

plate, the weight of the examined person is important. Nevertheless, the product tested had an effect even with persons weighing 90 kg.

Since both the subcutaneous and the muscle tissues are more in risk of creating necrosis due to pressure than the overlying skin (7), it is necessary to measure both the subcutaneous blood flow (Xenon washout) and the dermal blood flow (the laser-Doppler). The results are found to reflect the same pattern, indicating that the measurement of the blood flow by the laser-Doppler technique is sufficient when testing pressure-relieving materials according to the described procedure. In conclusion, the model appears to be useful in the determination of the blood circulation in tissue under applied pressure, and we should recommend it to be used in the evaluation of other types of pressure-relieving products.

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Scleroderma after Occupational Exposure to Trichlorethylene and Trichlorethane

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Three cases of scleroderma, developed after occupational exposure to trichlorethylene and trichlorethane are described. The question is raised whether exposure to these chlorohydrocarbon solvents may be an etiological factor. (Received October 9, 1986.)

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Scleroderma-like disease has been described after exposure to vinylchloride monomer and to vapor of epoxy resin (1). A few observations suggest that scleroderma may develop after exposure to trichlorethylene and perchlorethylene as well (2, 3). We describe three cases of scleroderma developed after occupational exposure to trichlorethylene and trichlorethane.

CASE REPORTS

Case 1

A 52-year-old man was admitted because of disabling sclerodactyli with nail fold capillary changes, scleroderma of hands and forearms, and Raynaud's phenomenon, developed during the previous 18

months. An X-ray examination of the hands showed osteolysis of distal phalanges. No sign of systemic involvement was found. ANA was positive. Exposure: During the previous 12 years he had worked with cleaning of high-voltage cables using a spray with trichlorethane as well as trichlorethylene applied with a cloth. He worked mainly out-of-doors, but without any protection of the hands.

Case 2

A 63-year-old man was referred with severe sclerodactyli with contractures, scleroderma of hands and forearms, and Raynaud's phenomenon with digital ulceration and scarring. He complained of exertional dyspnoe, as well as marked forgetfulness and vertigo. The symptoms had developed during the previous 10 years. X-ray examinations of chest, hands, and oesophagus appeared normal. A cranial CT-scan revealed central and cortical cerebral atrophy. Lung function test showed reduced diffusion capacity. ANA was positive. Exposure: Fourteen years before he had started employment in a factory where he worked with degreasing of metallic items which he dipped into an open container with warm cleaning fluid. During the first six years trichlorethylene was used, later trichlorethane. The room lacked effective ventilation. Four years before referral he left work because of his symptoms.

Case 3

A man aged 25 years presented with sclerodactyli and scleroderma of hands proximal to the digits, and Raynaud's phenomenon with digital ulcerations. A scaling erythema was found on knuckles, elbows, and knees. He complained of exertional dyspnoe and proximal muscle weakness. The symptoms had developed during the previous three years. An X-ray examination of hands showed osteolysis of distal phalanges and calcific deposits in subcutaneous tissue. X-ray examinations of chest and oesophagus appeared normal. Lung function test demonstrated a restrictive impairment of lung function with reduced diffusion capacity. ANA was positive. Creatine phosphokinase was 1650 U/l (reference <175 U/l). EMG and muscle biopsy revealed changes that were consistent with myositis. Exposure: Four years before referral he began working with degreasing of metallic items using a cloth or a brush which he dipped into a bucket with trichlorethylene. He did not protect his hands when he worked. There was no air exhauster in the room. He had been unable to work the last 18 months before referral because of his symptoms.

DISCUSSION

All our three patients developed scleroderma after prolonged and intensive exposure to trichlorethane and/or trichlorethylene in connection with cleaning of metal. According to the ARA criteria all three cases may be classified as definite systemic sclerosis (1). We conclude that our observations, together with observations by others (2, 3), make it reasonable to raise the question whether exposure to these widely used chlorohydrocarbon solvents may be an etiological factor in clinical syndromes within the spectrum of systemic sclerosis.

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