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Preliminary and Short Report

MELANIN IN LANGERHANS CELLS*

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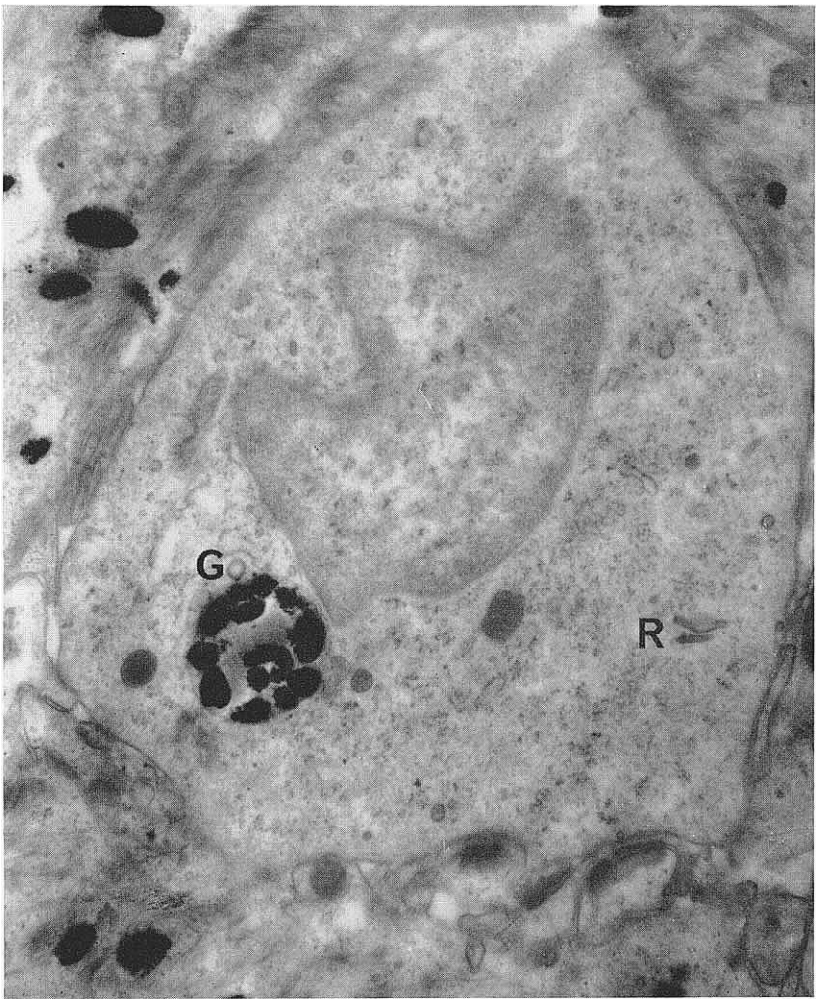

FIG. 1. A Langerhans cell from the "pigmented margin" of a vitiliginous lesion. Lead hydroxide stain. × 24,000. A cluster of melanin granules, G, is present. R, Characteristic Langerhans cell granules. There are no individual melanin granules or pre-melanosomes in the cytoplasm.

MELANIN IN LANGERHANS CELLS

In an earlier paper (1) a new concept of the relation between the Langerhans cell and the melanocyte was presented. As was pointed out at the time, were the hypothesis correct one might expect melanin granules to be present in the cytoplasm of the Langerhans cell, and our failure previously, or since, to demonstrate this in normal epidermis must weigh against acceptance of our postulate. This difficulty, however, might seem to be overcome by Zelickson's (2) recent publication of electron micrographs showing clearly the pres-

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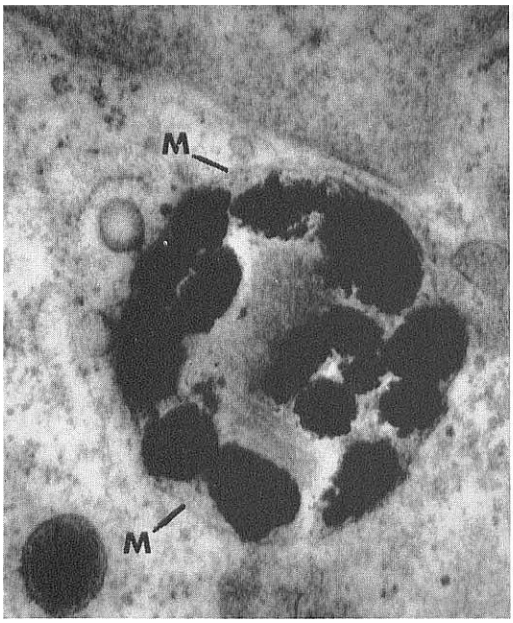

FIG. 2.

