Merkel Cells Express Desmosomal Proteins and Cytokeratins

J. P. ORTONNE[1] and M. DARMON[2]

[1]*Laboratoire de Recherches Dermatologiques Hôpital Pasteur, F-06031 Nice, and* [2]*Centre International de Recherches Dermatologiques (CIRD), Sophia Antipolis, F-06565 Valbonne, France*

Ortonne J P, Darmon M. Merkel cells express desmosomal proteins and cytokeratins. Acta Derm Venereol (Stockh) 1985; 65: 161–164.

Indirect immunofluorescence experiments performed on various mammalian tissues rich in Merkel cells show that these cells contain keratin intermediate filaments and desmosomal proteins, which demonstrates their epithelial nature. Although they share desmosomes with neighbouring keratinocytes, Merkel cells differ from them, since they contain keratin polypeptides usually found in simple epithelia. In that respect, Merkel cells resemble fetal keratinocytes. *Key words: Skin; Intermediate filaments; Keratinocytes.* (Received October 6, 1984.)

J. P. Ortonne, Dermatological Research Laboratory, Pasteur Hospital, F-06031 Nice, France.

The embryonic origin of Merkel cells (MC) is still controversial, but two main hypotheses have been proposed. According to the first one, MC would be derivatives of the neural crest, while, according to the second, they would derive from the epidermis (1). Intermediate filaments are excellent markers to identify cell types, since their polypeptide composition is specific of each type of tissue (2). For example, epithelial cells contain keratin polypeptides, while neurons contain neurofilament proteins.

We recently reported (3, 4) that MC were specifically labelled by a monoclonal antibody, Troma-1 (5) recognizing a basic cytokeratin found in simple epithelia and fetal skin, i.e. component 8 of the Moll catalogue (6), but did not contain neurofilaments, and concluded that MC are probably of epithelial rather than of neural origin. These observations were recently confirmed by others (7, 8). In the present paper, we show that MC also contain acidic keratins found in simple epithelia and fetal skin, but not the keratin polypeptides specific of adult keratinocytes. We thus conclude that MC are epithelial cells similar to fetal keratinocytes.

Table I.

(−): Negative; (+) to (+++): increasing intensity of labelling. MC = Merkel cells; BK: basal keratinocytes; SBK: suprabasal keratinocytes. * = Dr M. Steinberg, Princeton, New Jersey, USA. Personal communication. ** = Dr H. Eto, Detroit, Michigan, USA. Personal communication

Antibodies and corresponding references		Specificities	Staining		
			M.C.	B.K.	S.B.K.
TK (15)	(PAb)	Epidermal keratins	−	+	+
67 K (16)	(PAb)	Component 1	−	−	+
EndoB (11)	(PAb)	Component 18	+	−	−
KG 8.13 (13)	(MAb)	Components 1, 5, 6, 7	−	+	+
KL 1 (14)	(MAb)	Components 1, 10	−	−	+
Troma-1 (15)	(MAb)	Component 8	+	−	−
Troma-3 (5)	(MAb)	43 kD, acidic	+	−	−+
LE 61 (12)	(MAb)	41–43 kD, acidic	+	−	−
B 11-1*	(PAb)	Desmoplakins and desmogleins	+	++	+++
HK 1**	(MAb)	Desmoplakins	+	++	+++

