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ULTRASTRUCTURAL FEATURES OF RAT UTERINE BLOOD-TISSUE BARRIER DURING DIFFERENT FUNCTIONAL STATES

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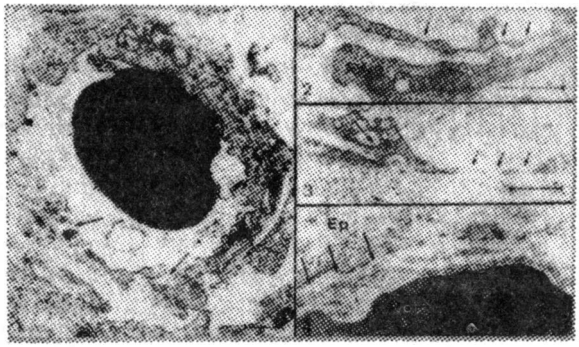
Rat uterine vascular bed is known by the microcorrosion casting/scanning electron microscope method (4,5) but the ultrastructural organization of the exchange vessels have received little attention (1-3). This study was undertaken to give morphological account of rat uterine blood-tissue barrier (BTB) during ontogenesis, pregnancy and after delivery as well as to find the ultrastructural equivalent to increased permeability and barrier reduction at these states.

A total of 93 female Wistar rats were used. Vaginal smears were taken daily to ensure the exact phase of sexually mature virgin animals (4). A standard procedure for TEM was applied by immersion fixation with 3% glutaraldehyde and 1% OsO_4.

In every uterine layer (endometrium, myometrium and perimetrium) BTB consists of vascular components - endothelial cells of capillaries and post-capillaries with their basal membrane, and extravascular components -extracellular matrix and basal membrane of the respective epithelium (liminal, glandular or mesothelial). Up to puberty BTB appears to be incomplete for the presence of endothelial gaps and pores with diameter about 150-300 nm (Fig.1). Moreover, vascular basal membrane is not found out along its whole extent and the quantity of extracellular matrix is very few. On the other hand, the epithelial basal membrane is fully formed as early as during the first postnatal days. In the estrus cycle fine structural changes are likely related to the estrogen dependent escape of large amounts of fluid from blood vessels into extravascular tissue (1-3) in proestrus/estrus and its resorption in metestrus/diestrus (Fig.2). Considerable alterations in uterine BTB showing increased permeability together with a marked reduction of the barrier (Figs. 3, 4) are present in the peripartum period. Endothelial gaps and pores found in pregnant and postpartum uteri are by 3-4 times bigger (diameter of 600-1000 nm) than those found in the early postnatal ontogenesis. An intense tissue reorganization occurs in the uterus during the postpartum period and in a lesser degree in the estrus cycle. The leukocytic migration observed through the endothelium into all uterine layers, even in the lumen, is closely related to this phenome-

non. In menopause, in contrast with the other states, similar changes in uterine BTB were not found.



Figs 1-4. Uterine capillaries and post-capillaries. Bar = 0,5 μm.
Fig.1. Gaps (arrows) - 5 days after birth
Fig.2. Fenestrae (arrows) - metestrus
Fig.3. Fenestrae (little arrows) and transendothelial channel (big arrow) - pregnancy day 21
Fig.4. Fusion (arrows) between vascular and epithelial basal membranes - pregnancy day 21

In conclusion it should be pointed out that all ultrastructural alterations in uterine BTB observed during this study seem to be very dynamic. This is obviously in correspondence to concrete functional demands in each state of the uterus. The local and general regulating factors are not fully investigated. An undoubted role is played by the female steroids (2,3) through some vasoactive substanses among which are very likely prostaglandins.

REFERENCES: 1. Cornillie, F.J., J.M. Lauweryns. Cell Tissue Res., 237, 1984, 371-373. 2. Friederici, H.H.R. Lab. Invest., 17, 1967, 322-333. 3. Martin, L., et al. J. Endocrinol., 56, 1973, 309-314. 4. Rogers, P.A.W., B.J. Gannon. Aust. J. Exp. Biol. Med. Sci., 59, 1981, 667-679. 5. Takemori, K., et al. J. Anat., 142, 1985, 21-31.