

BLOOD VESSEL CHANGES IN PSORIATIC SKIN

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Abstract. Patients with psoriasis were treated topically with steroid cream. Tissue from treated and untreated lesions as well as normal skin was examined with the electron microscope. Capillaries lying within the papillae close to the basal lamina in the diseased tissue demonstrated open endothelial cell junctions. These open junctions persisted after treatment was stopped but were not found in any of the normal tissue samples. Areas of inflammation generally found around these capillaries contained many mast cells. A weakness of the capillaries in psoriatic patients is suggested.

Dermal capillary blood flow in psoriatic skin is increased (4) as is the tortuosity of the capillaries themselves. To date, most of the studies on the microvasculature of psoriatic skin have been made with the light microscope and with capillary microscopy. The purpose of this paper is to report a capillary abnormality as seen with the electron microscope.

MATERIAL AND METHODS

Tissue was taken from 7 psoriatic patients before, during and after topical steroid treatment of the lesions. Control specimens were also similarly taken from the same patients from diseased sites that were being treated with a bland cream. To serve as a normal reference for each patient, biopsies were performed on areas free of disease. One-half of each sample was processed for light microscopy and one-half was processed for examination with the electron microscope. Slides for light microscopy were stained with H & E, toluidine blue and Fontana stain for melanin.

RESULTS

All of the normal tissue samples, when examined with both the light microscope and the electron microscope, demonstrated normal-appearing der-

mis with the general distribution of vessels usually seen in normal skin. The endothelial cells of all vessels in the normal skin contained the usual cytoplasmic organelles and were joined by intact intercellular junctions as well as by interlocking of the cells. In addition, all of the capillaries in the normal tissues were bounded by a complete basement membrane and none were found to be dilated.

In the diseased, untreated skin many of the capillaries found near the basal lamina were dilated (Fig. 1). The nuclei of the endothelial cells protruded into the lumen, the cytoplasm was stretched to a fine ribbon and the lumen was many times larger than that found in normal capillaries. Some of these capillaries were surrounded by a noncontinuous, broken basement membrane. Due to the thinness of the cytoplasm of the endothelial cells in the dilated capillaries, there was little or no interlocking of the cells and, in many instances, cells were separated at the junctions (Fig. 2). Where the dilated capillaries were found, many inflammatory cells were generally present. Prominent in these areas of inflammation were a great number of mast cells, many of which were lying close to the capillaries. Although quantitative studies were not made to determine the number of mast cells in the diseased tissue, close observation indicated that there were a far greater number than in normal skin. Toluidine blue staining of paraffin sections showed many metachromatic mast cells in the papillae and around the capillaries elsewhere in the dermis. A count of mast cells identified by the metachromatic pink color (6) in the toluidine blue sections yielded as many as twelve mast cells per high-dry field of the light microscope (Fig. 3). This count

