Short Communication

Loose Connective Tissue of Rat Rete Testis
Fine Structure, Postnatal Development and Effect
of Efferent Duct Ligation

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Summary. Fine structure, postnatal development and reaction to efferent duct ligation of the loose connective tissue of the rat rete testis were studied by light and electron microscopy.

The loose connective tissue of adult rats consists of elongate fibroblasts in a homogenous ground substance, together with some Leydig cells, lymphocytes, macrophages and mast cells. During postnatal development this tissue increases in amount, while the interstitial areolar tissue decreases. The "looseness" of the tissue becomes more evident between days 22 and 27, and may reflect an increase in hydration.

Efferent duct ligation for 15 min to five days has no effect on the histological appearance of the tissue.

Key words: Rete testis (rat) – Loose connective tissue – Postnatal development – Efferent duct ligation – Fine structure.

Unlike many other species the rat has very little loose connective tissue in the testicular interstitium (Fawcett et al., 1973), but loose connective tissue does occur beneath the rete testis epithelium (Nykänen, 1979a) especially near the intratunical rete and beneath the epithelium of the extratesticular rete.

Loose connective tissue has many functions, e.g., exchange of metabolites and protection against inflammation (Bloom and Fawcett, 1975), and may also be important for the functions of the rete testis. The present study describes the fine structure and postnatal development of this tissue, and its reaction to efferent duct ligation.

Materials and Methods

Testes and epididymides from groups of 2–3 Sprague-Dawley rats aged 2, 7, 10, 17, 22, 27, 37, 47 and 60 days, and 6 adults (over 3 months of age), were fixed in Bouin's fluid for 1–5 days, embedded in
paraffin, sectioned, and stained with haematoxylin and eosin. Tissues from 5 adult rats were fixed by aortic perfusion with 3–5 % phosphate buffered glutaraldehyde (pH 7.4), postfixed in the same solution for 30 min – 2 h, then after overnight washing in phosphate buffer (pH 7.4), were treated with buffered osmium tetroxide for 1–2 h at + 4 °C. After ethanol dehydration they were embedded in an Epon-Araldite mixture. Thick sections (0.5–1 μm) were stained with toluidine blue for light microscopy, and thin sections were stained with uranyl acetate and lead citrate for examination by electron microscopy.

Efferent duct ligation was carried out on groups of 2–3 animals using a technique described earlier (Nykänen and Kormano, 1978). Ligated specimens were killed and the testes prepared for histological examination after 30 min, 1, 2, 4, 6, 8, 12, 16 h and 1, 2, 3 and 5 days.

Results and Discussion

The intratesticular region of the rat rete testis is a flat tube located between the tunica albuginea and the testicular stroma. On the tunical side, the rete epithelium lies immediately adjacent to the dense tunical connective tissue. On the stromal side, the seminiferous tubules lie adjacent to the rete cavity, the lamina propria of the tubules often touching the basal lamina of the rete epithelium. Interstitial tissue components occupy the intertubular spaces adjacent to the rete. In addition, loose connective tissue occurs around the rete cavities. This consists of a matrix of ground substance containing loosely arranged collagen bundles, which are either free or wrapped around by fibroblasts (Fig. 1a). The other cellular components are typical of this type of tissue (Bloom and Fawcett, 1975), namely, lymphocytes, macrophages and mast cells. Some Leydig cells are also regularly present in the region of the intratesticular rete, and these frequently have larger lipid droplets than the cells of the testicular interstitium. The loose tissue around the intratesticular rete has no fat cells or neural tissue, and capillaries and other vascular structures are sparse. Sometimes the tissue forms cushion-like projections into the rete cavity (Fig. 1b). In the extratesticular rete the loose connective tissue differs from that of the intratesticular rete in having more vascular elements and some fat cells, and around the efferent ducts the number of blood vessels and fat cells gradually increases.

Two days-old rats have plenty of loose connective tissue in the testicular interstitium, but less around the rete area (Fig. 1c). With increasing age, however, the interstitial loose connective tissue decreases, but that surrounding the intratesticular rete increases in amount (Fig. 1d). The connective tissue around the extratesticular rete becomes “looser” (Fig. 1e) during postnatal development, and this is most marked between days 22 and 27.

The rete testis is known to modify the composition of fluid passing through it (Waites, 1977), and the loose connective tissue may have an important role in the exchange of metabolites. The tissue forms cushion-like swellings in the intratesticular rete, and these increase the surface through which, the exchange of metabolites can occur. The apparent “loosening” of the tissue between days 22 and 27 postnatally may be indicative of a hydration of the tissue due to the onset of fluid transport through the epithelium.

The larger lipid droplets in the intratesticular rete Leydig cells probably reflect a lower steroid synthetic activity in these cells (Christensen, 1975), as compared with those located in the interstitium.