bifida is a developmental birth defect caused by failure of closure of the neural tube. While some patients are asymptomatic, others suffer from more severe complications. Initially 2 years ago, this adolescent presented to a spina bifida clinic with multiple complications including neurogenic bowel and bladder, joint contractures, and a stage IV ulcer sary to fragmented care. At that time the patient was admitted to acute inpatient rehabilitation. Over the course of his stay, his wound resolved, he was placed on a bowel and bladder program and he received appropriate DME's. Two years later, when he developed another ulcer, the patient was equipped with the skills and knowledge to efficiently access care. The immediate goals of an inpatient multidisciplinary care are focused on medical optimiza-

tion, restoring function and ultimately returning to the community. However, we should not underestimate the opportunity for lasting influences. **Method:** This patient was monitored closely over two years as an outpatient, and readmitted to Blythedale Children's Hospital, where his progress was monitored by a multidisciplinary team. **Results:** An 18-year-old male with spina bifida initially presented two years prior with multiple complications sary to his underlying disease. At that time multidisciplinary care was initiated. Over the past two years his ulcer remained healed, he had optimized his bowel and bladder routine, and he had been compliant with utilizing his DME's. But, unfortunately due to the loss of his mother his compliance waned. At an appointment, his primary care physician noted a re-emergence of his sacral wound likely sary to friction from scooting. Using the knowledge and insight gained from his initial hospitalization this patient and his family were able to quickly access medical care and intervene while the wound was still in its early stages. He was re-admitted to the hospital, where the wound healed in a timely fashion. **Implications/Impact on Rehabilitation:** Families of CSHCN often receive fragmented care due to lack of communication between specialties. The acute inpatient setting provides a unique opportunity for these patients to work with a multidisciplinary team to strive towards patient/family-centered goals. In this case, we observe not only the immediate influence of acute inpatient rehabilitation, but additionally, this intervention had long lasting effects: it provided education for the patient and family, empowered the patient and ultimately impacted the course of his future medical care.

No. 479

THE EFFECTS OF EXTREACORPOREAL MEMBRANE OXYGENATION (ECMO) IN PEDIATRIC REHABILITATION: A CASE SERIES

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United States of America

Objective: A case series presentation of pediatric rehabilitation patients who have received ECMO prior to rehabilitation. **Method:** A 16-year-old female presented with generalized weakness of all extremities and superimposed plegia of the right lower extremity. She developed an acute febrile illness, which prompted admission to a local hospital. She had an abrupt onset of cardiovascular collapse, was diagnosed with Coxsackie's myocarditis with subsequent heart failure and placed on ECMO for 16 days. Her course was remarkable for infections, sary renal failure requiring hemodialysis, and retroperitoneal bleed with right lumbar plexopathy. A 7-year-old girl presented with abdominal pain, emesis and fever. She was admitted to the PICU, tested positive for H1N1 influenza, started on oseltamivir and received IVIG therapy. She became hypotensive and tachycardic. ECHO revealed poor biventricular function. She was diagnosed with myocarditis requiring pericardiocentesis and placed on ECMO for 6 days with subsequent left leg compartment syndrome and underwent two fasciotomies. An 11-year-old boy presented with gastroenteritis, fever, hypotension, s/p two cardiac arrests and resuscitations. He was diagnosed with myocarditis requiring ECMO for 4 days. While intubated, the patient had increased tone, spasticity and weakness. MRI showed multiple bilateral infarcts. **Results:** ECMO was initially used in the pediatric patient in neonates with severe respiratory distress syndrome, but expanded to the older population with cardiac dysfunction. Access and bleeding issues, however, can result in these medically frail children with obvious and more occult medical problems for which they need to be screened, especially upon admission to a rehabilitation unit to prevent additional morbidity. This strategy should be associated with fewer complications and reduced length of stay in the rehabilitation with improved quality of care. **Implications/Impact on Rehabilitation:** The children in this case series had ECMO associated events with functional deficits that were addressed and improved with therapy. It is important for physicians to be aware of these events to better help these patients improve their function.

No. 480

THE DEVELOPMENTAL AND FUNCTIONAL SPECTRUM OF HOLOPROSENCEPHALY (HPE)***Scott Paul, MD¹; Benjamin Solomon, MD²; Maximillian Muenke, MD²****¹Rehabilitation Medicine Department, NIH Clinical Center, and ²National Human Genome Research Institute, United States of America*

Objective: HPE is a condition causing embryological malformation of the developing forebrain. Although its prevalence in embryos is estimated to be 1:250, it is rare, found in only 1:10,000 live born infants and as few as 30% of those may survive to one year of age. Although it is known that virtually all children with HPE will have some developmental delay, along with motor and cognitive impairments, the spectrum of ability of persons with HPE to perform daily life skills has not yet been well described. The purpose of this study is to describe the developmental history and functional abilities of a series of children and young adults with HPE. *Method:* A series of 9 persons with HPE enrolled in a natural history study at a government research hospital and were seen for evaluation by the same pediatric physiatrist. As part of that evaluation, a detailed history of developmental milestones and current functional abilities was obtained from the caregiver. Subsequently, the reports of these evaluations were reviewed, results were tabulated and analyzed. *Results:* All patients had neurological and craniofacial features consistent

with HPE, though the severity of these malformations was variable between patients. Seven of 9 patients had structural brain malformations, while two did not have anomalies on conventional brain MRI, but had HPE-associated gene mutations and consistent craniofacial features. Subjects ranged in age between 1 and 24 years old. The majority of subjects had functional vision (66%), hearing (78%) and normal upper and lower limb muscle tone (54%). Only 22% had joint contractures. Walking was achieved in 66% of all subjects; one older subject lost this skill and is currently limited to combat crawling. 78% of subjects were able to tolerate solid food and 56% achieved some level of independence in eating. However, almost all subjects were dependent for toileting, grooming and bathing. To some extent, the degree of brain malformations seemed to correlate with the level of functional independence, but there were notable exceptions. *Implications/Impact on Rehabilitation:* Despite the commonly held belief that HPE is incompatible with life or guaranteed to result in profound disability, this study demonstrates that there is a broad spectrum of functional abilities in HPE and that many persons with HPE can achieve a reasonable level of ADL function. The level of ADL function may to some extent be predicted by the degree of brain malformations, but there are important exceptions in which the level of functional independence far exceeds what would be predicted by the degree of structural brain malformation. Physiatrists and other members of the rehabilitation team need to be involved in these patients care to optimize their abilities. Knowledge of the spectrum of abilities can assist in developing appropriate rehabilitation goals and plans.

SPINAL CORD INJURIES

No. 481

PSYCHOLOGICAL IMPACT OF THE IMPLEMENTATION OF A NEUROGENIC BOWEL REHABILITATION PROGRAM IN SPINAL CORD INJURY PATIENTS***Melina Longoni, MD; Laura Juan Bennazar, MD; Virginia Barat***
Argentina

Objective: To evaluate the reactions and responses of spinal cord injury patients to the implementation of a re-educational program for neurogenic bowel and correlate the moment or psychological stage that the patient is passing. **Method:** Monitoring and clinical intervention in 8 male patients with spinal cord injury, who entered an integral neurogenic bowel re-educational program, that implicates a modification in their diet and bowel habits. Semi-directed interviews to patients and their families. Six months follow up. Qualitative study. **Results:** All patients consider that the inadequate bowel management limits their social life, feeling "prisoners" and unable to perform activities and social outings that they used to do before the accident. During hospitalization period, the patient experience emotional disturbances, that are intensify before any change in the daily routine. At the beginning of the program, 12.5% were in the depressive phase, 25% denial phase, 37.5% protest phase and 25% adaptive, at the end of the program 50% were in the adaptive phase. Not necessarily all patients go through all psychological stages, nor experienced in that order. Each patient responded to the injury according to their personality and ability to adapt destabilizing events. Despite differences, at the end of the program, all patients were aware of the importance of re-educating the bowel. At the end, 87% accepted the program completely. In the beginning most of them were resistant to the change with some "denial" to receive this modifications, but as the confidence in their therapists grew, and they observed good results they offered less resistance and accepted the program. **Implications/Impact on Rehabilitation:** Spinal cord injury breaks with the lifestyle, balance and projects that the person has established for themselves. The intestinal problem, in spinal cord injury patients, has an impact in relationships and in the persons self-esteem, and it directly influences the prognosis, quality of life and in the future, the socio-professional reinsertion.

No. 482

INTRADETRUSOR INJECTIONS OF BOTULINUM TOXIN TYPE A IN THE TREATMENT OF SPINAL CORD INJURED PATIENTS REFRACTORY TO ANTICHOLINERGIC DRUGS***Rodrigo Medeiros; Ruiter Silva Ferreira; Carlos Arturo Levi D'Ancona***
Brazil

Objective: To evaluate the impact of the intradetrusor botulinum toxin type A (BoNTA) on quality of life (QoL) and on the urodynamic parameters in spinal cord injury (SCI) patients. **Method:** Twenty-eight patients with traumatic SCI with detrusor overactivity refractory to anticholinergic treatment were treated with intradetrusor injection of 300 U BoNTA (Botox®, Allergan) in 30 points of the bladder wall with sparing trigone. Urodynamic parameters such as maximum cystometric capacity (ml), maximum detrusor pressure (cm H₂O) and bladder compliance (ml/cm H₂O). QoL was assessed by using the Qualiveen questionnaire. The initial assessment was repeated after 24-weeks. It was used the Wilcoxon test to compare the numerical variables between the initial and final evaluations. The significance level adopted was 5%. **Results:** Twenty-three patients were male (82%), the mean age was 33.54±11.86 years with injury time of 23.75±8.73 months.

The maximum cystometric capacity increased significantly from 172.36±33.53 mL to 461.61±139.38 ml, $p<0.001$. The maximum detrusor pressure decreased significantly from 79.14±21.80 cm H₂O to 30.39±27.27 cm H₂O, $p<0.001$. The bladder compliance increased significantly from 14.89±3.15 ml/cm H₂O to 40.71±24.10 ml/cm H₂O, $p<0.001$. The Qualiveen analysis has shown a significant improvement in QoL represented by the score reduction of the Specific Impact of Urinary Problems from 3.38±0.39 to 1.90±0.7 ($p<0.001$) and by the increase of the Quality of Life Index from -1.28±0.45 to -0.65±0.49, $p<0.001$. **Implications/Impact on Rehabilitation:** The BoNTA has shown improvement in all urodynamic parameters and in QoL. The successful treatment of urinary incontinence SCI patients has been associated with better rehabilitation process.

No. 483

SATISFACTION OF PATIENTS WITH SPINAL CORD LESIONS AND DETRUSOR HYPERACTIVITY SUBMITTED TO INTRADETRUSOR INJECTION OF BOTULINUM TOXIN TYPE A***Rodrigo Parente Medeiros, MD; Livia Gabriela Rocha; Santos De Oliveira Saliba; Ruiter Silva Ferreira***
Brazil

Objective: To evaluate the satisfaction of patients with spinal cord lesions submitted to intradetrusor injections of botulinum toxin type A (BoNTA). **Method:** Sixty patients with traumatic spinal cord injuries and detrusor hyperactivity were treated with intradetrusor injections of 300 U of BoNTA (Botox®, Allergan) diluted in 30 ml of 0.9% saline solution. One ml (10 U) was injected into 30 points in the bladder wall, sparing the trigone. The patients were interviewed in person or by telephone and answered a questionnaire to evaluate their satisfaction with treatment. A modified Likert scale was used. The chi-square test was used to correlate the variables and statistical significance was defined as $p<0.05$. **Results:** Of the 60 patients, 47 (78.3%) were male and 13 (21.7%) were female. Thirty-nine patients (65%) had been submitted to only one application of BoNTA, while 17 patients (28.3%) had had two applications and 4 patients (6.7%) had had three applications. The association between the patient's gender and the number of applications received was not statistically significant ($p=0.247$) and gender was not found to be associated with the responses on the modified Likert scale ($p=0.491$). Forty-one patients (68.3%) responded that they were fully satisfied with the treatment. Seven patients (11.7%) answered that they were partially satisfied and two (3.3%) that they were indifferent to treatment, while one patient (1.7%) was partially dissatisfied with treatment and 9 patients (15%) were completely dissatisfied. The number of patients completely satisfied with treatment was significantly higher ($p=0.0009$). **Implications/Impact on Rehabilitation:** Adequate treatment of urinary incontinence in patients with spinal cord injuries improves quality of life and self-confidence, positively affecting the rehabilitation process.

No. 484

THE ANALYSIS OF SYMPATHETIC SKIN RESPONSE IN THE PATIENTS WITH SPINAL CORD INJURY***Guangxu Xu, MD, PhD; Chao Peng; Hongxin Wang; Jianan Li****Rehabilitation Department of the First Affiliated Hospital to Nanjing Medical University, Nanjing, China*

Objective: The aim of this study is to find out the difference frequency of sympathetic skin response (SSR) between the patients with spinal

cord injury (SCI) and normal subjects. The SSR may be a new objective method to assess the integrity of spinal autonomic nerves (especially for sympathetic system) in the patients with SCI. *Method:* Ten chronic patients with complete SCI in different levels and 10 chronic patients with incomplete SCI in different levels and degrees were involved in the SSR testing. Meanwhile, 20 normal subjects were tested as the control group. All subjects lie supine on the bed with the electrical stimulation in left supra orbital nerve, median nerve and tibial nerve respectively. At the same time, the record electrodes were set at the bilateral palms of two hands and soles of feet. The rate of SSR was analyzed in each group. *Results:* No matter where the electrode on, the SSR in 20 normal subjects always presented. No matter where the electrode on, the detection rates of SSR in patient with complete SCI were decreased ($p < 0.05$). The number of samples presenting SSR by stimulating left supra orbital nerve with each record electrodes was 7, 7, 3, 3, median nerve was 7, 7, 2, 2, tibial nerve was 2, 2, 1, 1. The rates of response at sole-SSR decreased when stimulated left median nerve and tibial nerve in the patients with incomplete SCI ($p < 0.05$). The number of samples presenting SSR by stimulating left supra orbital nerve with each record electrodes was 9, 9, 8, 7, median was 9, 8, 6, 6, tibia was 7, 7, 5, 5. *Implications/Impact on Rehabilitation:* The rates of SSR in the patients with chronic SCI were abnormal and even decreased by comparing with control group. We may use the SSR to assess the impact of the autonomic nerve system, particularly for the sympathetic systems after spinal cord injury.

No. 485

EFFECT OF ELECTROACUPUNCTURE COMBINED WITH CLEAN INTERMITTENT CATHETERIZATION ON URINE RETENTION FOLLOWING SPINAL CORD INJURY: A RANDOMIZED CONTROLLED SINGLE-BLIND CLINICAL TRIAL

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Objective: To investigate the effects of combination of electroacupuncture (EA) and clean intermittent catheterization (CIC) on urine retention due to spinal cord injury (SCI). *Design:* A randomized, controlled, single blind clinical trial. *Setting:* Department of Rehabilitation Medicine. *Method:* One hundred and seven cases with urine retention were assigned randomly to three groups according to the treatment: group-1 received CIC alone, and group-2 received sham acupuncture combined with CIC, group-3 received EA and CIC. *Outcome assessment:* residual urine volume, voided volume per time, numbers of the cases reaching to bladder balance and frequency of carrying out CIC were used to assess all patients. *Results:* Among three groups, residual urine volume in group-3 was less than other groups ($p < 0.05$), voided volume per time in group-3 appeared to achieve a significant increment than the other groups ($p < 0.05$), frequency of carrying out CIC in group-3 was less than other groups ($p < 0.05$), cases reaching to bladder balance in group-3 were more than other groups ($p < 0.05$). *Implications/Impact on Rehabilitation:* The therapeutic effects of EA combined with CIC were superior to that of CIC alone or CIC combined with sham acupuncture. EA combined with CIC could reduce residual urine volume and frequency of carrying out CIC, increase voided volume per time, and promote the balance state of vesical function.