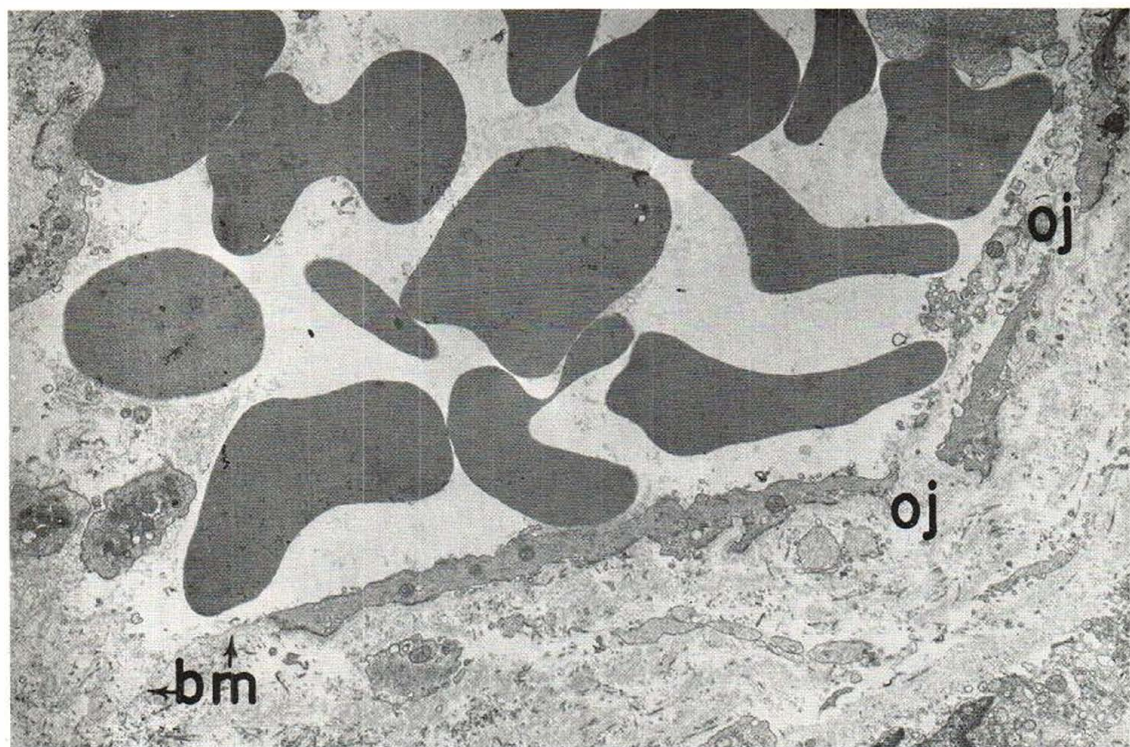


Fig. 1. This low magnification micrograph shows one-half of a dilated capillary found in psoriatic skin. The dilated capillaries are usually located high in a papilla and close to the basal lamina. Although three endothelial

cell separations are evident in this view, the basement membrane can be seen to bridge most of these separations. Open junction (oj), basement membrane (bm).

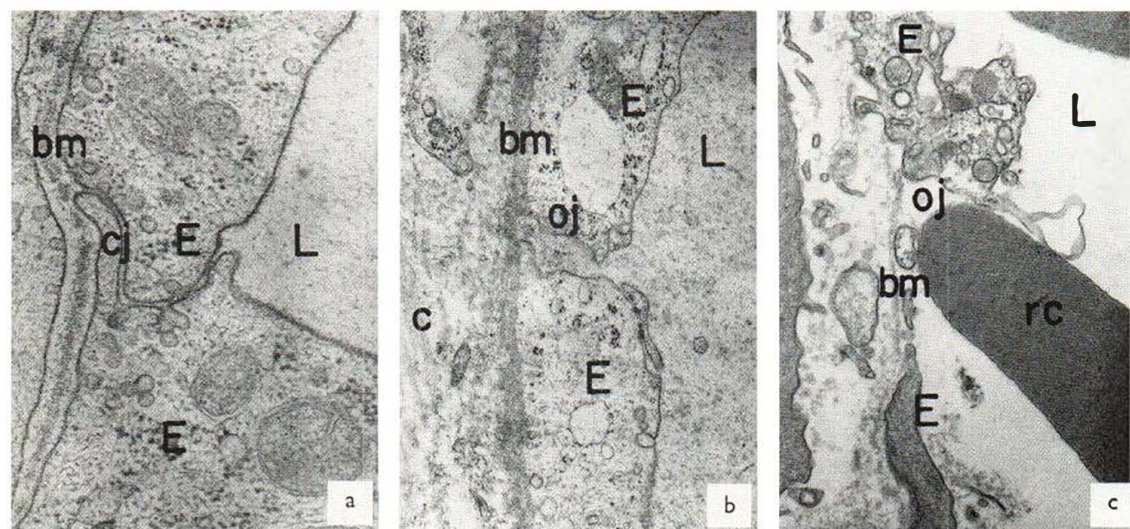


Fig. 2. Three capillary endothelial cell junctions from psoriatic skin are shown in this series: *a* is from a normal capillary, *b* shows the early stage of endothelial cell separation, and *c* demonstrates a completely open junction. In *a* the basement membrane is evident, as is the near interlocking and closeness of the junction. Note that in *b* the

basement membrane is intact and spans the opening. Although the opening in *c* is considerable, it appears to be somewhat protected by the basement membrane. Basement membrane (bm), open junction (oj), closed junction (cj), lumen (L), endothelial cell (E), collagen (c), red cell (rc).

