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Structure of Pericapillary Space of Adrenal-Gland Sinusoid Capillaries

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Adrenal gland of white Wistar rats was studied by transmission electron microcopy (TEM). The pericapillary space was manifested at single places only along the sinusoid capillaries and contained extraendothelial cell elements of connective tissue nature, reticulin fibrils and bundles of elastic microfibrils. As a rule, a continuous basal membrane on the surface of the vascular pole of the parenchymatous cells in the adrenal cortex could be observed. This could be related with the presence of microvilli and processi. In the adrenal medulla, the basal membrane strictly followed the cellular surface facing the sinusoid capillary that was smooth and with small invaginations. A basic qualitative difference between the capillaries of both adrenal parts was established. Microvilli and processi of parenchymatous cells in the pericapillary space and the wall of the sinusoid capillaries in the cortex were observed while such relationships were lacking in the medulla.

Key words: adrenal gland, sinusoid capillaries, pericapillary space, TEM.

Introduction

Transcapillary exchange within the adrenal gland includes not only the movement of substances related to the trophics of the glandular parenchyma but also a series of hormones related to the specific functions of the gland. This exchange depends on the structure of the sinusoid capillaries as well as on the relations of the glandular cells towards the capillary wall that includes the structural peculiarities of the pericapillary space, too. Literature data about the structure of the pericapillary space are scanty and contradictory [1-4, 6].

Material and Methods

We studied the adrenal gland of white rats of Wistar breed. We made use of a conventional electron microscopic technique: glutaraldehyde, osmium tetraoxide, durcopan, uranyl acetate, lead citrate. Microscope JEM 7A.

Results

The pericapillary space of the sinusoid capillaries of the adrenal gland is located between the endothelial basal membrane and the surface of the parenchymatous cells or their basal membrane in case of its existence. Our observations show that when the parenchymatous cell is firmly attached to the capillaries by a smooth surface there is one basal membrane only situated between both cells with a thickness of about 30 nm (Fig. 1a). It is separated from the surface of the endothelial cell by a narrow subendothelial space with a width of 30-40 nm. As it can be observed the thickness of the only basal membrane common for both cells corresponds to the thickness of the endothelial basal membrane. When the surface of the parenchymatous cell moves away from the endothelium the basal membrane remains in unchanged relationships with the latter; sometimes but not always, a basal membrane can occur on the distant surface of the parenchymatous cell. The absence of a parenchymatous basal membrane could be related to the presence of processi and microvilli of the glandular cell. In the dilatations of the pericapillary space, there are fibrillary elements, pericapillary cells, processi and microvilli of the parenchymatous cells (Fig. 2). Here, as a comparatively rare component, the basal processi of the endothelial cells are also located. The fibrillary elements occur at a restricted stretch. In most cases, it deals with small bundles of reticulin fibrils. More significant accumulations are established in the neighbourhood to the pericapillary cells rich in filamentous material. Elastic elements can be very rarely observed. No typical elastic fibres presenting with a shaped elastin component of amorphous appearance can be found out. The pericapillary cellular elements repre-

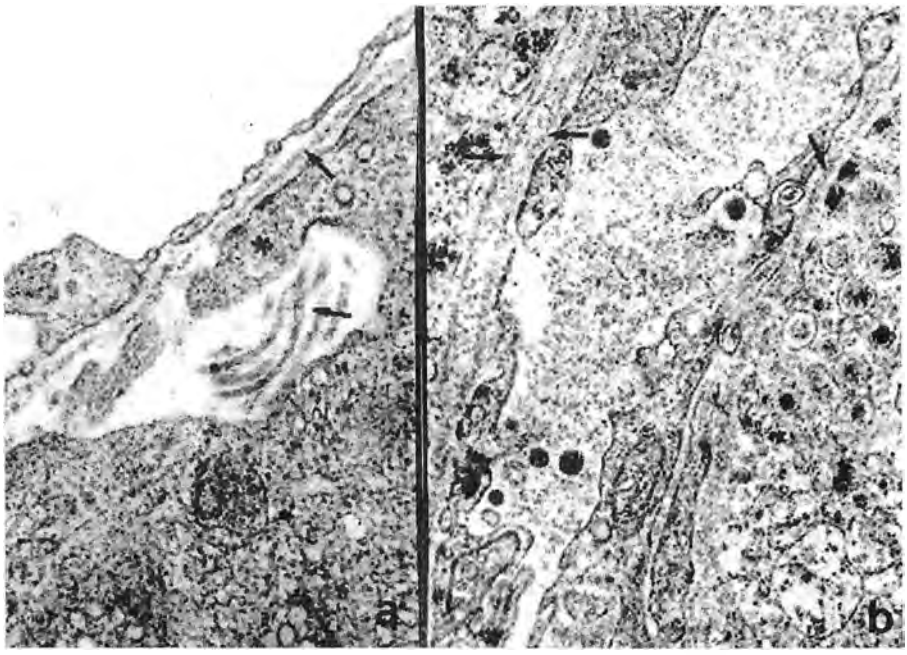

Fig. 1. Electron micrograph of rat adrenal gland
a — adrenal cortex, × 20 000; b — adrenal medulla, × 20 000

Fig. 2. Adrenal cortex. × 20 000

sent multipotent cells of connective tissue nature with a secretory, motor, and phagocytary function. (Their detailed cytological characteristics have been described in another paper of ours [5]). The main part of the content of the pericapillary space is represented by the microvilli and processi of the parenchymatous cells, some of them penetrate into the lumen of the vessel.

The pericapillary space of the sinusoid capillaries in the medulla is located between the endothelial basal membrane and the basal membrane of the parenchymatous cells; which is permanent and strictly follows the surface of the cell (Fig. 1b). The pericapillary space is absent comparatively often and at a considerable stretch. In these regions, the parenchymatous cells closely attach to the capillary wall being separated from the endothelial cells by a common basal membrane thus it deals with a different degree of fusion of both membranes, i.e., of the endothelial and the parenchymatous one. The surface of the medullary cells facing the sinusoid capillary is smooth and with small invaginations of the cytolemma. In the pericapillary space, there are fibrillary and cellular elements which, in principle, do not differ from these in the cortical part of the gland.

Discussion

The results disprove the general validity of some additional signs incorporated into the classification characteristics of the capillaries of the endocrine organs, namely, the uninterrupted layer of periendothelial elements, parenchymatous basal membrane as an obligatory external borderline of the pericapillary space, and microvilli of the parenchymatous cells [3, 4, 6].

Our data demonstrate that in the cortical part of the gland, the parenchymatous basal membrane occurs as an exception and there are no microvilli in the pericapillary space of the medulla.

We establish a basic qualitative difference between the capillaries of both parts of the gland. It concerns the interrelationships of the sinusoid capillaries with the parenchymatous cells. We observe microvilli and processi of the parenchymatous cells in the pericapillary space and the wall of the sinusoid capillaries in the cortical part and absence of such relationships in the medullar one.

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