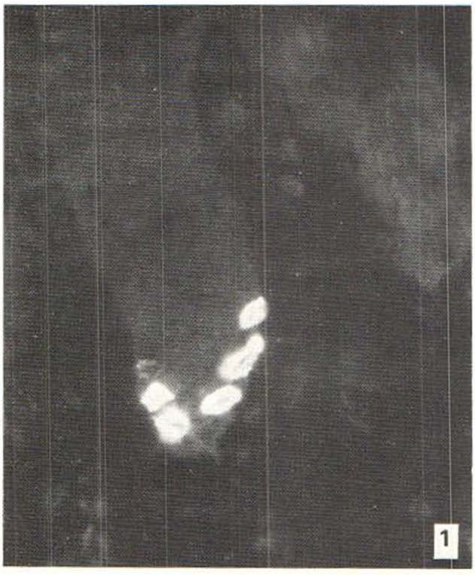
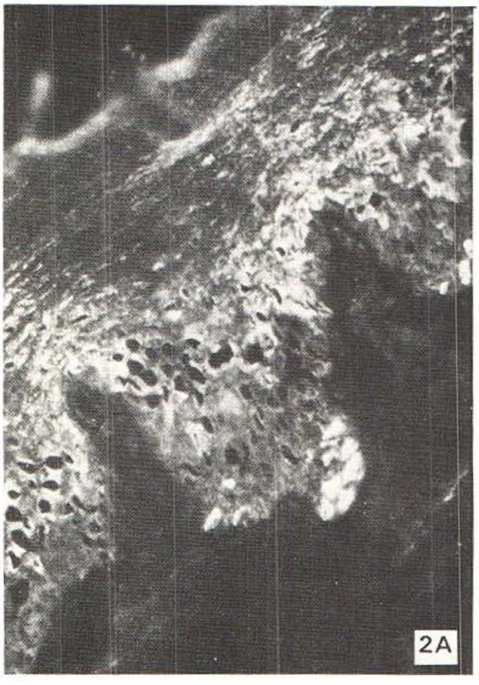
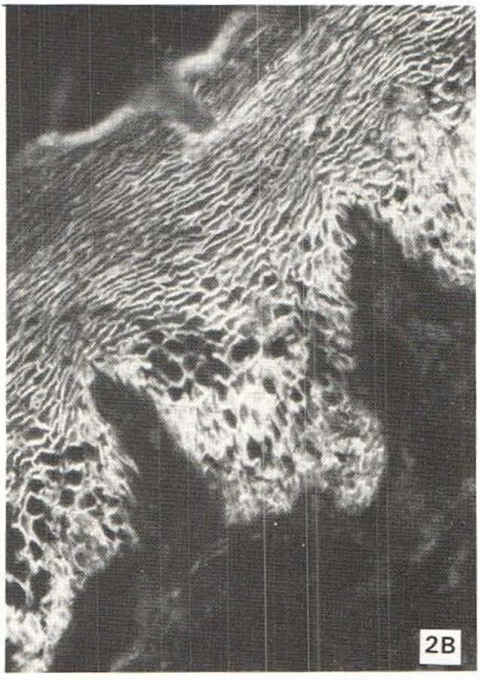


Fig. 1. TROMA III-positive Merkel cells in rabbit lip.

Fig. 2. Desmosomes of Merkel cells. Double labelling with Pr 1 h and anti-desmosome MAb (HK 1). (A) Merkel cells detected by Pr 1 h antibody. (B) Desmosomes are labelled by HK 1 MAb at the surface of all epidermal cells including Merkel cells.





MATERIALS AND METHODS

The following tissues were processed for indirect immunofluorescence: rabbit lip, pig snout, human gingiva, and human finger tip skin; rabbit epidermal sheets were prepared with EDTA (9). Staining was performed using standard procedures on 4 μm cryostat sections or on epidermal sheets. MC were identified by labelling with monoclonal human immunoglobulins Pr 1 h (10). Table I lists the specificities of polyclonal (PAb) and monoclonal (MAb) antibodies reacting with desmosomal and keratin proteins. Whenever possible, the Moll classification of human keratins was used. Negative and positive controls for each antibody were included in all experiments.

RESULTS AND DISCUSSION

Fig. 1 shows that rabbit lip MC contain a cytokeratin network and establish desmosomal contacts (Fig. 2A, B) with neighbouring keratinocytes. These features allow us to classify MC as epithelial cells. Table I lists the results obtained on rabbit lip with the various antibodies used in that study. Similar results were obtained on pig snout and human gingiva and skin. On EDTA-separated rabbit epidermal sheets, MC could be easily stained and counted. In all tissues examined, MC were found to contain keratin polypeptides usually found in simple epithelia or fetal skin, namely the basic keratin no. 8 recognized by Troma-1 MAb (5), the acidic keratin no. 18 recognized by anti-EndoB PAb (11) and the acidic keratin recognized by Troma-3 (5) and LE61 MAbs (12). On the other hand, antibodies reacting with polypeptides found in adult keratinocytes such as MAbs KG 8.13, reacting with components 1, 5, 6 and 7 (13) and KL 1, reacting with components 1 and 10 (14), did not label MC.

These results suggest that MC are of epidermal origin and are similar to fetal keratinocytes.

ACKNOWLEDGEMENTS

We are grateful to Drs H. Eto, B. Geiger, B. Habibi, R. Kemler, B. Lane, R. G. Oshima, M. J. Staquet, M. Steinberg, and J. Viac for kindly providing us with antibodies, and to Dr B. Bernard for stimulating discussions.

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