No. 486

THE URODYNAMIC STUDIES OF THE NEUROGENIC BLADDER AFTER SPINAL CORD INJURY

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China

Objective: To investigate the associations between the level of injury and the type of neurogenic bladder, the associations between the completeness of injury and the type of neurogenic bladder through urodynamic studies on patients with spinal cord injury. *Method:* A total of 45 patients (32 males, 13 females) with spinal cord injury were involved in this retrospective analysis. The patients were categorized by the levels of injury (35 with suprasacral injury and 10 with sacral injury) and further categorized by the completeness of injury according to the ASIA Impairment Scale (12 with complete suprasacral injury, 23 incomplete suprasacral injury, 4 with complete sacral injury and 6 with incomplete sacral injury). Urodynamic studies on each patient were performed with Delphis urodynamic machine from the Laborie Medical Technologies Corporation. Outcome measures were recorded with the International Spinal Cord Injury Urodynamic Basic Data Set established by ISCoS. *Statistical analysis of the data was performed with SPSS 15.0. Results:* No significant difference in bladder sensation during filling cystometry between the suprasacral and sacral injury ($p = 0.193$), while significant difference between the completeness of suprasacral injury ($p = 0.000$). The detrusor function ($p = 0.017$) and urethral function during voiding ($p = 0.000$) between suprasacral and sacral injury showed significant difference, while no significant difference between the completeness of suprasacral injury ($p = 0.357$ and 0.634 , respectively) and the completeness of sacral injury ($p = 0.719$ and 0.190 , respectively). No significant difference in compliance during filling cystometry between the suprasacral and sacral injury ($p = 0.526$), the completeness of suprasacral injury ($p = 0.517$) and completeness of sacral injury ($p = 0.667$). *Implications/Impact on Rehabilitation:* For the patients of neurogenic bladder after spinal cord injury, the type of lower urinary tract dysfunction could not predict by the ordinary neurological examination. Regular urodynamic investigation should be performed to assess the function of bladder and urethral.

No. 487

EFFECTS OF HIGHLY SELECTIVE POSTERIOR ROOT RHIZOTOMY ON BLADDER AND URETHRAL FUNCTIONS IN RATS

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China

Objective: To explore the role of selective conduction of L6 and S1 posterior rootlets on bladder and urethral functions of rats, and to observe the effects of highly selective posterior roots rhizotomy on intravesical pressure (IVP) and urethral perfusion pressure (UPP). *Method:* Forty male Sprague-Dawley (SD) rats were divided into Baseline Group (10 rats) and Rhizotomy Group (30 rats), and it was divided into Subgroup A and Subgroup B. In Baseline Group, the changes of IVP and UPP were recorded during electro-stimulation. In Subgroup A, the highly selective rhizotomy was done on the rootlets which conducted impulses from the detrusor. In Subgroup B, the same procedure was performed on the rootlets which conducted impulses from the sphincter. The changes of IVP and UPP before and after rhizotomy were studied and recorded during electro-stimulation. Paired *t*-test with SPSS 13.0 software was chosen to analyze the data. *Results:* In Baseline Group, there was no significant variation in the changes of IVP during electro-stimulation between L6 and S1 ($p = 0.168$) and was significant in the changes of UPP ($p < 0.001$). There was no significant variation in IVP and UPP between the left and right posterior roots of L6 segment (p is 0.870 and 0.887 , respectively). In Rhizotomy Group, there was significant differences in IVP or UPP ($p < 0.001$) after highly selective rhizotomy of L6 posterior rootlets. *Implications/Impact on Rehabilitation:* Conclusion: Rootlets of L6 were identified and dissected using microsurgical technique. Different posterior rootlets which conduct impulses from the detrusor or sphincter of L6 can be distinguished by electro-stimulation in SD rats. Highly selective rhizotomy of posterior rootlets could change IVP or UPP, respectively.

No. 488

THREE MOTOR TRAINING PARADIGMS DIFFERENTIALLY IMPROVE MOTOR ACTIVITY RECOVERY AFTER SPINAL CORD CONTUSION IN RATS

Ding Xiaojing; Wang Tong; Wang Jin; Wang Hong-xing
China

Objective: Compare the promotion of three different motor training paradigms in rats after spinal cord injury. **Method:** 45 female adult Sprague-Dawley rats were made a incomplete spinal cord injury at T9 spinal cord. Taken the injured rats without training as the control group. Three groups of injured rats were trained by different motor training paradigms, body-weight-support-treadmill- training (BWSTT), swimming training and wheel running. Exercise training began 1 week post surgery. Locomotor functioning was evaluated using inclined plane tests modified Tarlov scores and Basso-Beattie-Bresnahan (BBB) scales. We observed the histomorphological changes of T9 spinal cord and gastrocnemius muscle, and analyzed the cross stion area and diameter of the gastrocnemius muscle fibers. **Results:** Locomotor functioning of BWSTT group and swimming training group had increased significantly ($p < 0.05$), and the scores of the two groups was similar ($p > 0.05$). Although the scores of the wheel running group had increased, it was no significant difference compared with the control group ($p > 0.05$). Histomorphological observation of the T9 spinal cord of the three training groups showed that the improvement of the BWSTT group was the most significant, the swimming training group was less, and the wheel running group was the least. Histomorphological observation of the gastrocnemius muscle fibers showed the improvement of amyotrophy of BWSTT group was the most significant. The swimming training group also has great improvement compared with the control group. But the amyotrophy of the wheel running group was not significant. **Implications/Impact on Rehabilitation:** Body-weight-support-treadmill- training is a more valid and feasible motor training paradigm for spinal cord injury rats, making it more facilitate for the animal research of rehabilitation.

No. 489

BODY-WEIGHT-SUPPORT-TREADMILL TRAINING IMPROVE MOTOR ACTIVITY RECOVERY AND DECREASE SARY LESION IN DISTAL SPINAL MOTOR NEURON AFTER SPINAL CORD CONTUSION IN RATS

Ding Xiaojing; Wang Tong; Wang Jin; Wang Hong-xing
China

Objective: To explore the promotion of body-weight-support-treadmill training (BWSTT) and the changes of sary lesion in distal spinal motor neuron in rats after spinal cord injury. **Method:** 30 female adult Sprague-Dawley rats were made a incomplete spinal cord injury at T9 spinal cord. Taking the injured rats without training as the control group. One group of injured rats were trained by BWSTT. Exercise training began 1 week post surgery, lasted 30 min per day, 5 days a week for 4 weeks. Locomotor functioning was evaluated using inclined plane tests, modified Tarlov scores and Basso-Beattie-Bresnahan (BBB) scales before the operation and on the 1st day, and the 1st, 2nd, 3rd, 4th, 5th week post surgery. Histomorphological changes of L5 spinal cord and gastrocnemius muscle were observed at the 5th week. **Results:** Locomotor functioning of BWSTT group had increased significantly compared with the control group at any time of the observation ($p < 0.05$). Compared the shape, and the cross stion area and the diameter of the gastrocnemius muscle fibers, it showed that the improvement of amyotrophy of BWSTT group was significant. Its cross stion area and diameter was nearly closed to the normal group ($p > 0.05$). The histomorphological observation of the L5 spinal cord of each group showed that the improvement of the BWSTT group was significant. After 4 weeks of BWSTT,

neurites and Nissl bodies didn't have great decreased, the shape of myelin sheath and neuraxis was mostly integrity, and the vacuole in the cell matrix was significantly decreased. **Implications/Impact on Rehabilitation:** The body-weight-support-treadmill training can effectively decrease the sary lesion in distal spinal motor neuron, making us pay more attention to the sary lesion in distal spinal motor neuron of spinal cord injury patient.

No. 490

RESEARCH OF EFFECTS ON BDNF AND ITS RECEPTOR TRKB BY DU MERIDIAN ELECTRO-ACUPUNCTURE COMBINED WITH REHABILITATION TRAINING ON THE SPINAL CORD HEMITRANSTION INJURY IN RATS

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China

Objective: To investigate the expression of BDNF (brain-deried neurotrophic factor) and TrkB (receptor of BDNF) in rats with Hemitranstion Spinal Cord Injury by electro-acupuncture Du-meridian and rehabilitation training, and to observe the rats' behavioral changes. **Method:** 96 adult female Sprague-Dawley (SD) rats were divided randomly into acupuncture group, rehabilitation training group, acupuncture combined with rehabilitation training group and sham operation group. The electro-acupuncture group began the treatment three days after the operation. The rehabilitation training group began the treatment four days after the operation. Acupuncture combined with rehabilitation training group did both of the treatment. The sham operation group did not need to do any treatment. We evaluated their neurological behavior every week and extracted spinal cord tissue 4 and 8 weeks later, respectively. By using the immunohistochemical method, RT-PCR and Western blot, we observe relevant statistics of BDNF and TrkB. **Results:** Successfully making the model of SCI, the operational group always have the neurological and motor functional defects. 2) BBB grade increases gradually as time going on. The score is obviously increased in acupuncture combined with rehabilitation training group than the other two operational groups. 3) The result of immunohistochemical method, RT-PCR and Western blot also indicates that there are significant difference between operation group and sham operation group of BDNF and TrkB at the same time point. And the result is much more obvious in acupuncture combined with rehabilitation training group than the other three groups. **Implications/Impact on Rehabilitation:** Electro-acupuncture Du-meridian and rehabilitation training could obviously improve those neurological and motor functional defects. Experimental results demonstrate that the curative effect of acupuncture combined with rehabilitation training group is the best plan.

No. 491

QUALITY OF LIFE AND ACTIVITY OF DAILY LIVING AMONG INPATIENTS WITH SPINAL CORD INJURY DURING CONVALESCENCE IN CHINA

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China

Objective: To assess quality of life (QOL) and Activity of daily living (ADL) among inpatients with spinal cord injury (SCI) and the effects of the rehabilitation therapy during convalescence. **Method:** Ninety-one SCI inpatients 1-2 months post-injury were randomly assigned to comprehensive rehabilitation (traditional Chinese and Western rehabilitation) ($n1=47$) or traditional rehabilitation ($n2=44$). Controls ($n=100$) had bone and joint disorders but not SCI. All patients were assessed at baseline and after therapy, in-

cluding QOL questionnaire (WHOQOL-BREF [Chinese version]), demographics, physiological and ADL(BI). *Results:* The mean age of patients with SCI was 37.48 ± 13.86 years and those aged 26–50 years accounted for 57.14%, primarily from traffic accident, falls and injury by striking against heavy objects (73.63%). Global and dimensional QOL scores were significantly lower in two SCI groups than no SCI controls ($p < 0.05$). Rehabilitation treatment markedly increased global score and scores in physiological and environmental dimensions ($p < 0.05$) after therapy, but not social dimensions. Treatment increased global and physiological scores in group 1 more than in group 2 ($p < 0.05$). Barthel Index in both treatment groups significantly increased after therapy ($p < 0.01$), more so in group 1 ($p < 0.05$). *Implications/Impact on Rehabilitation:* Most patients with SCI were young adults whose QOL was poorer than controls. Patients benefitted most from rehabilitation combining Chinese with Western techniques.

No. 492

FACTORS AFFECTING QUALITY OF LIFE AMONG INPATIENTS WITH SPINAL CORD INJURY DURING CONVALESCENCE IN CHINA

Weihong Qiu, MPH; Yuantao Hao; Zulin Dou; Hongxiang Zhu; Guifang Wan; Shaoling Wu; Xiaomei Chen; Li Jiang; Shun Li; Yingxia Zhang; Lijun Xie
China

Objective: To analyze the determining factors of quality of life (QOL) among inpatients with spinal cord injury (SCI) during convalescence. *Method:* Ninety-one SCI inpatients 1–2 months post-injury were involved in this study at the. Their QOL and seventeen factors (such as sociodemographic and medical data) were recorded and analyzed with multiple linear regression analysis, and the influence factors were screening. The scales included WHOQOL-BREF (Chinese version), ASIA, Barthel Index and a questionnaire. *Results:* Factors affecting Quality of Life in spinal cord injury patients during rehabilitation involved several aspects, such as gender, marital status, sexual life, leisure activity, bladder and bowel control, medical complication, rehabilitation therapy, family quarrel and source of medical expense, etc. The factors which determine the global score of QOL were BI, family quarrel, source of medical expense and gender. The factors which determine the physiological dimension of QOL were rehabilitation therapy, BI, bladder and bowel control and medical complication. The factors which determine the psychological dimension of QOL were BI, family quarrel, marital status and gender. The factors which determine the social dimension of QOL were sexual life and marital status. The factors which determine the environmental dimension of QOL were leisure activity, BI and medical complication. *Implications/Impact on Rehabilitation:* Factors affecting QOL in SCI patients involved several aspects. Patients benefitted most from rehabilitation combining Chinese with Western techniques. The interventions for these factors have great advantage for improving QOL of SCI patients.

No. 493

THE EFFECTS OF TRANSPLANTATION OF INDUCED DIFFERENTIATED BONE MARROW MESENCHYMAL STEM CELLS ON THE NEUROLOGICAL FUNCTION RECOVERY AFTER SPINAL CORD INJURY IN RATS

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China

Objective: To investigate the effects and the suitable engraftment time of transplantation of oriented- induced bone marrow mesenchymal stem cells (BMSCs) on the nerve function recovery after spinal cord injury (SCI) in rats. *Method:* The BMSCs at 3rd passage were induced towards the direction of neural stem cells. The oriented-induced BM-

SCs were labeled with Brdu 3 days before they were transplanted, and they were slowly injected into the injured site of the SCI rats in group A (transplantation at 1 week postinjury) and group B (transplantation at 2 weeks postinjury). The SCI rats in group C as the control group. The BBB scores after transplantation were recorded so as to estimate the nerve function recovery. The distribution and differentiation of transplanted cells were observed by using immunofluorescence staining with antibodies against Brdu combined with Nestin and Brdu combined with NF200. NF200 immunofluorescence staining was used to show the axonal regeneration. We measured the cavity area by staining with hematoxylin-eosin(HE). *Results:* BBB scores in group A and group B were significantly higher than group C ($p < 0.05$). The immunofluorescence showed that a large number of Brdu and Nestin double-positive cells and some Brdu and NF200 double-positive cells filled the injured site and linked the two sides of the injured area in group A and group B, and the lesion area of the spinal cord were less than those in the group C ($p < 0.05$). More importantly, further reduction in lesion area and improvement in function were observed in group A. *Implications/Impact on Rehabilitation:* The transplantation of oriented-induced BMSCs could effectively promote the nerve function recovery after SCI, and the effect of transplantation at 1 week postinjury was better than transplantation at 2 weeks postinjury.

No. 494

HYPERHIDROSIS: NOT A MILD COMPLICATION OF SPINAL CORD INJURY

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Objective: To report a case in which surgical management reduced the disability associated with sweating related to spinal cord injury (SCI), and to review the issue on the management of this complication. *Method:* A 14-year-old quadriplegic adolescent with an American Spinal Injury Association (ASIA) A injury to C5 experienced profuse sweating with position change and stressful situations. Symptoms began one year before being mild at their start, but after a surgical correction of thoracic scoliosis worsened became profuse, socially embarrassing and disabling, compromising his participation in school (he even was rejected from school in an alleged illegal decision) and family activities. Signs of dysautonomy were absent as documented by Holter. He occasionally had dyspnoea and tachypnoea. *Results:* Even though pharmacological treatments were considered as possible effective treatments, due to the respiratory symptoms, and suspecting a pleural focus of stimulus for dysautonomic symptoms Thoracoscopic Sympathectomy was proposed by the team and accepted by the patient and his family. After the procedure episodes of sweating decreased in number and frequency; two months later he was asymptomatic and remains this way to date; no side effects had been reported by the patient or his family. It is also remarkable that pleural adhesions were found and released with significant reduction of respiratory symptoms. *Implications/Impact on Rehabilitation:* Many possible treatments for hyperhidrosis as topical antiperspirants, anticholinergic medications, iontophoresis exists. They had shown to be successful in only a fraction of patients, provide short-term relief, are costly and may have significant side effects. To our knowledge there is only one specific report on the use of a surgical approach to this complication in the spinal cord injury population. The successful interaction of a team led by the physiatrist including a thoracic surgeon lead to a successful intervention. Trough appropriate research it may become a standard for hyperhidrosis in SCI patients.

