

## Columnar Cells of the Parietal Layer of Bowman's Capsule and their Relationship with the Sexual Cycle in Normal Female Mice

F. CARPINO, F. BARBERINI, G. FAMILIARI and M. MELIS<sup>1</sup>

*Department of Technic and Diagnostic Histopathology and Department of Anatomy, University of Rome, Viale Regina Elena 289, Roma (Italy), 17 May 1976.*

**Summary.** The tubule-like cells (TLC) are present also in the parietal layer of the Bowman's capsule of the renal corpuscles in normal female mice kidney. These cells are morphologically similar to the cells of the proximal convoluted tubule. Further, significant variations of the TLC were present according to the phase of the sexual cycle.

The presence of tubule-like cells (TLC) in the parietal layer of the Bowman's capsule has been reported in different species of mammals<sup>2-5</sup>, and it has been related to testosterone secretion<sup>5</sup>. Statistically significant data about their presence in normal conditions have also been reported<sup>6,7</sup>. In previous reports the TLC of the parietal layer of the Bowman's capsule in the male mice kidney have been described by means of transmission and scanning electron microscopy. This note presents the electron-microscopic features of the TLC of parietal layer of the Bowman's capsule and their possible relationship with the sexual cycle, in normal female mice.

**Materials and methods.** The study has been performed on white Swiss female mice, on a standard diet, in various stages of sexual cycle. The stage of sexual cycle has been revealed by vaginal smears stained with the PAPANICOLAOU's method<sup>8</sup>. The animals were sacrificed by decapitation and both kidneys were removed. Sections of about 2 mm in thickness were cut at the level of the hilus along the major axis of one of the kidneys. These sections, fixed in 10% calcic formaldehyde, embedded in paraffin, were stained with Hematoxylin-eosin (H.E.).

All values were subjected to statistical analysis<sup>9</sup>. Counter-lateral kidneys from mice were cut into small pieces and fixed in cold 2.5% glutaraldehyde in phosphate buffer<sup>10</sup> for 2 h; postfixed in cold 1.33% osmium tetroxide, buffered at pH 7.4, dehydrated in alcohol and embedded in Epon<sup>11</sup>. Ultrathin sections were cut on Porter-Blum MTI ultramicrotome, stained with uranyl acetate<sup>12</sup> and lead cytrate<sup>13</sup> and viewed in a Zeiss EM9A electron microscope.

**Observations.** The electron microscope results showed that, also in the renal corpuscles of sexually mature Swiss female mice, next to the flattened cells, cylindrical cells are evident in the parietal layer of the Bowman's capsule<sup>6,7</sup>. The observations with the phase-contrast microscope demonstrated that these cells are morphologically similar to the cells of the proximal convoluted tubule. In fact the TLC are provided with a typical 'brush' border, junctional complexes and infoldings of the plasma membrane containing mitochondria. In addition, the cytoplasm possess canalicular invaginations, membranes of granular endoplasmic reticulum, free ribosomes, and apical vacuoles similar to those also ob-

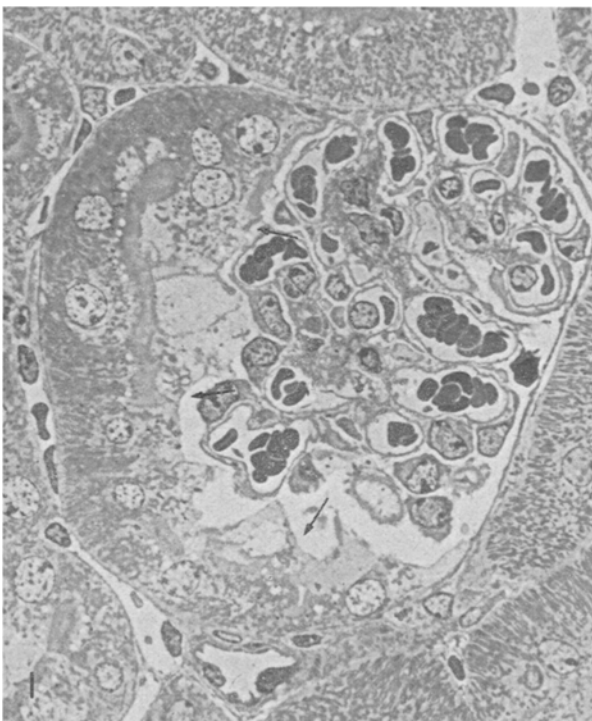


Fig. 1. Phase contrast microscopy of a renal corpuscle. The parietal lamina of the Bowman's capsule possess a continuous layer of TLC (arrows).  $\times 40$ , stained with toluidin blue.