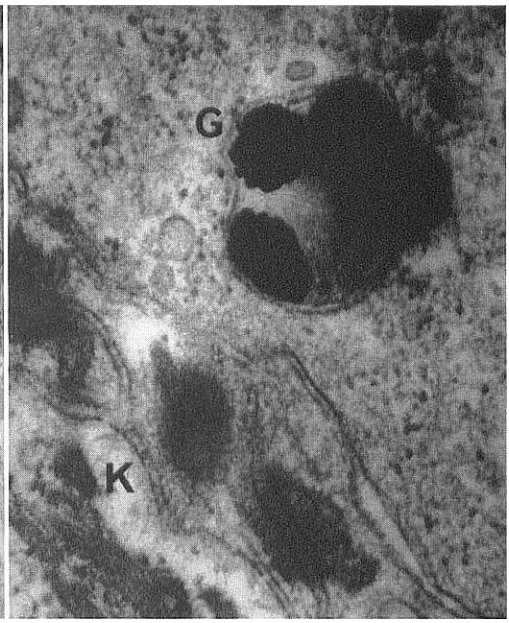

FIG. 3.

FIG. 2. Higher power micrograph of melanin granules illustrated in Fig. 1. Lead hydroxide stain. × 60,000. The cluster of granules is enclosed by a membrane, M.

FIG. 3. Cytoplasm of Langerhans cell from a second patient with vitiligo. Lead hydroxide stain × 60,000. The cluster of melanin granules G, is surrounded by two membranes. K, adjacent keratinocyte.

ence of melanin granules in Langerhans cells. According to Zelickson this melanin was produced by the cells themselves, since he found no evidence that Langerhans cells are capable of phagocytosing melanin. Recent observations of ours on Langerhans cells in vitiligo indicate however that they are capable of phagocytosis, or at any rate of receiving extraneous melanin.

MELANIN IN LANGERHANS CELLS IN VITILIGO

Fig. 1 presents a Langerhans cell from the "pigmented margin" of a vitiliginous lesion. The cytoplasm contains, in addition to the granules characteristic of this type of cell, a discrete cluster of melanin granules. At higher magnification (Fig. 2) it is evident that these latter granules are enclosed by a membrane. Fig. 3 illustrates a similar cluster of melanin granules within a Langerhans cell from a similar area of another patient with vitiligo. The granules in this instance are enclosed by a double membrane. Single isolated fully melanized granules or non-melanized pre-melanosomes (*i.e.* formative stages) are not present in the cytoplasm of either cell.

DISCUSSION

Drochmans (3) has shown that the transfer of melanin to epidermal keratinocytes is effected through penetration or invagination of the cell by the dendrite of a melanocyte which is then "nipped off". Initially the melanin granules within the engulfed dendrite are separated from the cytoplasm by two membranes—that of the dendrite, and that of the recipient cell. These eventually break down leaving the granules free in the cytoplasm where they tend to remain clustered in small groups. This process is somewhat akin to phagocytosis. The appearances illustrated in the present micrographs are entirely consistent with the suggestion that the melanin present in the Langerhans cells has arrived there by a similar process. Thus, Fig. 3 could be interpreted as representing a stage shortly after the dendrite had penetrated the Langerhans cell, its membrane and that of the latter being still intact. Fig. 2 could be regarded as a later stage where the dendritic membrane has already disappeared and the other one is in process of disintegration. The final stage, *i.e.* with melanin granules in the cytoplasm not limited by any membrane, we cannot illustrate, but there are certain features of Zelickson's (2) micrographs which suggest that they might represent just this stage, rather than evidence that Langerhans cells can produce melanin. The granules figured by him occur in clusters and lie within localized circular areas of electron opacity distinctly different to that of the surrounding cytoplasm, a condition very commonly seen in keratinocytes which receive melanin, but not in melanocytes which synthesize it. A very

similar appearance is characteristic of melanin in dermal macrophages. Zelickson (2) does not figure pre-melanosomes in his present series of Langerhans cells, a feature which would provide certain evidence that they can produce melanin; but he has previously published a micrograph showing what was identified as a pre-melanosome of the type found in melanocytes of red hair (5). This particular profile could well be a section through a lysosome, which structures are known to occur in Langerhans cells (5). In this connection it might be argued that Fig. 2, considered by itself, represents a section of a lysosome containing melanin, and not one of a penetrant melanocytic dendrite as we have suggested. If this were the case, the problem of the origin of the melanin granules would remain. In our opinion it would be more likely to be of extraneous rather than of internal origin, since as argued above, we feel that the capability of Langerhans cells to synthesize melanin remains to be proven.

SUMMARY

Evidence is presented which suggests that Langerhans cells are capable of phagocytosing melanin granules, and it is argued that their ability to produce these granules remains to be established.

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