No. 495

RESULTS OF A RETROSPECTIVE STUDY: 25 NEW CASES WITH SCI (TETRAPLEGICS) IN THREE YEARS (2008–2010) OUT OF WHICH 2 WITH POST-TRAUMATIC SYRINGOMYELIA (PTS)

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Objective: To investigate the incidence of PTS in spinal injuries. PTS can occur following spinal cord injury. It can occur from one month to decades after injury. The results can be devastating, causing new levels of disability long after a person has had successful rehabilitation. The clinical symptoms include progressive deterioration of spinal cord, progressive loss of sensation or strength, profuse sweating, spasticity, pain and autonomic dysreflexia. **Method:** During the last three (2008–2010) years 395 patients were hospitalized in our clinic. 140 had SCI, of which 25 were new cases. During hospitalisation 2 developed PTS. First case: A 42-year-old man with a cervical spine injury, tetraplegia A5, ASIA A (motorcycle accident). Eight months after injury complained of pain, numbness of the upper limbs. Clinical examination found a deterioration of the neurological level. MRI revealed a cystic cavity from A4 to A5, 1 cm. Second case: A 55-year-old woman, with cervical spine injury, quadriplegia A6, ASIA C, (fall accident). She underwent surgical stabilisation of spine. Seven months after the injury she complained of weakness of lower limbs, difficulty in carrying out ADL. The MRI revealed cystic cavity length 3 cm from A5 to A7. **Results:** PTS is a rare complication of SCI. The incidence of symptomatic syringomyelia is 1–7%. It usually manifests in the form of gradually worsening myelopathy within 1 month from the injury until 16 years after injury, while there are references that it can present 40 years later. It occurs most often in complete injuries, elderly patients and in high lesions. **Implications/Impact on Rehabilitation:** The results can be devastating, causing new levels of disability long after a person has had successful rehabilitation.

No. 496

A DESCRIPTIVE EPIDEMIOLOGICAL STUDY OF SPINAL CORD INJURY OF 3 YEARS (2008–2010)

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Objective: The study is a description of data from our clinic on SCI in the last 3 years. **Method:** Retrospective study of 395 consecutive hospitalised patients. 104 were SCI (88 males, 16 females). **Results:** Tetraplegia 25 (22 males, 3 females). 11 ASIA A, 14 ASIA B, C and D. Mean age 35.44 years (± 12.4). Mean days of hospitalisation 102.1 (± 69.6). Paraplegia 51 (44 males, 7 females). 35 ASIA A, 16 ASIA B, C and D. Mean age 40.94 years (± 17.8). Mean days of hospitalisation 77.8 (± 56.8). Central Cord Syndrome 2 males. Myelopathy 3 males. Brown-Sequard Syndrome 3 (2 males, 1 female). Cauda Equina Syndrome 20 (15 males, 5 females). All but 3 patients (2 paraplegics and 1 central cord syndrome) underwent surgery. **Implications/Impact on Rehabilitation:** The data recorded for the patients with SCI is in accordance with the international data, except for the male-female ratio which in our study is 5.5:1. The causes of the lengthy hospitalisation were not investigated.

No. 497

“OCCUPATIONAL REHABILITATION” FOR SPINAL CORD INJURY PATIENTS – A PROPOSAL FOR PROMOTING ENTREPRENEURSHIP

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Objective: The corner stone for SCI patients' rehabilitation is social reintegration. This can be through their “occupational rehabilitation” and their active participation in social events. **Method:** The patients

were reexamined as outpatients. The average follow-up time was 18.6 months. Depending on the variant being assessed, the chi square test and one way ANOVA were used for statistical analysis. The statistical reliability level was defined at $p < 0.05$. **Results:** 13.6% ($n = 14$) were students and 8.3% were unemployed. 48.1% had heavy labor jobs while 33.3% had sedentary jobs. 44.3% continued to show interest in their jobs. In 32.4% ($n = 34$) their job met the needs of the new circumstances. 50.9% needed a career shift and retraining. 97.1% ($n = 101$) were found able to work. 82.7% received help from the social worker, 22.9% were motivated by their close environment. Solutions were offered to 66.7%. Modifications were made in the work place of 22.7% and changes in 20.7%. 25% performed less demanding jobs compared to the previous one, 18.7% had the same responsibilities as before and 11.4% were just present. Following the completion of the rehabilitation program patients were monitored in relation to their professional and social activities. Those who re-entered the job market successfully were former entrepreneurs. We propose recording the SCI patients' attitudes towards entrepreneurship using a specially designed questionnaire. An introductory entrepreneurship training intervention is designed to accommodate their particular needs in relation to quality of life (QoL) and satisfaction measurement scales. **Implications/Impact on Rehabilitation:** Entrepreneurship can be a challenging opportunity and a social motive for SCI patients facilitating their professional and social reintegration possible.

No. 498

ASSESSING LIFE SATISFACTION AFTER SPINAL CORD INJURY

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Objective: 1) to compare life satisfaction between individuals with different types, severity, and chronicity of SCI; 2) to explore the relationships between 3 different instruments assessing life satisfaction. **Method:** A multicenter cross-sectional study was conducted during a 10-month period from 10.2006 to 08.2007. 157 consecutive patients with SCI admitted to both inpatient multidisciplinary team care neurological departments and the outpatient clinics in the Sheba Medical Center, and the Loewenstein Hospital were included. The data collection included demographic population data, functional abilities assessed by SCIM, and quality of life assessed by WHOQoL. Life satisfaction was assessed by three different self-rating scales: 1) Satisfaction with Life Scale, 2) Life Satisfaction Instrument-9 (LiSat-9), and 3) The Personal Well-being Index. **Results:** Data from 128 SCI patients during their early post-acute rehabilitation and chronic phase was available for statistical analysis. Strong correlations were found between the various scales, ranging between $r = 0.71$ to $r = 0.86$, but none of the scales correlated with age or gender. During the early subacute rehabilitation, patients with tetraplegia and complete paraplegia scored higher in life satisfaction than incomplete paraplegics. After discharge from the hospital, this trend was found to be inverted, with greater life satisfaction in the incomplete paraplegic group as compared with tetraplegic and complete paraplegic patients. **Implications/Impact on Rehabilitation:** Results revealed significant interaction effect between the severity of injury and the timing after injury on life satisfaction. The more disabled patients group showed greater life satisfaction in the acute phase of rehabilitation in comparison to the less disabled group. Life satisfaction scores disclosed the opposite relationship in the chronic phase. Based on psychosocial reasoning and on the results of this study, an appropriate future study protocol will be suggested for investigating this phenomenon.

No. 499

BROWN-SÈQUARD SYNDROME PRODUCED BY CERVICAL DISC HERNIATION: A CASE REPORT

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Objective: Cervical disc herniation (CDH) as a cause of Brown-Sèquard Syndrome (BSS) is very rare, and only 37 cases have been reported in the English language literature up to now. We report a case who was diagnosed with BBS resulting from extradural CDH. **Method:** A 57-year-old man presented one-week history of neck and left shoulder pain. In the morning, suddenly left hemiplegia occurred. He consulted our emergency room and was examined by brain CT and MRI. And he was admitted to the neurosurgery department as the diagnosis of TIA or infarction, even though brain MRI with diffusion weighted imaging showed normal intracranial findings. Three days later, his cervical MRI was checked and transferred to our department. Cervical MRI revealed a large left extradural paramedian disc herniation with severe unilateral spinal cord compression at the C3–C4 level. **Results:** After complete decompression of neural structures, anterior cervical fusion was performed. Postoperatively at the six-month follow-up examination, he showed almost complete recovery from his motor and sensory deficit. BSS is a rare neurological condition characterized by a lesion in the spinal cord which results in loss of motor function due to corticospinal tract compression on one side of the body, and a loss of pain and temperature sensation as a result of spinothalamic tract dysfunction on the opposite side, BBS may be caused by traumatic injuries to the spinal cord, spinal cord tumors, spinal cord ischemia, infection or inflammatory diseases, spontaneous cervical hemorrhages, and degenerative cervical diseases. **Implications/Impact on Rehabilitation:** It is important to diagnose it early by cervical MRI, especially in the absence of the typical symptoms of CDH or other obvious etiology of extremity numbness. Immediate surgical treatment is also essential for a favorable functional neurological recovery.

No. 500

EFFECTIVENESS OF INTENSIVE REHABILITATION FOR THE ACUTE PHASE SPINAL CORD INJURY PATIENTS OF THE CRITICAL CARE AND EMERGENCY CENTER IN JAPAN

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 Japan

Objective: In Japan, most of the spinal cord injury (SCI) patients move to rehabilitation hospitals after acute care and acute phase rehabilitation. Thus it is important to know effectiveness of intensive rehabilitation for acute phase SCI patients. **Method:** The subjects were 37 acute SCI patients who admitted in our critical care and emergency center and treated intensive rehabilitation. Mean age was 57 years old. Mean length of stay was 47.2 days. Injury cord level was C4 4 cases, C5 17 cases, C6 14 cases and C7 2 cases. We evaluated ASIA impairment scale in admission and at discharge, injury severity score, complication with trauma, motor FIM in admission and at discharge, moving capacity at discharge and discharge after disposition. Also we examined correlation of these factors. **Results:** ASIA impairment scale in admission was A 10 cases, B 12 cases, C 12 cases and D 3 cases, ASIA impairment scale at discharge was A 8 cases, B 5 cases, C 19 cases and D 5 cases. ASIA C increase was due to conversion from ASIA A and B. Average injury severity score was 17.2. Complication with trauma was thoracic lesion 9 cases, abdominal lesion 8 cases, upper extremities 8 cases, lower extremities 10 cases. Average motor FIM in admission was 18.9, motor

FIM at discharge was 24.9. Moving capacity was full assistance 22 cases, wheel chair self-driving 4 cases, walking with cane 3 cases and independent walking 1 case. Disposition after discharge was rehabilitation hospitals 2 cases, general hospitals 9 cases, nursing hospitals 10 cases, and back to home 8 cases. There was significant correlation between ASIA at discharge and motor FIM at discharge, moving capacity at discharge and FIM at discharge. **Implications/Impact on Rehabilitation:** These results indicate effectiveness of intensive rehabilitation for the acute phase spinal cord injury, and also these data are useful for goal setting.

No. 501

20-MIN ARM CRANK ERGOMETER EXERCISE INCREASES PLASMA INTERLEUKIN-6 IN ABLE-BODIED PERSONS BUT NOT IN INDIVIDUALS WITH CERVICAL SPINAL CORD INJURY

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 Japan

Objective: In able-bodied persons, interleukin-6 (IL-6) is produced by contracting skeletal muscles and then released into the circulation. The purpose of the present study was to investigate the IL-6 response to exercise in persons with chronic cervical spinal cord injury (CSCI). **Method:** We investigated the IL-6 responses to 20-min arm crank ergometer exercise at 60% of maximum oxygen consumption in 8 trained individuals with cervical SCI (CSCI) between C6 and C7, and 8 able-bodied trained healthy subjects. The plasma concentrations of IL-6, adrenaline, prostaglandin E2 and cortisol were measured before, immediately after the exercise, 1 h and 2 h after exercise. **Results:** At rest, the plasma adrenaline concentration was significantly lower in individuals with CSCI than in able-bodied subjects ($p < 0.01$). On the other hand, the concentration of IL-6 was significant higher at rest in individuals with CSCI (2.18 ± 0.44 pg/ml, mean \pm SEM) than the control (1.02 ± 0.22 pg/ml, $p < 0.05$). In able-bodied subjects, the plasma adrenaline concentration increased significantly immediately after the exercise ($p < 0.01$) and returned to the baseline level at 1 h after exercise, and the plasma IL-6 level increased significantly at 1 h after exercise (1.91 ± 0.28 pg/ml, $p < 0.05$) and returned to the baseline level at 2 h after exercise. In contrast, adrenaline and IL-6 levels were steady throughout the study in individuals with CSCI. **Implications/Impact on Rehabilitation:** The lack of IL-6 response in individuals with CSCI could be due to muscle atrophy and sympathetic nervous system dysfunction.

No. 502

RECONSTRUCTION OF GAIT IN PARAPLEGICS. A NEW ORTHOTIC ROBOT, THE WEARABLE POWER-ASSIST LOCOMOTOR (WPAL)

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 Japan

Objective: We have developed a new gait-assist robot named “Wearable Power-Assist Locomotor” (WPAL). The objective of this study is to compare walking, standing-up and sitting-down in paraplegic patients between WPAL and knee-ankle-foot orthoses with a medial single hip joint (Primewalk). **Method:** Three paraplegic patients who had already trained with the Primewalk were recruited. This study was approved by the Institutional Review Board and a written informed consent was obtained from all patients. Two of them could walk independently, but the other one needed assistance for

walking with Primewalk. We trained walking, standing-up and sitting-down with WPAL. After sufficient training, we compared the walking distance, duration, heart rate, rate of perceived exertion, and electromyography of upper extremities between WPAL and Primewalk. We also analyzed gait with WPAL and Primewalk by using 3D motion analyzer “Kinema Tracer” (Kissei Comtec Co., Ltd) with 4 CCD cameras at a rate of 60Hz. Colored markers were put on the bilateral acromions, great trochanters of the femur, lateral epicondyles of the femur and lateral malleoli. The step length and the cadence in WPAL were set at the same as Primewalk. The locus of the virtual center of gravity was calculated from the loci of the colored mark. **Result:** All three patients could stand up, sit down, and walk by themselves using WPAL. Distance and duration of consecutive walk using WPAL was much more than those using Primewalk. Heart rate, rate of perceived exertion, and integral of electromyography of upper extremities of WPAL were lower than those of Primewalk. In 3D motion analysis, deflection of center of gravity with WPAL was less than that with Primewalk in vertical and horizontal directions. **Implications/Impact on Rehabilitation:** A gait-assist robot WPAL is useful to reconstruct a gait in paraplegic patients.

No. 503

QOL MEASURED BY SF-36 BEFORE AND AFTER THE INTRODUCTION OF ITB

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Objective: We evaluated the intrathecal baclofen (ITB) therapy for severe spasticity using quantitative evaluations such as maximal walking speed, distance, Berg Balance Scale, Visual Analogue Scale, and Functional Independence Measure. We also evaluated quality of life (QOL) by SF-36 before and after pump implantation. We report an interesting results. **Method:** Five patients completed the SF-36v2 Japanese version twice in total, as preoperative (before screening test) and postoperative (at the state when the dose and the spasticity were stable). **Results:** [a typical case] Fifty-five-year-old man with spastic paraplegia by unidentified myeloradiculopathy at Th10 and below. The spasticity of preoperative lower limbs was determined by grade 2 in Modified Ashworth Scale. He could walk only in a short distance using both ankle foot orthosis and canes. At first we aimed improvement of the walking ability, and performed rehabilitation training and dose titration with 3-month hospitalization after the pump implantation. His walking ability was impaired due to loss of the bearing property of the lower trunk and lower limbs. Then he introduced wheelchairs for daily movements. However he was satisfied with the ITB therapy because of the pain reduction. In SF-36, the subscore of “role physical”, “bodily pain”, “general health”, and “social functioning” showed major improvement. The subscore of “physical functioning” did not decrease. **Implications/Impact on Rehabilitation:** As for QOL improvement with the ITB therapy, many reports showed improvement vaguely, and less reports examined with quantitative measurement. We should conduct a quantitative evaluation of QOL, to detect the characteristic of the change, in order to raise patients satisfaction.