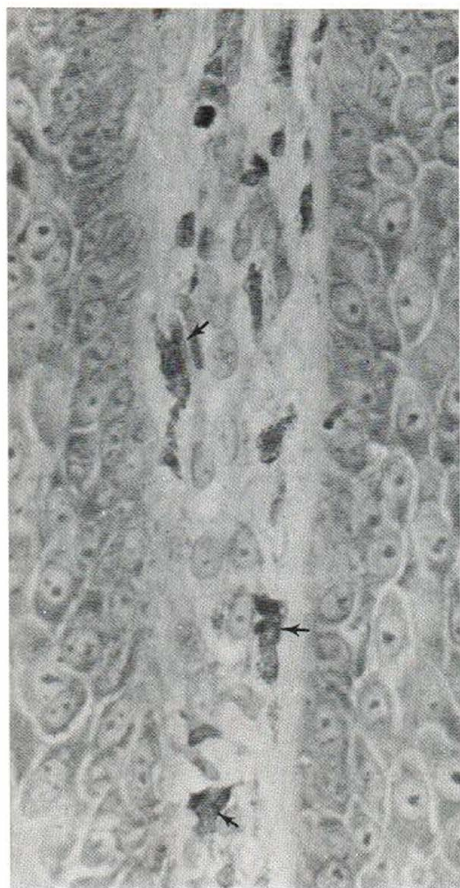


Fig. 3. This is a photomicrograph of a toluidine blue section of a papilla in psoriatic skin. The dark cells indicated by arrows are mast cells as identified by the metachromatic coloring.

was much higher than in any of the normal tissue similarly examined. The cytoplasmic membrane of some mast cells, as examined with the electron microscope, was incomplete and mast cell granules were often found free in the dermis (Fig 4).

As treatment with the steroid progressed, fewer of the dilated capillaries were evident. The steroid treatment was continued until the epidermis appeared to have returned to normal and it was felt that no further treatment was necessary. Tissue samples taken at this time still revealed a few dilated capillaries with open intercellular junctions.

Some patients were recalled 2 months after the steroid treatment was stopped. Examination of these patients showed an epidermis free of disease;

however, tissue samples from previously treated areas were examined with the electron microscope and were found to contain some dilated capillaries with open endothelial cell junctions. Dilated capillaries in these tissue samples were not accompanied by large numbers of inflammatory cells or mast cells. Tissue samples from sites which had no history of psoriasis were also examined with the electron microscope and revealed no abnormal capillaries.

DISCUSSION

Dilated capillaries, not commonly seen in normal dermis, have been reported in the dermis of psoriatic tissue (2, 7). Studies with the light microscope have described a psoriatic vascular pattern as having "markedly elongated and tortuous" capillaries. It is this vascular pattern and these dilated capillaries that we feel contain the open junctions seen with the electron microscope and reported here. Similar gaps have been reported in pustular psoriasis (1), possibly in arterial capil-

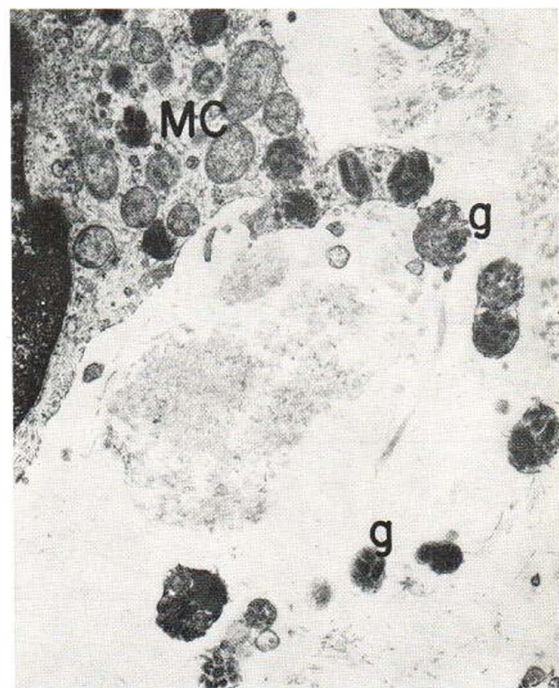


Fig. 4. This mast cell with broken cell membrane is typical of many mast cells found in psoriatic skin. Granules have been released and are free in the dermis. Mast cell (MC), granule (g).

laries, resulting in the loss of blood cells and albumin.

Whether or not the presence of an abnormal number of mast cells at the sites of the dilated capillaries can be related to the open junctions is not known; however, introduction of histamine into tissue has been reported to cause vascular damage (5) and to produce open junctions (3). It is interesting to note that as late as 2 months after the skin had healed and after the steroid treatment was stopped, open capillaries were still seen in the superficial dermis while none were found in normal tissue from the same patient. This tends to indicate that a capillary weakness exists for some time in these patients, which in part might account for the recurrence of lesions at previously treated sites.

ACKNOWLEDGEMENTS

Supported by Derm. training grant 2T01 AM 05560-06 U.S. P.H.S. and Research grant no. 5R01 AM 14913-02 U.S. P.H.S.

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Received October 13, 1972

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