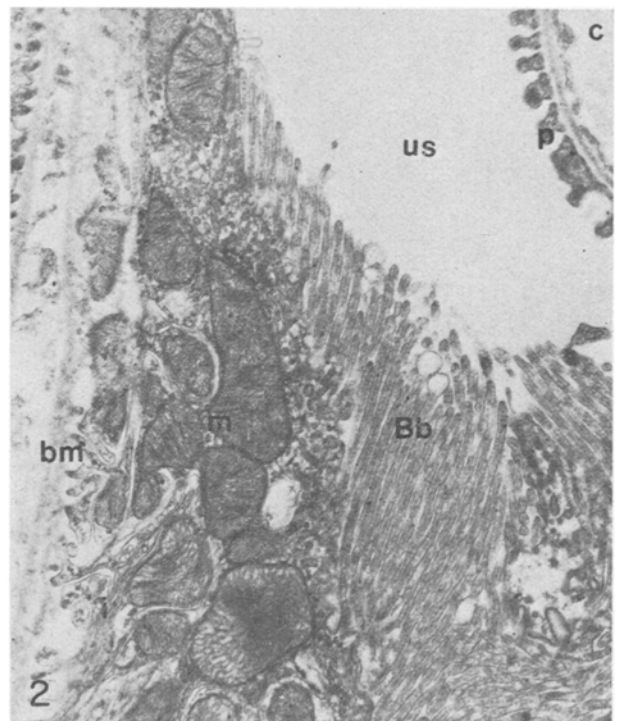


Fig. 2. Electron microscopy of TLC in the parietal layer of the Bowman's capsule. Bb, brush border; i, infolding of the plasma membrane; m, mitochondria; bm, basal membrane; us, urinary space; p, podocytes; c, capillary.  $\times 12,000$ .

served in the cells of proximal convoluted tubule (Figures 1 and 2).

The total number of the renal corpuscles and the number of those corpuscles containing the TLC have been counted in the sections stained with H. E. The results demonstrated an average of  $97 \pm 8$  renal corpuscles for each section calculated on 100 kidneys,  $28 \pm 3\%$  of which showed the TLC. Further significant variations of the TLC were present according to the phase of the sexual cycle. Statistically we counted  $31 \pm 3\%$  of TLC in proestrus,  $29 \pm 2\%$  in oestrus,  $24 \pm 2\%$  in metaestrus and finally  $25 \pm 3\%$  in diestrus (Figure 3).

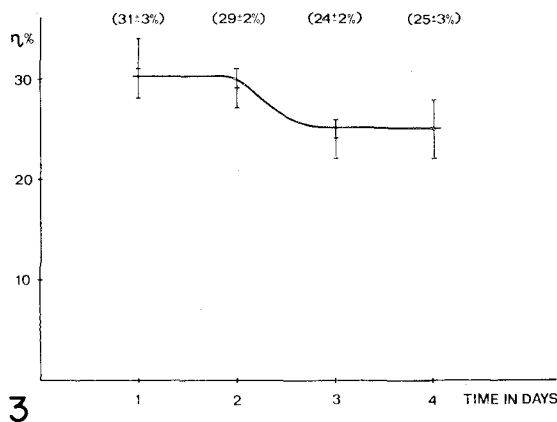


Fig. 3. Percentage of TLC (n%) in the phases of the sexual cycle. 1. Proestrus; 2. oestrus; 3. metaestrus; 4. diestrus.

**Discussion.** Previous reports demonstrated that in the male mice kidney the TLC are about  $38 \pm 5\%$ <sup>6,7</sup> and a particular relationship was described between the presence of TLC and the testosterone secretion in these animals<sup>5</sup>. The present findings demonstrated 1) that in the female mice kidney about  $28 \pm 3\%$  of the renal corpuscles showed the TLC and 2) that these corpuscles with these cells increase of about 5% in proestrus and oestrus; this increase may be related to the increase of the oestrogen secretion or to the fall of the progesterone secretion in the above phases. Further experimental data are needed in order to clarify this relation.

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## Nephrocompensatory Growth Following Thymectomy<sup>1</sup>

Š. VLAHOVIĆ and BISERKA RADOŠEVIĆ-STAŠIĆ

Department of Physiology, Faculty of Medicine, University of Rijeka, O. Ban 22, YU-51000 Rijeka (Yugoslavia), 3 May 1976.

**Summary.** Thymectomy performed 28 days before unilateral nephrectomy produced significant inhibition in compensatory renal growth (CRG) in 3–6-month-old rats. Sera from thymectomized animals are not deprived of their renotropic activity, but thymectomy of serum recipients almost abolished the capability of renotropic serum to produce CRG.

Following thymectomy, a multifacet physiological distress usually appears. Wasting disease and impaired immune competence could be considered as most evident dramatic outcome<sup>2</sup>. Body growth retardation, being a major sign of wasting disease, could be considered indicative for a more general role of the thymus in the control of growth.

Another aspect of growth, the compensatory enlargement of an organ, following removal of its portion, could also be thought as being controlled by the thymus. In the present study, we investigated the influence of thymectomy on the enlargement of the remaining kidney after unilateral nephrectomy. In addition, the renotropic features of the serum from unilaterally nephrectomized animals<sup>3</sup> were investigated in conditions altered by the thymectomy of serum donor or serum recipient.

**Material and methods.** In all experiments, outbred albino male rats were used. At nephrectomy the animals were grouped according to their age as follows: 1–2, 2–3, 3–4 and 6 months old. Since, according to our experience, age exerts a major influence on the compensatory renal growth (CRG)<sup>4</sup>, age selection was performed with particular care.

Unilateral nephrectomy was performed on the right side and the remaining left kidney was removed 48 h afterwards. The wet and dry weight increase of the remaining kidney was expressed in percentage. Thymectomy was always performed 28 days before unilateral nephrectomy.

The donors of serum were 3.5-month-old rats. All were unilaterally nephrectomized, and some of them were also thymectomized 28 days before unilateral nephrectomy. The sera were obtained from blood taken by abdominal aorta puncture, 48 h after unilateral nephrectomy, and were stored at  $-25^{\circ}\text{C}$ .

Serum recipients were also unilaterally nephrectomized, and some of them were thymectomized 1 month before uninephrectomy. The first 2 ml injection of serum was

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