No. 504

HISTOPATHOLOGICAL CHANGES IN KNEE JOINT COMPONENTS AFTER SPINAL CORD INJURY IN RATS

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Objective: We conducted experiments to observe the histopathological changes in knee joint components after spinal cord injury

(SCI) in rats. **Method:** Eighteen adult, nine-week-old female Wistar rats (body weight: 160–190 g) were used for this study. The nine experimental rats underwent a spinal cord transection at the level of Th8–9 and the other nine control rats were raised normally. The animals were assessed at 1, 2, and 4 weeks after surgery. The knee joints excised after sacrifice were fixed in formalin. Decalcified and embedded in paraffin. Staining was done with Hematoxylin and Eosin stain and examination with a light microscope. Alterations of knee joint components were evaluated at five sites: synovial membrane under the patellar ligament site, synovial membrane within the posterior articular capsule site, cartilage of femur apposed site, cartilage of tibia apposed site, fat pad under the patellar ligament site. **Results:** Dilatation and congestion of the microvasculature and lymphoid infiltration were observed during synovial membrane in the SCI group. These changed in similar histology of synovial membrane in early osteoarthritis. The surface layer of the articular cartilage in the SCI group showed fibrous proliferation, compared with the control group. And atrophy of adipose cells observed during fat pad in the SCI group, compared with the control group. **Implications/Impact on Rehabilitation:** We suggested that these histopathological changes were slight and stayed, and there may be related with spastic hindlimb function or autonomic function.

No. 505

PNEUMORRHACHIS OF THORACIC SPINE AFTER GUNSHOT WOUND: FIRST CASE REPORT FROM PAKISTAN

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Objective: To present a rare complication of traumatic spinal cord injury (SCI) and first case report of pneumorrhachis from Pakistan. **Method:** A 32-year-old previously healthy Pakistani male soldier sustained gunshot wound to lower neck, initially resulting in quadriplegia. Computerised tomography cervicodorsal spine was suggestive of fracture of spinous process and left lamina of DVI along with spinal stenosis and air in the spinal canal. Clinical examination was consistent with complete Spinal cord Injury (SCI) ASIA-A at T2. **Results:** He was managed conservatively for the spinal trauma and underwent comprehensive SCI rehabilitation for six months. Repeat scan showed complete resolution of the pneumorrhachis. At one-year follow-up neurological status remained unchanged without any complication. Pathogenesis of this rare finding along with review of relevant literature is presented. **Implications/Impact on Rehabilitation:** This is the first documented case of pneumorrhachis in Pakistan. Pneumorrhachis is an uncommon finding in SCI, is asymptomatic and resolves spontaneously most of the times. Rarely, it may cause cord compression resulting in neurological deterioration. Once diagnosis of pneumorrhachis is established, it is important to rule out potentially serious causes like basilar skull fracture, injury to lungs, mediastinum, mastoid air cells, frontal sinuses or intestine. It is important to rule out the serious etiologies and to offer prompt effective surgical measures if needed.

No. 506

AN OVERVIEW OF THE STEM CELLS IN THE MANAGEMENT OF SPINAL CORD INJURY

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Objective: To present an overview of the latest trends in the use of stem cells for the repair of the injured spinal cord and its relevance to relevance to rehabilitation of SCI. **Method:** An electronic literature search was carried out (1960–2010); English language; Key words:

Spinal cord injury, stem cells, advances, management, paraplegia, quadriplegia). Because the purpose of this work was essentially descriptive, no attempt was made to weight the quality of the articles that were identified. The literature comprised case reports, case series, clinical experience, original research articles, expert opinion, and literature reviews. **Results:** Attempts to enhance recovery after spinal cord injury by stem cell transplant are a promising technique widely used in the animal models. There is evidence for some degree of recovery from spinal-cord injury in animals after experimental cell transplantation alone, or in combination with other agents. However there are important differences between the animal and human spinal cord which should be considered before reaching a conclusion. Although the exact mechanisms are not fully known a large number of spinal cord injury patients have already received transplants of stem cells and other cell types. A rigorous scientific analysis failed to demonstrate any benefit of stem cell transplant in human spinal cords in terms of improved functional outcome. A stem cell-based transplantation strategy that proves successful in human models, where mechanisms are understood and functional outcome is improved still faces practical challenges. However this is an exciting area of research in regenerative medicine which holds promise in the future. **Implications/Impact on Rehabilitation:** 1) There has been no case of stem cell transplant which has resulted in functional improvement of the disabled SCI patient. 2) Despite the resources spent on stem cell transplant in SCI, a comprehensive multidisciplinary rehabilitation remains the only intervention that can help patient regain functional independence and optimal community reintegration. 3) In developing countries where financial resources are a major consideration and stem cells transplant is a distant dream, SCI rehab should be promoted as a cost effective and workable alternative.

No. 507**SACRUM OSTEOMYELITIS IN A SPINAL CORD INJURY PATIENT – CASE REPORT**

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Objective: Osteomyelitis of the sacrum is most often due to contiguous spread of adjacent infection from the bladder, intestines, genitourinary tract or soft-tissue in the pelvis (as occur in decubitus ulcers) or from intravenous injections, or sary to traumatic injuries to the sacrum and osseous pelvis. It can be present an extensive soft-tissue inflammatory change, with fluid collections within the presacral soft tissues, adjacent articulations or sacral epidural space. The aim is to describe a case of a spinal cord injury patient who developed a sacrum osteomyelitis with implications in his functional recovery. **Method:** The data were collected by direct interview and observation of the patient and consulting his clinical paper and informatic records. **Results:** The authors present a case report of a 43 years old patient who suffered a fracture/luxation of T12/L1 in 09/01/2002 after a high fall, with immediate L1 level ASIA A paraplegia. Initially in a regimen of continuous vesical catheterization, he has developed several urinary infections before starting intermittent vesical catheterization. The urodynamic study done in April/2005 revealed detrusor hyperactivity, so he initiated ditropan 5 mg 3 id, with poor results (urine losses between catheterizations). He was submitted to intravesical botulin toxin injection in November/2005, initially with good results, but later on he developed stress urinary incontinence and reported sexual dysfunction. He also developed several trochanteric, ischiatic and sacral pressure ulcers, with necessity of inpatient care treatment. In 2006, in a follow-up consultation, due to the observation of hipotonia and hiporreflexia in the lower limbs (not present before), it was requested a CT and MRI study of the sacral-lumbar region which revealed sacral osteomyelitis and septic arthritis of both hips, with involvement of the sacral roots, which was the cause of the sexual and vesical dysfunctions which the patient was experiencing. **Implications/Impact on Rehabilitation:**

Conclusion: In a spinal cord injury patient with some years of progression, an worsening of his neurologic symptoms or new ones should alert us to possible complications, and in that PMR has a very important role by paying special attention to the clinical features changes in the follow-up of the patient.

No. 508**POSTPRANDIAL HYPOTENSION IN SPINAL CORD INJURY AIS A PATIENT – A CASE REPORT**

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Republic of Korea

Objective: Postprandial hypotension is defined as a fall in systolic blood pressure of at least 20 mmHg that occurs within 2 h of the start of meal ingestion or when the systolic blood pressure decreases to less than 90 mmHg if the pre-ingestion systolic blood pressure was greater than 100 mmHg and which occur in elderly people. We present a case of a postprandial hypotension in Spinal cord injury AIS A patient. **Method:** A 56-year-old male with no past medical history had a passenger's traffic accident in 12.02.2008. The patient had a dislocation of C3–4 spine and MMT of below than C5 was checked as Trace to Zero and was classified into Sensory level C2/C2 ASIA A as there was no light touch and pin prick sensation below than C3 level dermatome. During hospitalization, the patient had no anti hypertensive medication as he was found in good condition with normal blood pressure (100/70–130/80 mmHg), regular heart rate (70–80/min) and stable body temperature (36.2–37.4°C). **Results:** Post 7 months after injury, the patient repeatedly complained dizziness after 1 h ingestion of a meal. 80/60 mmHg hypotension was checked and there was no bradycardia (heart rate: 70/min). Electrocardiogram showed the sinus rhythm but left ventricular hypertrophy. Abdominal CT scan showed elevation of left diaphragm and the heart was compressed by stomach and intestinal fat. It was also noted on plain abdominal X-ray which was taken after meal with oral contrast media. After the patient reduced one time meal into 1/2–1/3, increase mealtime to 4–5 times, systolic blood pressure falling was decreased and there was no dizziness. **Implications/Impact on Rehabilitation:** Postprandial hypotension occurs in elderly people with medical diseases like diabetes mellitus, hypertension. We present a case of postprandial hypotension in high level spinal cord injury patient as he had no past medical history.

No. 509**QUANTITATIVE ANALYZING MYELOPATHOLOGICAL CHANGES IN HIGH-VOLTAGE ELECTRICAL INJURY OF HUMAN SPINAL CORD USING 3T MAGNETIC RESONANCE DIFFUSION TENSOR IMAGING: A NOVEL DIAGNOSTIC MODALITY FOR OBJECTIVE ANALYSIS OF MYELOPATHY**

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Objective: To diagnosis myelopathy by quantitative analysis of pathological changes in high-voltage electrical injury of human spinal cord using diffusion tensor imaging (DTI). **Method:** DTI was performed in five patients (38.3-year old, 5 men) who were suspected to have spinal cord injury following high-voltage electrical injury nevertheless conventional MRI failed to visualize pathologic changes. Five sex-and age-matched volunteers (35.6-year-old, 5 men) without neck pain and neurological abnormalities also recruited for the acquisition of normal cervical spinal cord DTI. DTI was performed on a

3-Tesla Philips Intera system (Philips medical System, Amsterdam, The Netherlands). The imaging parameters were: 15 directions, b value=500 s/mm², TR/TE=6300/63 ms, FOV=120x120x145 mm, slice numbers=40. Fractional anisotropy (FA) and Apparent diffusion coefficient (ADC) were calculated in 6 region of interest (anterior, posterior and lateral region of both right and left sides of cervical spine white matter) at each spinal body and intervertebral disc level C2 to T1 using FMRIB software library (University of Oxford, London, UK), MedINRIA software (INRIA Sophia Antipolis, Paris, France). Mann-Whitney test in the SPSS 13.0 software (SPSS, Chicago, USA) was used to evaluate diffusion parameters. *Results:* In electrical injured patients, FA values decreased and ADC values increased with statistical significance compared to normal participants ($p < 0.05$). In electrical injured patients, posterior parts of spinal cord had a tendency to be less injured than anterior parts. *Implications/Impact on Rehabilitation:* DTI is sensitive imaging method diagnosis of myelopathy induced by high voltage electrical injury. Particularly, when conventional MRI did not reveal any pathological lesions, DTI would be good diagnostic tool to visualize spinal cord injury by quantitative analysis of diffusion parameters. Supported by a grant from Hallym University Medical Center Research Fund (01-2010-13).

No. 510

THE CLINICAL EFFECT OF LONG-TERM STANDING & GAIT TRAINING IN PARAPLEGIC PATIENT DUE TO SPINAL CORD INJURY

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Objective: The aim of this study was to investigate the clinical effect of long-term standing and gait training in paraplegic patients due to traumatic thoracic spinal cord injury. *Method:* Five paraplegic patients (4 class A, 1 class C on ASIA scale) due to spinal cord injury between T6 and T12 level were recruited. The age of the patients was 45 ± 10 years, and disease duration was $1,650 \pm 966$ days. One patient was supplied with a RGO, three with bilateral KAFO, and one with unilateral KAFO. After a pre-training evaluation, an orthosis fitting training, a standing training, a parallel bar gait training, and a walker gait training with orthosis were done sequentially with an average training period of 184 ± 41 days. *Results:* Training enhanced standing and walking abilities which manifested significant increases in the walking index for spinal cord injury II (WISCI II), maximal walking distance and time, and increased diastolic blood pressure after the intervention ($p < 0.05$). Furthermore, pulse pressure was significantly decreased at the post-test ($p < 0.05$), whereas center of pressure (COP) area during quiet standing tended to decrease after intervention, but the change was not statistically significant ($p = 0.109$). 3 patients showed an increased T-score of the lumbar vertebrae in bone mineral density. There were no changes in body composition, pulmonary function, cardiac sonography, and blood tests before and after the training. *Implications/Impact on Rehabilitation:* Our meaningful findings suggest that the intensive standing and walking training could be used as a part of walking training strategy for the management of SCI patients with paraplegia. Furthermore, our study invites future investigation to establish neuromuscular control mechanisms of standing balance and walking ability enhancement for SCI patients with paraplegia in large-scale clinical trial.

No. 511

LONG-TERM FOLLOW-UP OF NEUROGENIC BLADDER IN PEDIATRIC SPINAL CORD INJURY PATIENTS

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Objective: To collect information about the management of neurogenic bladder in pediatric spinal cord injury (SCI) patients. *Method:* Medical records of 35 pediatric SCI patients aged 15 years or younger, who visited Yonsei University College of Medicine, during 2000–2010 were reviewed retrospectively. *Results:* Among 35 patients, 15 were male and 20 were female. Eleven were tetraplegic and 24 were paraplegic. Twenty-one had a complete injury, and 14 had an incomplete injury. Average age at injury was 6.1 years. Urodynamic study was performed 3.3 times in average with each child. In total 116 cases were reviewed. Bladder capacity was preserved with more than 90% of age-adjusted bladder capacity in 52 cases (23 overactive, 29 areflexic). In 35 cases (32 overactive, 3 areflexic) bladder capacity was decreased below 50% of age-adjusted bladder capacity. Among the 32 overactive neurogenic bladder cases, voiding methods were reflex voiding in 18 cases, clean intermittent catheterization in six cases, indwelling catheter in five cases, and clean intermittent catheterization after reflex voiding in three cases. Among 32 cases, 13 were prescribed additional anticholinergics or a higher dose of anticholinergics, eight changed their voiding methods for stretching their bladder, two changed both their medication and voiding method, and nine were lost during follow-up. Among 35 patients, 21 showed a vesicoureteral reflux (15 overactive, six areflexic), and of the 15 with overactive bladder, ten showed a reflex volume. Five children, with a decreased bladder capacity below 50% of age-adjusted bladder capacity, later showed an increase of bladder capacity above 90% of age-adjusted bladder capacity at the end of our treatments. *Implications/Impact on Rehabilitation:* As pediatric SCI patients need an age-appropriate increase of bladder capacity, a regular follow-up of urodynamic studies is necessary, and proper pharmaceutical management and adjustment of voiding methods are required.

No. 512

EEG BASED BRAIN-COMPUTER INTERFACE IN CHRONIC TETRAPLEGICS, TO ACTUATE A ROBOTIC ARM DEVICE, AS ASSISTIVE TECHNOLOGY – CLINICAL SURVEY AND LONG-TERM POST TRIAL FOLLOW-UP

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Romania

Objective: EEG based brain-computer interface in chronic tetraplegics, to actuate a robotic arm device, as assistive technology – clinical survey and long-term post trial follow-up. *Method:* The enrolled patients underwent specific EEG-BCI training sessions, aiming to ultimately control a robotic arm device, as functional assistive technology (Brain Machine Interface – BMI). The analysis of the data obtained included multiple linear regressions as to evaluate probable predictors of BCI ability on individual spectral power components of each subject's typical EEG spectrum and to assess the dependence of the "answer" variable EEG-BCI performance on a set of independent variables. Furthermore, cluster analysis was performed to graphically represent the factors influencing BCI performance. Finally, long-term follow-up, including a questionnaire – referring to the patients' own perception on their capacity to control, by BCI, the cursor and/or the robotic arm device – was carried out within 14 months after the experiments. *Results:* EEG-BCI performance classification trial accuracy averaged 80.99%, with median 79.2%, while feedback training performance sessions accuracy reached an average of 70.51% with a median of 68.79%, for the 8 subjects who completed the 'feedback' BCI trials. According to our follow-up questionnaire, 7 (77.7%) of the 9 subjects, reported having had the feeling of control over the cursor while 3 (33.3%) subjects felt they were also able to voluntarily control the robot through their

movement imagination. According to multiple linear regression, on spectral power components – in order to identify probable predictors of BCI training accuracy from potentially pre-recorded clinical data - BCI performance was positively correlated with beta (13–30 Hz) spectral power density (coefficient 0.432, standardized coefficient 0.745, p -value <0.025) and negatively correlated with gamma power band (31–40 Hz.) (the standardized coefficient being -4.014, p -value = 0.203); another factor of potential influence was the sensitive AIS score (sensitive) (range 0–224, maximal level of deficit being 224 coefficient -0.177, std. coeff. -0.512, p =0.089. The rest of the assessed independent variables in the model (including subject age (p =0.31), AIS motor score, and time since SCI injury) had negligible regression coefficients. *Implications/Impact on Rehabilitation:* Considering our results, the potential of EEG-BCI to be useful in daily self assistance for chronic tetraplegics, thereby to improve their quality of life (QOL) could be roughly predicted by beta spectral power density, positively and AIS sensitive score, negatively. The AIS sensitive score had a less pronounced, but detectable, influence on BCI, although data from more subjects may be necessary to confirm this. It would mean that higher sensory deficit may mean a slightly increased ability to perform motor imagery based BCI. Hence, EEG-BCI/BMI could be a valuable method, as assistive technology, to compensate for some severe limitations in tetraplegics – and possibly other severely disabled patients especially after further improvement in miniaturization, user friendliness and cost effectiveness.

No. 513

OUR EXPERIENCE ON INTERMITTENT CATHETERISATION (IC) IN POST SCI PATIENTS WITH NEUROGENIC BLADDER, USING HYDROPHYLIC RELATED DEVICES – PRELIMINARY RESULTS

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Objective: Assess differences between specific parameters of the use of hydrophilic vs. non-hydrophilic catheters. *Method:* 45 post SCI patients, 30 using exclusively hydrophilic and 10 that used exclusively non hydrophilic, catheters; 5 patients – included in both lots – their own witnesses. Compare outcomes of long term IC using the two types of catheters, based on own unitary questionnaire, with 12 items – answers quantified as ordinal variables. Assessment methods: unvaried (Somers' concordance index and Pearson correlation coefficient), multivariate - standardized canonical discriminator function coefficients (SCDFC) - and comparison Wilcoxon Two-Sample Test (WT). *Results:* Regarding multivariate discrimination analysis upon patients' appraisal on their satisfaction level about the IC procedure, most contributive variables to the "Worse"-"Much worse"/"Better"-"Much better" separation, are time elapsed since the onset of IC (standardized canonical discriminant function coefficients – SCDFC – 2.238) and time elapsed since the onset of using hydrophilic catheterization (SCDFC: 1.965). Main WT results: the (30) patients using exclusively hydrophilic vs. those (10) that used exclusively non-hydrophilic type of catheters presented a significantly lower number of inflammatory episodes at scrotal level (p -value: 0.0001); the patients using exclusively hydrophilic vs. those that used exclusively non-hydrophilic type of catheters presented a significantly lower number of post/intra/inter catheterization bleeding episodes (p -value: 0.0001). Further validation of these interesting preliminary results on bigger lots. *Implications/Impact on Rehabilitation:* Intermittent catheterization (IC) in the management of patients with (mainly) retention type of neurogenic bladder, including post SCI, is accepted/ validated and employed worldwide, as "state-of-the-art" in this respect. An important contribution to IC, appeared in the beginning of the 80'

by the use of hydrophilic coated catheters. This new technology progressed, so that recently is on the way an awesome tendency: the large extension of "all in one" devices used for IC, with close/sterile circuit for lubricating (sterile water and hydrophilic catheter in a single product – in Romania starting in 2010); this lessens related iterative urethral trauma, improves autonomy/ quality of life and also, restores the achievement, in this field, of a basic goal for any invasive procedure: sterility. Hence, such recent IC advanced devices are "intermediary" to practically sterile IC.

No. 514

HOW LONG CAN I LIVE WITH TRAUMATIC SPINAL CORD INJURY?

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Spain

Objective: Survival study of traumatic spinal cord injured (TSCI) in the northeast of Spain. *Method:* Retrospective cohort study of TSCI admitted in a tertiary referral Hospital from 2000 to 2010. We used Kaplan-Meier method and Cox regression to analyze survival and identify independent predictors of mortality. *Results:* 234 patients with a mean age of 47.31 years (2.79–87.54) were reported. 15% died. Mean survival time (MST) was 109.12 months. 29.3% of the sample were over 65 with 6.611-fold increased risk of mortality, (p <0.000). 60% died within the first year. Falls (43.58%) and traffic accidents (38.03%) were the leading causes of injury. 47.86% suffered from associated injuries; 58.97% received steroid treatment. The complete tetraplegia (32%) was the first order, then incomplete tetraplegia (17.6%), incomplete (7%) and complete paraplegia (4.6%). Tetraplegics were 4.89 times more likely to die than paraplegics (p <0.001). Concerning ASIA scale, C occurred in 40% and A in 35% of the cases at admission. The most common cause of death was respiratory (53%), then cardiovascular and spinal shock (14.7% each). Pulmonary disease and spinal shock were leading causes of death among tetraplegics while cardiovascular was among paraplegics. *Implications/Impact on Rehabilitation:* It is interesting to have concise information on survival to calculate long-term economical needs; however, there is a lack in the literature. Additionally, it may be helpful to identify leading causes of death for the implementation of preventive measures. In our series, the risk of mortality was higher in the first year postinjury, in tetraplegics and in patients over 65 (p <0.001). Respiratory diseases were the most common cause of death. All in agreement with revised literature. Injury mechanism, ASIA impairment scale, associated injuries and NASCIS protocol were not associated with increased mortality. There is a 91% of survival rate after the first year postinjury and 80% after 10 years, with a MST of 109.12 months.

No. 515

COMPARATIVE STUDY: CONVENTIONAL VS. ROBOTIC LOCOMOTION THERAPY IN THE GAIT TRAINING IN INCOMPLETE SPINAL CORD INJURY

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Objective: Nowadays there is insufficient scientific evidence to determine what is the most effective rehabilitation model in recovering locomotion in spinal cord injury patients. The aim of this study is to expose and evaluate differences in functional outcomes for two methods of gait-rehabilitation. *Method:* A retrospective study, including a group of patients with incomplete spinal cord injury grade B, C and D (admitted between March 2008 and April 2010) who received standard treatment and treatment by robotic

gait system (Lokomat®) was compared with a historical cohort of patients (admitted between January 2006 and December 2008), who received only conventional treatment; comparable by age, sex, etiology, level and ASIA grade. *Results:* We included 119 patients, 23 were treated with the Lokomat® and 96 with conventional treatment. The improvement in muscle balance of the hip flexors in conventional treatment group was 1.60 points versus 2.32 points in Lokomat® group, and in the knee extensors (1.75 and 2.41 points respectively) ($p=0.041$), these differences were statistically significant. The 85.4% patients who received conventional treatment ($n=82$) performed gait at discharge, compared to 78.3% ($n=18$) of the Lokomat® (n.s. $p=0.525$). In the control group 31.7% performed gait without assistance, compared with 16.3% of Lokomat®. Twenty-six percent of patients in the control group are dependent, compared to 39.1% in Lokomat® ($p=0.434$). *Implications/Impact on Rehabilitation:* Both types of treatment are effective in the recovery of locomotion in patients with incomplete spinal cord injury. While emphasizing the significantly greater improvement in muscle balance in the Lokomat® group, this is not reflected in terms of walking ability or functionality, with no significant differences.

No. 516

RANDOMIZED CONTROLLED TRIAL IN LOKOMAT TRAINING IN SPINAL CORD INJURY. SPEED AND ENDURANCE STUDY

Monica Alcobendas-Maestro, MD; Ana Esclarin-Ruz, Ramiro Palazon-Garcia, Alejandro Muñoz-Gonzalez, Esteban Gonzalez-Valdizan, Antonio Sanchez-Ramos
Spain

Objective: To compare results obtained after a walking re-education programme using the Lokomat system against those obtained with conventional training among individuals with incomplete spinal cord injury. *Method:* A total of 80 patients admitted to the National Paraplegics Hospital for incomplete motor spinal cord injury (American Spinal Injury Association grades C, D) with a time course of under 6 months, were included in a single-blind randomised clinical trial of parallel groups, with blind evaluation by third parties. Patients received 40 walking re-education sessions using a combination of the Lokomat and conventional systems, or exclusively using a conventional system. Main outcome measure was Lower Extremity Motor Scores (LEMS). Sary outcome measures were 10-meters walk test and the 6-min walk test. *Results:* LEMS and the 6-min walk test displayed significant differences in favour of Lokomat. *Implications/Impact on Rehabilitation:* The Lokomat system obtains better results in terms of lower-limb strength and achieves greater resistance for walking than conventional re-education does. Nevertheless based these results there is insufficient evidence to claim that neuroplasticity-based training is better than traditional techniques.

No. 517

A CASE REPORT ON THE APPLICATION OF THE ICF (INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH) IN REHABILITATION MANAGEMENT IN SPINAL CORD INJURY

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Swiss Paraplegic Research, Switzerland

Objective: To illustrate a concrete application of the ICF within the combined use of the ICF Core Set for spinal cord injury and ICF-based documentation tools in rehabilitation management. *Method:* Case report. ICF-based documentation tools (ICF Categorical Profile, ICF Assessment Sheet, ICF Intervention Table, ICF Evaluation Display) were applied in the different steps of the rehabilitation management of a 22-year-old male patient with incomplete tetraplegia (AIS C, C2). The ICF Core Set for spinal cord injury

in the early post-acute context served as the basis for the assessment and documentation of functioning during the management. *Results:* The ICF Categorical Profile allowed the comprehensive depiction of the patient's limitations in all areas of functioning, in particular in movement related functions. The ICF Assessment Sheet highlighted the patient's experience in relation to these limitations. Based on the ICF-based assessment, mobility was identified as the most important treatment goal. A goal oriented plan of care was after that implemented. The ICF Intervention Table provided an over-view of the comprehensive and multidisciplinary rehabilitation management. Over the course of treatment, the patient achieved significant improvements in functioning which became evident in the ICF Evaluation Display. *Implications/Impact on Rehabilitation:* The use of ICF tools contributes to comprehensive rehabilitation management by facilitating multidisciplinary teams to develop and work on common and patient-oriented rehabilitation plans.

No. 518

PHYSICAL ACTIVITY IN PERSONS WITH SPINAL CORD INJURY - WHAT MAKES THE DIFFERENCE?

Alexandra Rauch, PT; Albert Marti; Christine Muff; Szilvia Geyh
Switzerland

Objective: To describe the level of physical activity (PA) in persons with spinal cord injury (SCI) in Switzerland and to identify potential determinants for PA. *Method:* Sary data analysis of questionnaire-based survey. Data were obtained from a survey for vocational integration among the SCI population in Switzerland (2008). Frequency of PA was assessed retrospectively for the time before onset of SCI and for the time of the survey. Items likely to be related to PA were selected from the complete questionnaire (86 items) based on expert opinion. Descriptive statistics, correlation and regression analyses were performed. *Results:* Data from 510 subjects were analysed (male: 73.5%, mean age: 49.4, paraplegic: 70.8%, complete lesion: 48.4%). Subjects participated less frequent in regular PA after onset of SCI than before (60.0% vs. 71.2%, $p=0.000$). After onset of SCI, women participated less frequent in regular PA than men (47.3% vs. 64.3, $p=0.001$). Items referring to disease/disability specific (11) and sociodemographic (8) aspects, behaviours (3) and attitudes (2) were selected for correlation and regression analyses. From these, eleven items correlated with PA ('Gender', 'Percentage employment', 'Lesion level', 'Length of first rehabilitation', 'Manual/electric wheelchair', 'Required time for ADL's', 'Subjective health', 'Importance of sport before onset of SCI', 'Importance of sport today', 'Frequency of sport before onset of SCI', 'Being an active club member'). After regression analysis, only 'Gender', 'Importance of sport before onset of SCI', 'Importance of sport today', 'Frequency of sport before onset of SCI', 'Being an active club member' correlated with PA. *Implications/Impact on Rehabilitation:* Gender and attitudes seem to play an important role in the level of PA in persons with SCI. Future research is necessary to better understand their relationships to PA.

No. 519

REHABILITATION NEEDS IN PERSONS WITH SPINAL CORD INJURY IN POST-EARTHQUAKE HAITI

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Objective: To explore the feasibility of rehabilitation needs assessment using the International Classification of Functioning, Disability and Health (ICF) in persons with spinal cord injury (SCI) following the earthquake in Haiti and to discuss the need for such assessments following humanitarian emergencies in general. *Method:* Feasibility study. Rehabilitation needs were assessed during a relief action of

Swiss Paraplegic Foundation at Haiti Hospital Appeal (HHA) centre, five months following the earthquake. The assessment included (1) the rating of the extent of problems in each of 41 ICF categories selected from the ICF Core Sets for SCI, (2) the identification of related rehabilitation needs and (3) the allocation to specific intervention types. *Results:* Eighteen persons with SCI were assessed. Seven (39%) were male, 17 (95%) paraplegic and 13 (72%) with complete lesions; mean age was 36.7 years (26–55). For at least one participant some or complete problems were identified in all 11 categories of the ICF component 'Body functions', in 2 of 4 categories in 'Body structures', in all 17 categories in 'Activities and Participation', and in 5 of 9 'Environmental factors'. Rehabilitation needs (including preventive approaches) were identified in 39 of 41 ICF categories. Technical investigations, medication, counselling, nursing care, physical therapy, psychological and social worker's support would be required to address these needs. Most of these are presently unavailable in Haiti. *Implications/Impact on Rehabilitation:* ICF-based needs assessments could provide standardized information to plan and provide rehabilitation services in the aftermath of humanitarian emergencies. However, the assessment has to be adapted to the particular setting and is only useful if the evidence will effectively inform health care providers and policy makers.

No. 520

PRESSURE ULCER RISK FACTORS IN SPINAL CORD INJURED PATIENTS: A SHORT-TERM PRELIMINARY STUDY

Belgin Erhan, MD; Umut Yakut; Berrin Gündüz; Aye Nur Bardak; Seda Ozcan; Fatih Kahraman
Turkey

Objective: Pressure ulcer is a common complication seen after spinal cord injury (SCI). The aim of this preliminary study was to evaluate the short term risk factors of pressure ulcers in SCI patients. *Method:* Fifty SCI patients either rehabilitated as inpatients or admitted to the out-patient clinic between February 2010 and October 2010 were enrolled in the study. Demographic characteristics, body mass index, injury duration and intensive care treatment history, ambulation level, incontinence, daily sitting duration, number of push-ups, and smoking habits were recorded. The patients were examined according to American Spinal Injury Association (ASIA) standards; tonus was evaluated with Ashworth Scale and existing pressure ulcers were recorded. The patients were questioned about previous pressure ulcers, their knowledge and awareness about pressure ulcers, laboratory parameters were recorded. Patients were reexamined for pressure ulcers 3 months after the initial examination. In statistical evaluations descriptive statistics, Mann-Whitney U test and Fisher's exact test was used. To evaluate the results $p < 0.05$ was considered significant. *Results:* Sixteen women and 34 men with a mean age of 40.8 ± 14 years and a median injury duration of 85 (min 9–max 418) months were evaluated. The frequency of pressure ulcer after 3 months was 10%. Intensive care in the history, failure to do push-ups, presence of pressure ulcers in the initial examination, high sedimentation rate, low albumin and total protein levels were significantly correlated with the development of pressure ulcer 3 months later ($p < 0.05$). *Implications/Impact on Rehabilitation:* Pressure ulcer is a frequent complication after SCI which deteriorates quality of life. More caution should be taken in patients with a history of intensive care treatment, pressure ulcers and who cannot do push-ups and have low protein levels. Further evaluation of risk factors is necessary for prevention of pressure ulcers.

No. 521

PREVALENCE OF COMPLICATIONS IN PEOPLE WITH SPINAL CORD INJURY

Berna Celik, MD; Kadriye Ones; Berna Celik; Ebru Y. Yalcinkaya; Ozlem Gultekin; Halil Harman
Turkey

Objective: The aim of this study was to evaluate medical complications in people with spinal cord injury (SCI). *Method:* Ninety-eight people with SCI were included in the study. The study was planned retrospectively and consisted of 58 men and 40 women with a mean age 35 years (14–62). The mean time since injury was 1.24 ± 2.32 years. The study group was evaluated according to ASIA/IMSOP classification. 64 people were found to be paraplegic, and 34 people were found to be tetraplegic. 64 people were classified as complete, and 34 people were classified as incomplete. *Results:* The most frequent cause of SCI was motor vehicle accidents. The etiology of SCI was motor vehicle accidents in 36 people with SCI, falls in 25 people with SCI, gun shot wound in 10 people with SCI, tumour in 9 people with SCI, degenerative diseases in 9 people with SCI (lumbar stenosis, postoperative lumbar disc hernia), infection in 7 people with SCI, and sports injury in 2 people with SCI. The most frequent complications were spasticity (42 people with SCI), urinary infection (34 people with SCI), neuropathic pain (33 people with SCI), pressure sores (22 people with SCI), contracture (12 people with SCI), deep vein thrombosis (11 people with SCI), heterotopic ossification (8 people with SCI), and autonomic dysreflexia (3 people with SCI) respectively. *Implications/Impact on Rehabilitation:* Complications are commonly seen in SCI. Raising awareness about the complications of SCI could result in saving time during rehabilitation process, and would improve functional outcomes.

No. 522

INCIDENCE OF THROMBOEMBOLISM IN PATIENTS WITH TRAUMATIC SPINAL CORD INJURY IN THE INDIAN SUBCONTINENT

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United States of America

Objective: To identify the incidence and natural history of thromboembolism in a cohort with traumatic spinal cord injury (SCI) from the Indian Subcontinent with no other obvious risk factors for thromboembolism. *Method:* 50 consecutive patients with traumatic SCI who were not on prophylactic anticoagulation and admitted to Christian Medical College Rehabilitation Center were followed longitudinally with serial compression ultrasonography (CUS) of femoral and popliteal veins of bilateral lower limbs. CUS was performed every two weeks until 14 weeks post injury as well as if the subject showed clinical signs of Deep Vein Thrombosis (DVT). Patients identified to be positive for DVT were reassessed with Venous Doppler Ultrasound for confirmation of findings. Clinical signs of pulmonary embolism were monitored as well. *Results:* The incidence of DVT in the initial 14 weeks post injury was 8 of 50 (16%); 3 occurred in the third week, 2 in the fourth week, and 1 each in the fifth, seventh and thirteenth week post-injury, respectively. The clots were not present on CUS in 4 of the 8 patients by the end of the study. One of the 8 patients (who was untreated) died of sudden cardiac arrest, etiology being unknown as autopsy was not performed. *Implications/Impact on Rehabilitation:* Patients with traumatic SCI in the Indian Subcontinent are noted to have a signifi-

cant incidence of thromboembolism. However, this report may show that the incidence is less than that found in the western population without prophylaxis. With therapeutic anticoagulation, 50% of the clots in the lower limb veins were no longer seen at 14 weeks of injury. As the cost of prophylactic anticoagulation is often borne by the patient/family, further study would be of benefit in the Indian subcontinent regarding routine prophylactic anticoagulation.

No. 523

MALIGNANT INTRAVASCULAR LARGE B-CELL LYMPHOMA PRESENTING AS CAUDA EQUINA SYNDROME. CASE REPORT

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Objective: Case description. **Method:** A 36-year-old man presented to the Emergency Department with back pain, urinary and stool retention, and diminished lower extremity strength and sensation. His symptoms, consistent with cauda equine syndrome, were believed to be sary to a L5-S1 disc bulge causing mild central canal stenosis as demonstrated by MRI. The patient, however, did not improve with L5-S1 laminectomy and discectomy. During his subsequent rehabilitation stay the patient experienced further neurological decline and evaluation led to the diagnosis of transverse myelitis. The patient was discharged to acute rehabilitation and then home. From home, he presented to the hospital with further neurological deterioration. Imaging revealed multiple enhancing lesions in his brain. Clinical improvement following immunomodulation and plasmapheresis led to a diagnosis of multiple sclerosis and he was discharged to acute rehabilitation. When the patient's status continued to worsen after discharge from the rehabilitation hospital, presented again with altered mental status, a brain biopsy demonstrated malignant intravascular large B-cell lymphoma (IVL). **Result:** After diagnosis IVL, patient received 8 cycles of CHOP-R and whole brain radiation. The MRI lesions decreased in size and no new lesions were identified. His functional status, however, did not improve much during his 3rd acute care stay and was sent to long-term acute care hospital. We continued to follow him in our outpatient. Malignant intravascular large B-cell lymphoma is a rare form of non-Hodgkin's lymphoma that often presents with skin and nervous system involvement. The variable presentation makes diagnosis difficult with the typical diagnosis made at autopsy. We describe a patient who had multiple admissions to our rehabilitation hospital during the course of his disease and who is constantly changing neurological status presented a rehabilitation challenge. **Implications/Impact on Rehabilitation:**

Intravascular lymphomatosis presents a diagnostic and rehabilitation challenge. Physiatrists must consider the diagnosis of intravascular lymphomatosis in their differential when faced with patients with unexplained neurologic deterioration. Early diagnosis makes treatment possible and also helps maximize function. Our goals as physiatrists are to contribute to early diagnosis as well as to provide comprehensive rehabilitative care.

No. 524

ACUTE TETRAPARESIS SARY TO CHIARI MALFORMATION WITH SYRINGOMYELIA. CASE REPORT

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Objective: Case description. **Method:** A 19-year-old female with history of Anti-phospholipid Syndrome presented to a local community hospital after awakening with tetraparesis, generalized parasthesia, and severe neck pain. Three weeks prior, she had been evaluated for severe headache and was discharged three days later after bacterial meningitis was no longer felt to be likely. At that time, a CT scan of the brain revealed no abnormalities. The community hospital transferred the patient to our acute care hospital. An MRI of the head and spine was then performed and revealed a cystic lesion involving the cervical spinal cord extending from the C1 level to the C6 level as well as an Arnold Chiari type 1 malformation. Emergent surgical posterior fossa decompression with duraplasty and C1 laminectomy was undertaken. Most symptoms improved immediately post operatively. On post op day 15, the patient was transferred to our acute rehabilitation hospital for an additional 16 days. With continued aggressive therapy, she demonstrated significant improvement in muscle strength, function as well as improvement of parasthesia. This is the first reported case of acute tetraparesis sary to Chiari malformation with syringomyelia. Surgical decompression leading to resolution of symptoms made infectious, neoplastic, ischemic, and metabolic etiologies extremely unlikely. There was no history of trauma. **Results:** Rehabilitation was effective evidenced by her change in total FIM score from 69 on admission to 114 on discharge. Follow-up eight weeks later revealed further functional improvement with additional neurological recovery. Many of the different theories on the pathogenesis of syringomyelia are discussed, although none can fully explain the unique presentation of this case. **Implications/Impact on Rehabilitation:** We believe this to be the first reported case of Chiari malformation type 1 with syringomyelia presenting as acute tetraparesis. Recovery with functional improvement was similar to that expected in any patient with acute tetraparesis.

SPORTS REHABILITATION

No. 525

COMPLETE RUPTURE OF THE PROXIMAL RECTUS FEMORIS TENDON: SURGERY OR NOT?Mathieu Maroy, MD

Belgium

Objective: Quadriceps muscle strains are common injuries in kicking, sprinting or jumping athletes. Notwithstanding literature is replete with information about this injury, reports of total ruptures of the proximal rectus femoris tendon are rare. *Method:* A case of a 24-years old, professional football player with a complete rupture of the indirect head of the rectus femoris tendon is reported. *Results:* After multidisciplinary consultation the player was treated non-operatively (graded rehabilitation). Ten weeks after onset return to play was possible. *Implications/Impact on Rehabilitation:* A literature review was done to compare results of conservative and surgical treatment and to try to postulate practical recommendations for the sports physicians concerning this kind of injury.

No. 526

NON-INVASIVE MEASUREMENT OF REGIONAL INTRATENDINOUS STRAIN USING DYNAMIC ULTRASOUND. AN EX VIVO VALIDATION EXPERIMENT IN A HUMAN ACHILLES TENDONLeonie Geukens, MD; Shingo Fukagawa, Lennart Scheys, Pieter Slagmolen, Paul Suetens, Johan Bellemans, Koen Peers

Belgium

Objective: To evaluate the feasibility of automatic, intensity-based, spatio-temporal elastic registration for non-invasive regional intratendinous strain measurement. *Method:* An Achilles tendon was isolated from a fresh frozen human cadaver. The calcaneus was fixed in a pot with bone cement and the proximal part of the tendon was attached to the loading frame using a tendon clamp. Ultrasound recordings were obtained with a 5–12 MHz linear array transducer (ACUSON P50, Siemens), orientated along the long axis of the tendon. An extensometer, used as golden standard strain measurement method, was sutured into the tendon at the opposite side of the ultrasound probe. Dynamic recordings were made while speed and displacement were controlled by the loading frame (3 different velocities and 5 different displacements were used). The ultrasound movies were processed using automatic, intensity-based, spatio-temporal elastic registration and these data were compared with the extensometer data. *Results:* 23 out of 31 movies were included (= 74%). The other 8 movies were excluded because the algorithm was not able to perform plausible speckle tracking, resulting in unrealistic negative strain values. For all retained movies this resulted in an absolute strain difference of 0.15% between US and extensometer measurement or a relative difference of 13.45%. *Implications/Impact on Rehabilitation:* These results indicate that automatic, intensity-based, spatio-temporal elastic registration is a feasible method for non-invasive regional intratendinous strain measurement. Using this technique to measure subregional Achilles tendon strain in vivo will provide better insights in the etiopathophysiological processes and the subsequent management of Achilles tendinosis. This information will lead to optimized preventive strategies and a specification of the existing exercise protocols.

No. 527

OUTCOME AFTER FASCIECTOMY FOR CHRONIC EXERTIONAL COMPARTMENT SYNDROME IN THE LOWER LEGBruno Vanhecke, MD; Caroline Schouteden, BSc; Koen Peers, MD, PhD; Johan Bellemans, MD, PhD

Belgium

Objective: 1) To evaluate functional outcome and pain level in patients who underwent a fasciectomy of one or more lower leg muscle compartments. 2) To identify preoperative outcome predictors for fasciectomy. *Method:* A retrospective descriptive cohort study was performed in the sports medicine department of a tertiary care hospital. 69 patients underwent fasciectomy of one or more muscular compartments between January 1999 and December 2009. After application of exclusion criteria a series of 34 patients were identified as potential participants. 30 patients completed the study. A questionnaire was designed to assess pain, satisfaction level, resumption of sport activities, occurrence of complications and reoperations. Demographic data of patients and compartmental pressure levels were recorded from the hospital charts. *Results:* In general 73% ($n=22$) of the patients were satisfied after surgery. 27% ($n=8$) were unsatisfied. Mean reduction of pain score after fasciectomy was 4.9 on visual analogue scale (VAS); patients who underwent surgery of the anterolateral compartment ($n=18$) had a mean reduction of 5.2 on VAS; mean VAS-reduction post-fasciectomy of all 4 compartments ($n=11$) was 4; VAS-reduction post-fasciectomy of the posterior compartments ($n=1$) was 9. Mean patient follow-up time was 5.4 years (10.6 years–1.3 years). There was a tendency towards a better outcome in patients who had a positive preoperative intracompartmental pressure measurement ($n=25$) compared with those who didn't have a positive preoperative intracompartmental pressure measurement ($n=5$). No correlation was found between residual pain score on VAS and age, preoperative VAS-score and preoperative compartmental pressure level. *Implications/Impact on Rehabilitation:* A fasciectomy for patients with CECS in the lower legs gives a satisfactory result in most of the cases. Performing a preoperative intracompartmental pressure measurement is useful since there is a tendency towards a better outcome if the diagnosis of CECS is confirmed by intracompartmental pressure measurement.

No. 528

INFLUENCING FACTORS ON THE TRACTION PLUS EPIDURAL BLOCK FOR LUMBAR DISC HERNIATIONShouwei Yue, PhD

China

Objective: To explore related factors with the effect of epidural block plus SLR exercise for lumbar disc herniation, and further improve the efficacy of treatment. *Method:* The data of 270 lumbar disc herniation cases, treated with epidural block plus SLR exercise from January 2005 to January 2009 at the Department of Rehabilitation Qilu Hospital of Shandong University, were reviewed. Gender, age, incentives, occupation, duration, past medical history, clinical symptoms (JOA score), protruding type, protruding segment, protruding size, and spinal canal or lateral recess stenosis were observed. Which treatment efficacy was the dependent variable, while the 12 other

factors were the variables. Single factor analysis was performed and multivariate logistic regression analysis was done on the significant factors singled out. *Results:* Univariate analysis showed that duration, place of stenosis (spinal canal or lateral recess), with or without predisposing factors, clinical symptoms (JOA score), protruding type, and protruding segment were significantly related to the prognosis of lumbar disc herniation ($p < 0.05$). Multivariate logistic regression analysis further revealed that duration, place of stenosis, and predisposing factors were independent risk factors affecting the efficacy. *Implications/Impact on Rehabilitation:* Long duration, spinal canal and/or lateral recess stenosis, and no predisposing factors are independent risk factors which can affect the results of epidural block plus SLR exercise for lumbar disc herniation. These factors should be considered during the treatment.

No. 529

SPECIALIZED CORE STABILITY EXERCISES: A POSSIBLE NEGLECTED KEY TO THE MANAGEMENT OF ANTERIOR CRUCIATE LIGAMENT RUPTURE

Huifang Wang, MD
China

Objective: The incidence of anterior cruciate ligament injury has steadily increased over that last two decades, which results into abnormal dynamic gait and osteoarthritis of the knee in the end. We make this project in order to improve its rehabilitation. *Method:* Ninety-three articles have been explored from PUBMED. *Results:* We regard core stability exercise as a potential approach because the neuroplastic following anterior cruciate ligament injury. The neuroplastic from lumbar, thoracic, cervical to brain can diminish activation in the contralateral thalamus, postparietal cortex, SM1, basal ganglia-external globus pallidus, SII, cingulate motor area, premotor cortex, and in the ipsilateral cerebellum (vermis and anterior lobe) and SM1 and increase activation in pre-SMA, SIIp, and pITG, indicating modifications of the CNS. Furthermore, it can regulate the activation of trunk muscle, for example, sternocleidomastoid and lower trapezius muscles. Also, core stability has a negative correlation with the incidence of anterior cruciate ligament injury. Therefore, we hypothesized that core stability exercises may improve the rehabilitation of anterior cruciate ligament strains by increasing core motor control. Specialized core stability exercises to rectify biomechanical problems associated with gait and core stability may play a key role in the management of anterior cruciate ligament rupture. *Implications/Impact on Rehabilitation:* If the hypothesis is verified by future research, core motor control will offer new insights and a deeper understanding of treatments directed at anterior cruciate ligament rupture.

No. 530

COMPARING OF CHARACTERISTIC OF BODY COMPOSITION OF DIFFERENT EVENT EXCELLENT ATHLETES

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Objective: The purpose of study basing on s-rundle excellent athlete of china is discussing characteristic of body composition of different event excellent athlete and hope to give some reasons for selecting athlete or improving level of sports training. *Method:* 57 s-rundle athletes (30 for male and 27 for female) including sprinting, cycling, fencing were observed and body composition were measured. *Results:* Fat percent and weight of muscle mass of sprinting athlete for male and female was lower than cycling athlete and fencing athlete ($p < 0.05$), however, it is no significant difference between fencing and cycling ($p > 0.05$) but muscle percent of sprinting athlete for male and female is higher than cycling athlete and fencing athlete

($p < 0.05$). Extracellular fluid of cycling athlete is higher than sprinting athlete but Intracellular fluid is reverse. Extracellular fluid and intracellular fluid of fencing athlete is between sprinting and cycling. *Implications/Impact on Rehabilitation:* Characteristic of body composition of different event athlete is different and body composition can be used as basis for selecting athlete or sports training.

No. 531

HIP DISLOCATION IN A SOCCER PLAYER: THINGS TO TAKE INTO CONSIDERATION IN REHABILITATION

Atzmon Tsur, MD; Gershon Volpin; Arkadi Galin; Nail Shkeer
Israel

Objective: Hip dislocations, anterior or posterior, are relatively uncommon during athletic events. Posterior dislocations comprise the majority of all sports-related traumatic hip dislocations. They usually occur with high-energy trauma and are uncommon in sports. They have been reported in American football, rugby, gymnastics, water and alpine skiing, snowboarding, race car driving, equestrian sports, gymnastic, basketball, biking, and jogging. *Method:* We are reporting a case of a 22-year-old fourth division soccer player who sustained a posterior hip luxation in his left and non-dominant leg, during game. He tried to kick the ball away while running, with the left hip in internal rotation, but at the same moment the adversary tackled him from behind and dropped him to the ground. The patient arrived to the emergency room with the left lower extremity in flexion, adduction and internal rotation. Radiologic evaluation confirmed that he had a right posterior hip dislocation. General anaesthesia allowed the patient and his musculature to relax, and the reduction was performed. Skeletal traction through the tibia was installed for one month, and then, the patient was treated with rest and physical therapy, including non weight bearing on crutches for several months. *Results:* The most common complication of hip dislocations is avascular necrosis, shown to occur due to interruption of the blood supply to the femoral head, during dislocation. The femoral head loses its blood supply, which leads to degeneration and eventually, the joint becomes severely arthritic. Osteoarthritis is the most common long-term outcome of hip dislocation, and it can be exacerbated by the presence of bony fragments and soft tissue in the joint space. Athletes recovering from hip dislocations must follow a strict physical therapy regimen to ensure complete recovery of function. *Implications/Impact on Rehabilitation:* Stretching and range of motion exercises are important early in the recovery process, advancing to walking on crutches when the patient's pain fully resolves. Strengthening exercises of the muscles around the hip are important during the rehabilitation to take stress off the injured joint. Muscle strength is a determinant factor in successful performance of the kicking skill and can be developed through appropriate training. Athletes that participate in high-performance activities need to understand the importance of performing proper warm-up techniques before competition and maintaining good overall flexibility and strength.

No. 532

PLATELET RICH PLASMA (PRP) INJECTION AND HYDROKINESITHERAPY FOR ACHILLES TENDON SPRAIN: OUR EXPERIENCE

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Italy

Objective: Our study aims to analyze the effectiveness of combined treatment with injections of PRP (Platelet Rich Plasma) and hydrokinesitherapy on healing traumatic and/or degenerative Achilles tendon sprain. *Method:* We recruited 10 patients with Achilles tendon sprain. Main exclusion criteria were previous surgical or

rehabilitative treatment for AT, Hemoglobin content of less than 11 g/100 ml blood and platelet count < 150,000/ μ l of blood. Patients submitted a clinical evaluation with analysis of ROM. We adopted VAS and Ankle Hindfoot Scale and musculoskeletal ultrasound (US) that confirmed AT sprain at 48/72 h after traumatic injury. Patients took a blood sampling of 300 cc, from which the platelet component and thrombin were isolated and frozen. Patients then underwent in new US examination, during which they were infiltrated by activated platelets at the site of injury. Infiltration guided by US was repeated every 15 days for a total of 3 infiltration. For each infiltration we used 10 ml of PRP. Patients underwent clinical and US control every 15 days and follow-up to 15 days after the last infiltration, 6 months and, for five patients, at 12 months. After the second infiltration all patients were initiated in the rehabilitation treatment by association of daily physical therapy (Resistive and Capacitive Energy Transfer) and assisted exercises in hydrokinesitherapy. *Results:* All patients reported complete resolution of the tendon injury at the end of treatment. The values of the scales for pain and function reported a gradual improvement during treatment and US controls at follow up showed an anatomical repair of the lesion. *Implications/Impact on Rehabilitation:* Results are certainly exciting, but we must take into account the small sample observed ($n=10$). We should go on with a larger sample and wait for the follow up to two years to assess the presence of any complication (calcification, adhesions and new lesions).

No. 533

WHAT IS CRITERIA OF RETURN TO PLAY FOR ATHLETES WITH LOW BACK PAIN?

Mamoru Okubo, MD; Masairo Kusaka; Yoshikazu Ohara; Shingo Otsuki; Tatsuo Doi; Ikuhisa Yanagida
Japan

Objective: The purpose of this study is to examine the spinal strength and its duration of exercise, for decision making of return to sports activity of athletes with low back pain (LBP). It is well known that a LBP is the most common disorders in the lumbar region. Although its pathophysiology is not well understood, the prognosis is relatively good. Therefore, non-athletes could return to daily life within almost one month. However, in case of athletes, their final goal is to return to sport activity. We should establish the standard of rehabilitation for athletes with LBP. *Method:* 1) Subjects of this study. There are two series of study. In the 1st series (1-S) 14 cases were studied between September 1990 and August 1991, and in the 2nd series (2-S) 26 cases between December 1997 and September 2005 were followed up. 2) Evaluation of Spinal function. We have been using modified Kraus-Weber Test (m K-W Test) for evaluating spinal muscle strength since 1974. In the studies of 1-S and 2-S, the same rating system were applied with m KW-Test. The test is composed with 2 items for abdominal muscles (check of strength) and 5 items of keeping posture for 60 s (check of durability) of abdominal and back muscles. For athletes, extra load is added for every items. For example, in case of items for abdominal durability, athletes have to keep posture for 60 s with some weight (5–10% of body weight) as extra load in the neck with two hands to get full marks. The exercises consists of not only programs for the trunk but also the leg, arm and general durability. 3) Duration of return to sports in the two studies were calculated. 4) Results of two series for spinal function using mKW-Test and duration of rehabilitation were compared for evaluating reliability and reproducibility of these study. *Results:* In the 1-S spinal function using m KW-Test was a rate of 61.1 ± 13.1 (SD) in average that is equivalent to about 3 kg extra load with full marks. On the other hand, in the 2-S, spinal function was 61.7 ± 14.3 (SD) in average and also equivalent to the results of 1-S. The duration of rehabilitation to returning to sport were approximately 60 days in both studies. *Implications/Impact on Rehabilitation:* The results of two studies, during open for more than 10 years, showed the similar results in spinal function and duration. The goal of rehabilitation of athletes with LBP is full marks of m KW-Test with 3 KG extra load and 60 days exercises in average. The rating system of m K-WTest

with extra load has practical value of decision making for returning to sport for athletes with LBP.

No. 534

AQUA GYMNASTICS AND FUNCTIONAL FITNESS OF WOMEN OVER 60 YEARS OLD

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Objective: People advanced in years very often avoid exercising and lead a sedentary life, which accelerates development of involutory changes and leads to significant decrease in muscular force, scope of joints' mobility and balance disturbances, the result of which are complications such as i.a. falls, which are dangerous for elderly people's health and life. The preventive treatment against developing involutory changes is the participation of elderly people in proper groups exercising physical activities, such as e.g. aqua gymnastics for seniors. The aim of the study was evaluation of the impact of aqua exercise on the functional activity of women over age 60. *Method:* The study included 20 women aged 60 to 75. Body height and weight, hip and waist circumference were measured, BMI and WHR factors were calculated. To assess the functional activity the Fullerton Functional Fitness Test was used. The research was conducted before and after a course of gymnastics classes in the water. The exercises were carried out two times a week for 4 months. The U Mann-Whitney, *t*-student and χ^2 tests were used in the statistical analysis. *Results:* Based on the survey showed an improvement in women functional activity. The researchers observed the significant ($p < 0.05$) and highly significant ($p < 0.01$) differences between measurements 1 and 2 for all variables. Only in the case of WHR there was no significant ($p = 0.5566$) difference in measurements 1 and 2. Body weight, BMI and waist and hip circuits decreased, while in the case of physical tests their results significantly increased. *Implications/Impact on Rehabilitation:* Aqua gymnastics is a very good training and improves functional activity of the women after 60 years of age.

No. 535

EFFECTS OF WHOLE-BODY VIBRATION ON VASTUS LATERALIS ACTIVATION DURING ISOMETRIC AND DYNAMIC SQUATTING

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Objective: Exercising on a whole-body vibration (WBV) platform is thought to enhance neuromuscular activation and therefore potentially increase muscle strength gains. This study analyzed the effect of whole-body vibration on muscle activity of the vastus lateralis (VL) during different squatting exercises in comparison to no vibration. Additionally, for each exercise, different vibration frequencies were tested. *Method:* Fourteen healthy active volunteers (7 females and 7 males, mean age 35 ± 12.5 years old, 172 ± 1.5 cm, 70 ± 14.2 kg) performed a sequence of exercises (simple standing, isometric half-squat and dynamic squat) on a side-alternating platform under different conditions: no vibration, vibration at 6 Hz, 10 Hz, and 13 Hz. Muscle activation was assessed using surface electromyography.

graphy, estimating the power of the signal using root mean-square (EMGrms). The signals were recorded by two electrodes fixed lengthwise, over the middle of the VL of dominant lower extremity. **Results:** WBV resulted in higher EMGrms activity from VL ($p < 0.001$). In simple standing, any vibration frequency resulted in increased muscle activity, ranging from 61–168%. There was a significant 22% increase in EMGrms during the isometric squat at 13 Hz, compared with no vibration. In the dynamic squat, the activation improvement with vibration was less notable, with a maximum of 14% at 13 Hz. The 6Hz frequency did not augment VL EMGrms in either squatting exercises. In the dynamic squat exercise, the 13 Hz frequency did not show significant increase in muscle activation when compared to the 10 Hz frequency. **Implications/Impact on Rehabilitation:** There was wide variability in VL activation with whole-body vibration. The largest impact was seen in exercises with a smaller absolute muscle activation (simple standing), with less gains in squatting exercises. Higher vibration frequencies led to higher EMGrms. The addition of WBV to three simple weight-bearing exercises increased lower body muscle activity. WBV exercise may be an alternative modality for strength enhancement in rehabilitation and training protocols.

No. 536

A CONTRIBUTION TO THE KNOWLEDGE OF SURFING INJURIES IN PORTUGAL

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Portugal

Objective: To learn about the state of surfing-related injuries in Portugal, understand their pattern and risk factors and define injury prevention directives. **Method:** Cross-sectional study comprising 151 surfers (convenience sample) of both genders, aged 18 years or over, and who were active surfers in 2009. The questionnaire was developed by the author. The SPSS program was used for statistical analysis. **Results:** 306 injuries were reported. 246 acute injuries were reported: lacerations (46.4%), contusions (10.1%), sprains/strains (8.2%) and fractures (8.2%). 31.3% were head injuries and 31.3% were lower limb injuries. 53.3% resulted from the collision with their own board, 20.2% occurred while entering/exiting the water, 65.9% from hitting sea floor, 42.7% while riding small waves and 81% using shortboards. Sixty chronic injuries were described: 5.9% tendinopathies (mostly in the shoulder – 83.33%) and 5.2% lower back pain. Surfers that practice in large waves have a higher risk of significant injuries. The calculated injury risk was 2.4 per 1000 surfing episodes. **Implications/Impact on Rehabilitation:** It is quite possible that most injuries can be prevented by using protective equipment, making changes in the equipment and adopting self-protection strategies. More studies are needed for a better evaluation of surfing injuries.

No. 537

ACUTE ANTERIOR CRUCIATE LIGAMENT INJURY DURING FENCING COMPETITION

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Puerto Rico

Objective: The purpose of this study is to discuss the prevalence of Anterior Cruciate Ligament (ACL) injury in fencers, and to review the contributing factors that can lead to an injury of this magnitude, including biomechanics, posture and sport demands. **Method:** This is a case report of a 31-year-old male patient, right handed, who is an elite athlete in the Fencing National Team, and who acquired an acute left non-contact ACL injury while competing in the Centro American Games. The mechanism of the lesion was the combination of a left knee and ankle valgus position, while decelerating on an unstable foot. **Results:** ACL injuries are most often associated to low-velocity, non contact, deceleration injury, and in contact

injuries with a rotational component. Other mechanisms have been described like twisting, valgus stress or hyperextension. Fencing, although not perceived as the typical contact sport, has biomechanical challenges to the lower extremity that can lead to serious injuries. Fencing is not among sports with high prevalence of ACL injury. **Implications/Impact on Rehabilitation:** Fencing is a sport that demands technique precision of multiple parts of the body: the dominant upper extremity, the trunk and pelvis, and the lower extremity. More than posture, rapid ballistic motions are necessary to reach the target and protect from attacks. Weakness and asymmetry is common in the body composure of these athletes. Rehabilitators must have a role, not only in treating the injuries, but in identifying early weakness and muscle asymmetry in the pre-competition phase that can predispose to injuries.

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No. 538

GLUTEAL TAPING FOR PATELLOFEMORAL PAIN IN RACEWALKERS: CASE SERIES

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Puerto Rico

Objective: Patellofemoral pain syndrome (PFPS) is an extremely common condition, covering a range of usually vague symptoms of pain 'in', 'under' or 'behind' the patella. The exact etiology is not well understood but research has reviewed the hypothesis that hip muscle weakness may be related to excessive femoral adduction and medial rotation during functional activities, leading to an increase in knee dynamic valgus and a decrease in patellofemoral joint contact area, which are suggested as possible factors leading to PFPS. Patellar taping has been used as a treatment modality for patellofemoral pain, but currently no studies have reviewed the possibility of gluteal taping for patellofemoral pain. Our objective is to describe 3 cases of racewalkers diagnosed with patellofemoral pain treated with gluteal taping. The goal of the gluteal taping was to try to activate or improve gluteal muscle firing, thus trying to decrease internal hip rotation and knee dynamic valgus while racewalking, thus improving patellofemoral pain. **Method:** We studied 3 cases of adolescent racewalkers diagnosed with patellofemoral pain. Gluteal taping was applied at least 3 times a week usually before training sessions. Tape was applied from the sacroiliac joint to the greater trochanter of femur, with the hip externally rotated during application. Pain improvement and functional status was assessed before taping and at follow-up visits. **Results:** Our results showed that the three racewalker patients had marked improvement of their patellofemoral pain and functional status after using gluteal taping. **Implications/Impact on Rehabilitation:** The importance of this case series is that gluteal taping may be used as an adjunct to other rehabilitation modalities for treating patellofemoral pain. It may cause changes in gluteal muscle firing, thus improving strength, decreasing femoral adduction and medial rotation, knee dynamic valgus and subsequently improving knee pain.

No. 539

15 YEAR OLD YOUNG BOY WITH LOWER EXTREMITIES JOINT STIFFNESS

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Republic of Kosovo

Objective: This case study deals with implementation of physical exercise programs which can get to muscular strength modification, motor function and psychological improvement. The goal of this

case report presentation is to describe the results of the ambulatory rehabilitation program with components of musculoskeletal system exercise among children with severe injuries, particularly to show the results of post operative physical therapy after tibia plate fractures. *Method:* A fifteen-year-old male patient sustained tibia plate fracture of his right leg during his Physical Fitness class at his High School Gymnasium. Detailed physical examination and clinical testing's confirmed the severe injuries, knee stiffness, muscular hypotrophy and difficulty walking with ambulation. Rehabilitation Program is divided into three phases: a) initial b) enhanced Individually Designed programs after 4, 8 and 12 weeks. Every each phase is highly distinctive with adequate types of exercise. *Results:* Muscular strength and motor function improvements are observed. The patient started to walk without crutches. *Implications/Impact on Rehabilitation:* This research demonstrates the fact that regardless of how extensive the rehabilitation program is, the end results usually are good if physical therapy is integrated into the rehabilitation process.

No. 540

RELATIONS OF THE OBJECTIVE CLINICAL MEASUREMENTS AND HEALTH RELATED QUALITY OF LIFE AFTER SPORT KNEE INJURY

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Slovenia

Objective: Rehabilitation process requires insight into the health consequences as perceived by patients next to the assessment of impairments by clinician-based measures. Their influence on activity limitations, participation restrictions and health related quality of life (HRQoL) of athletes is often overlooked by professionals. *Method:* The study was designed to assess relations between muscle atrophy, knee range of motion or muscle strength on one hand and the Oxford Knee Score (OKS) or subscales scores of the Short Form Health Survey (SF-36) which represent different aspects of perceived HRQoL. 101 adults after recent unilateral sport knee injury were involved successively. During the outpatient rehabilitation program isokinetic dynamometry was done to assess knee flexors and extensors peak torques, checking of knee range of motion and thigh circumference and participants were asked to fill in both questionnaires at the same time. We applied Spearman's coefficient to ascertain correlations between objective findings (muscle atrophy, knee range of motion and muscle strength) and the scores of SF-36 subscales as well as correlations between the OKS and SF-36 subscales scores. *Results:* The General Health and Mental Health subscales scores of SF-36 were not related to depressed body function in terms of muscle atrophy, knee range of motion or muscle strength of athletes after sport knee injury. Strong relationship between the OKS and Bodily Pain subscale score of SF-36 was demonstrated and the OKS score was highly associated with Social Functioning score of SF-36. Moderate relationship between knee extensors peak torque and the Social Functioning score of SF-36 was established while correlations between muscle atrophy or knee range of motion and the Social Functioning score were not significant, respectively ($p < 0.01$). *Implications/Impact on Rehabilitation:* Perceived activity can provide good information about pain, participation in athlete's social functioning and knee extensors weakness and vice versa.

No. 541

EFFICACY OF AN ACCELERATE PROTOCOL IN THE TREATMENT OF LCA RECONSTRUCTION IN AMATEUR ATHLETES

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Spain

Objective: The application of rehabilitation programs play a decisive role in the functional recovery after anterior cruciate ligament (ACL)

reconstruction. Such programs can be accelerate or conservative, according to the type of patient. Accelerated protocols are based on full passive knee extension, immediate weight-bearing and functional exercises to improve the professional player's overall outcome. Many studies have been reported about professional sports rehabilitation, but few literatures can be found on amateur athletes. The aim of this study was to compare the efficacy of an accelerate versus a conservative protocol in amateur athletes after ACL-reconstructed knee. *Method:* A retrospective study between 2004–2010, including 25 football and basketball participants (22 male and 3 female, aged between 19 and 36), who underwent ACL reconstruction with hamstring tendon autograft were classified into two groups: 13 patients conservative and 12 patients accelerate protocol. The main difference between the two programs is the rate of progression through the various phases of rehabilitation and the period of time necessary prior to running and sports. Isokinetics were used for treatment, change of stage and for discharge as well as Hop test. Statistical analysis: Analysed variables were: Number of sessions and time until return to the field. T Student with a statistical significance $p < 0.05$. SPSS. *Results:* Results showed a lower number of sessions (72.2/89) ($p = 0.028$) and faster improvement of muscle strength and stability in the lower extremities with the accelerate protocol. Our study also highlighted a significantly faster return to sport activity (4.9 vs. 6.6 months). There were no complications during the treatment. *Implications/Impact on Rehabilitation:* The use of an accelerated protocol in amateur athletes is safe, successful and efficient because it allows a faster return to the sport activity and requires fewer rehabilitation sessions.

No. 542

LOW BACK PAIN ASSESSMENT BY ISOKINETIC TECHNIQUES

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Spain

Introduction: Mechanical pain in the lumbar spine is a clinical entity of high incidence in high-level ice figure skaters. This pain has been linked to the biomechanical characteristics of the sport, especially with the implementation of technical elements such as triple and quadruple rotated jumps. *Objectives:* 1) Understanding of the biomechanical changes associated with mechanical spinal pain and its relationship to fatigue and/or muscle weakness of trunk flexor-extensor. 2) Analysis of trunk muscle balance by isokinetic techniques. 3) Detection of any biomechanical impairment in the trunk muscle in order to prevent back injuries. *Material and Method:* *Subjects:* 30 high-level ice skaters, 15 males and 15 females. *Instruments:* Isokinetic BIODEX SYSTEM3. *Protocol:* 1) Clinical evaluation of the spinal column. 2) Assessment of radiological impairment in lumbar spine. 3) Test isokinetic trunk in the sitting patient, establishment of pelvis and trunk, knee flexion; ROM 90° (80° of flexion, 10° of extension). The test series is to enter three different speeds: 1) 1st test: flexion/extension, ROM 90°, speed, 60°/s (10 reps). 2) 2nd test: flexion/extension, ROM 90°, speed, 90°/s (10 reps). 3) 3rd test: flexion/extension, ROM 90°, speed, 120°/s (10 reps). *Data analysed:* Morphology of the curve; Peak Torque (Nm); Average torque; Average power; Total work (Joules); Maximum Work repetition; Agonistic/antagonistic ratio; Angle distribution of Peak Torque along the range of movement; (ROM). *Results:* They will be presented in graphs and tables. *Implications/Impact on Rehabilitation:* 1) Isokinetic testing is a valid and reliable method to assess trunk strength in high level skaters. 2) The functional test is the most suitable to assess the flexion-extension ratio. 3) During the period of rehabilitation, isokinetic test is a valid method to assess clinical improvement. 4) The total work in patients with low back pain significantly decreased, compared with athletes who have no clinical symptoms. 5) Observed alterations in agonist-antagonist muscle balance (flexion-extension) in athletes who have low back pain in active phase. 6) Further investigation is needed to assess properly the morphology of the curve.

No. 543

MEDIAL TIBIAL STRESS SYNDROME ASSESSMENT BY ISOKINETIC DYNAMOMETER

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Introduction: The Medial Tibial Stress Syndrome is a clinical entity that has a high incidence in high-level athletes. It is characterized by pain in the anterior-medial side of the leg that is related to possible periosteal irritation in insertion area. **Objective:** 1) Analysis of the biomechanical changes associated with mechanical pain in the leg and its relation to fatigue and/or weakness of the flexor-extensor muscles of the ankle. 2) Analysis of ankle muscle balance by isokinetic techniques. 3) Detection of biomechanical imbalances in flexo-extensor muscles of the ankle associated with Medial Tibial Stress Syndrome. **Method:** **Subjects:** 45 high-level athletes, 23 males, 16 females. **Instruments:** Isokinetic BIODEX SYSTEM 3. **Protocol:** 1) Clinical evaluation of the lower extremities. 2) Implementation of Functional Scale of Lower Extremity (LEFS). 3) Test isokinetic ankle patient semi-recumbent, knee flexed to 30°, angle of rotation of the ankle aligned with the angle of rotation of the dynamometer. ROM 70°. The isokinetic test is divided into three series: 1st test: flexion/extension; ROM 70°, speed 30°/s (3 repetitions). 2nd test: flexion/extension; ROM 70°, speed 60°/s (5 repetitions). 3rd test: flexion/extension; ROM 70°, speed, 120°/s (15 reps). **Analyzed data:** Morphology of the curve; Peak Torque (Nm)/Body weight; Average torque; Average power; Total work (Joules); Agonistic/antagonistic ratio; Angle distribution of Peak Torque along the range of movement (ROM). **Results:** They will be presented in graphs and tables. 1) The isokinetic testing of ankle flexion and extension is a valid and reliable method to assess muscle imbalance in athletes. 2) The athletes who have had MTSS values of peak torque and total work significantly lower in the injured leg. 3) The morphology of the isokinetic curve of the affected patient presented more research will be needed to properly assess them. **Implications/Impact on Rehabilitation:** During the period of rehabilitation, the isokinetic test is a valid method to assess clinical improvement.

No. 544

EFFECTS OF DIFFERENT STRENGTH TRAINING ON MUSCLE ARCHITECTURE: CLINICAL AND ULTRASONOGRAPHICAL EVALUATION IN KNEE OSTEOARTHRITIS

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Turkey

Objective: To evaluate the effects of different strengthening exercises (isotonic, isokinetic, isometric) on muscle structure, and also to assess the possible morphological changes during cross-education in knee osteoarthritis. **Method:** Sixty-one patients with knee osteoarthritis (122 knees) were randomized into three exercise groups (isometric, isotonic, isokinetic). In each group, only one side (either the right or left quadriceps) was strengthened during physical therapy. Subjects were evaluated clinically for pain and functional status by using Visual Analogue Scale (VAS), Western Ontario McMaster Universities Osteoarthritis Index (WOMAC), 50-step-walking and single-leg-stand tests before and after 15 sessions of physical therapy (hot pack and ultrasound). Isokinetic testing was performed at a velocity of 60/s (con/con). Likewise, they were also evaluated ultrasonographically for pennation angle, fascicle length and muscle thickness of vastus lateralis (VL) muscle bilaterally. **Results:** Increased quadriceps muscle strength was observed on both sides in the isometric left leg training group after physical therapy. In the same group, right VL fascicle length

($p < 0.05$), left VL fascicle length ($p < 0.01$) and left VL thickness ($p < 0.05$) were found to increase. In the isokinetic left group, right VL thickness ($p < 0.05$) and left VL pennation angle were found to increase ($p < 0.05$). In isotonic left group, VL thickness ($p < 0.05$) increased bilaterally. All groups showed improvement of VAS and total WOMAC scores. **Implications/Impact on Rehabilitation:** These findings uncovered that left-sided isometric quadriceps training resulted in bilateral strengthening and that accompanying increase in muscle thickness and fascicle length in the same group was consistent with the strength improvement. On the other hand, despite the lack of prevalent increase in muscle strength measurements, all groups displayed significant functional improvement.

No. 545

OSTEOPOROSIS AND KNEE EFFUSION IN A 31-YEAR-OLD PATIENT?

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United States of America

Objective: Create awareness of osteoarticular tuberculosis as part of the differential diagnosis in patients with knee effusions. **Method:** Case report in an Outpatient Clinic. **Results:** This is a case of a 31-year-old male patient from Central America who presented to the clinic with left knee effusion and no history of trauma. The patient had the effusion for the last year; workup included knee arthrocentesis and MRI. Synovial fluid analysis was negative for bacterial infection and MRI was negative for ligament and meniscal tears. Review of symptoms was positive for a 30 pound weight loss and night sweats for the last year; chest X-ray was negative for TB. We performed a second synovial fluid analysis and ordered an X-ray which revealed osteoporosis and no joint space narrowing. Synovial culture resulted in growth of Mycobacterium tuberculosis and repeat MRI revealed bone marrow edema at the proximal tibia, femur and patella with very severe degree of synovitis-pannus formation, as may be seen in early manifestation of TB septic arthritis. The patient was referred to TB clinic who started the patient on a four drug anti-TB regimen. **Implications/Impact on Rehabilitation:** As physiatrists who increasingly treat patients from different countries, we have to be aware that TB affects one third of the world's population and osteoarticular tuberculosis without pulmonary involvement is often misdiagnosed. Musculoskeletal involvement of TB affects only 1–5% of these patients and the knee is the second most common site involved after the hip. Osteoporotic changes on imaging – indicative of a chronic process – should raise suspicion for this diagnosis. Other diagnosis such as Lyme disease, HIV, and gonococcal arthritis should also be considered. The ancient scourge of TB remains among us, and may well present de novo to the physiatrist.

No. 546

HYPERHIDROSIS IN A BICYCLIST S/P RIB FRACTURE: A CASE REPORT

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United States of America

Objective: To describe a unique case of hyperhidrosis in a patient with rib fracture. **Method:** A 59-year-old male presented to a New York City community hospital with a complaint of excessive sweating on the right side of his body. Three days prior, the patient sustained a rib fracture after he was hit by a cyclist while riding his bike. X-rays were taken which revealed a right posterior 8th rib fracture at the costovertebral angle which was complicated by a significant hemothorax. Patient denied shortness of breath. On examination, swelling and hematoma was noted on the posterior aspect of the 8th rib with tenderness on palpation and increased moisture over the involved area. His muscle strength was 5/5 in all extremities and sensory exam was unremarkable. **Results:** On further questioning, the patient revealed a history of profuse sweating at night and in the morning lasting 45 min per episode

associated with pain over the fracture site. The patient was treated conservatively with oral pain medications and additional treatment options including botulinum toxin injections and surgery such as endoscopic thoracic sympathectomy were discussed with the patient. A possible explanation for this case may be a misdirected connection of the sympathetic nerve fiber network, more specifically the sympathetic chain, which is located on the posterior aspect of the ribs. This mechanism may occur after traumatic injury such as rib fracture leading to hyperhidrosis. *Implications/Impact on Rehabilitation:* Bicycling is New York City's fastest growing mode of transportation with an average of 236,000 New Yorkers biking per day. With the increasing number of cyclists in New York City as well as in many cities across the world, the possibility of an injury with the sequelae as presented in this case will become more frequent and important to recognize.

No. 547

PERCEPTIONS OF PHYSICAL ACTIVITY, PHYSICAL ACTIVITY PREFERENCES AND HEALTH AMONG PERI-MENOPAUSAL WOMEN IN URBAN GHANA: A PILOT STUDY

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Objective: Obesity and other lifestyle-related diseases impact West African women far more severely than men. Physical activity (PA) has the potential to improve these health outcomes but data on psychosocial predictors of PA in this group are sparse. We

investigated associations between perceptions of PA, PA behaviors, and health in a group of urban Ghanaian women. *Method:* Non-experimental, cross-sectional case study using a mixed-methods approach. The qualitative phase comprised focus groups and in-depth interviews with Ghanaian women, fitness professionals and clergy. The quantitative phase included a self-administered survey constructed using interview findings. 218 Ghanaian women, aged 40 to 80 years, recruited from a large megachurch, were surveyed. Logistic regression, component and factor analyses were used to determine associations between PA behaviors, demographics, and both motivators and barriers for PA. *Results:* Qualitative: Activities of daily living were perceived as exercise. Exposure to rigorous PA came from male professional athletes whose common post-retirement weight-gain discouraged women from beginning any exercise program, for fear that PA cessation inevitably induces weight-gain. All subjects reported interest in group PA. Quantitative: Mean age, 49.4 years. Mean body mass index, 30.3 kg/m² (obese). 75.9% of women reported exercising sometimes or often. 48.4% reported personal history of lifestyle-related disease. "Weight loss," "health concerns" and "increased energy," were top PA motivators. "Can't find the time," "work/family obligations," and "don't have a facility" were top PA barriers. Presence of hypertension or hypercholesterolemia correlated with the slimming motivator (adjusted odds ratio [AOR] 2.59, $p=0.008$; [AOR] 3.56, $p=0.012$); as did history of exercise-induced weight loss ([AOR] 3.36, $p<0.001$). *Implications/Impact on Rehabilitation:* The surveyed population has unique, culturally-based perceptions of PA. Psychiatry endorses PA to mitigate disease. The study has broad implications for any physical activity intervention, either institution- or community-driven, where cultural nuance plays a role in people's capacity to modify behavior.

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