

POSTNATAL HISTOCHEMICAL STUDY OF THE DUCTUS DEFERENS IN THE RAM*

P.V.S. Kishore¹, Geetha Ramesh² and Sabiha Hayath Basha³

Department of Veterinary Anatomy & Histology
Madras Veterinary College
Chennai – 600 007

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The testis is an organ of lipid synthesis and catabolism. The testicular duct system is important for transportation, maturation and storage of sperms. The glands of the ampulla provide the first notable carbohydrate substrate to the semen (Pineda and Faulkner, 1980). The present work was undertaken to observe the histochemistry of carbohydrates, proteins and lipids during postnatal histological development from birth to maturity in the Madras Red ram.

The sixteen rams used were divided into four age groups viz; pre-weaning (birth to 3 months), pre-pubertal (4 to 6 months), pubertal (7 to 9 months) and post-pubertal (10 to 12 months), each of which consisted of four animals. The determination of age was ascertained based on the eruption of teeth (Noden and de Lahunta, 1985). Sections were stained by the combined Alcian blue-Periodic acid Schiff (PAS) technique and Best's carmine method for identification of carbohydrates. The identification of proteins was done by the Millon's reaction for tyrosine (Bancroft and Gamble, 2003). Frozen sections were cut and the Oil Red 'O' in propylene glycol method was employed for staining lipids (Luna, 1968).

Carbohydrates

At birth, a mild activity was variably observed in the capsule for neutral and acid mucopolysaccharides. In the pubertal period, it became moderate. The basement membrane and the luminal border of the epithelium showed a positive

activity for neutral mucopolysaccharides. The moderate reaction slightly increased as age advanced and the mass of sperms observed in the tubular lumen was PAS-positive.

The tunica serosa around the ductus deferens, in both the non-glandular and ampullary parts, showed a mild PAS-positive reaction. The tunica intima and the smooth muscles around the blood vessels were more reactive. The reaction in the basement membrane and luminal border of the epithelial cells, lamina propria and the different layers of tunica muscularis was intense, moderate and mild respectively for both neutral and acid mucopolysaccharides. The secretory material was strongly PAS-positive. However, Goswami *et al.* (1994) reported that in the camel, the basal cells showed a strong PAS-positive activity in all the three regions. The supra-nuclear zone, apical border and stereocilia of the epithelial cells in the non-glandular part of the ductus deferens showed a moderate PAS-positive activity.

In the present study, the activity for acid mucopolysaccharides in the lamina propria and inner circular layer of smooth muscle in the non-glandular part of the ductus deferens was moderate. In the outer longitudinal layer it was weak. In the ampullary region, the activity in the mucosa and lamina propria was moderate and weak respectively. The weak activity in the lamina propria surrounding the mucosa was constant whereas the activity in the folds extending to form the compartmentation was varied and showed more of neutral mucopolysaccharides.

* Part of Ph.D., thesis of the 1st author in the Tamil Nadu Veterinary and Animal Sciences University, Chennai – 600 007. E-mail: pvskishore_1963@yahoo.com. 2 & 3. Professor and Head & Associate Professor, Madras Veterinary College, Chennai.

Similar varied activity was noted in the tunica muscularis. The tunica adventitia was mildly reactive. Very mild activity was noticed in the secretory material in some of the crypts (Fig. 1).

A weak staining for glycogen was observed from birth up to the pre-pubertal period. Glycogen activity was better observed from the beginning of the pubertal period, first as fine granules and then as glycogen particles. Glycogen was absent in most parts of the capsule and inter-tubular area, but the wall of the blood vessels showed the activity. Glycogen granules were seen in the different cells of the epithelium but the luminal border showed higher localization and presented an intense activity. The peri-tubular smooth muscle layers showed very fine granules and the activity was weak.

Lipids

A weak positive reaction was observed from birth up to the pre-pubertal period. It turned to moderate in the pubertal period and along with fine granular lipids, large granules were also observed. In all periods, the reaction was more towards the luminal surface. In the pre-pubertal and pubertal periods, the tunica albuginea and the inter-tubular tissue were negative to weakly positive. The mucosa was strongly positive in the basal and apical regions. Both fine and large lipid droplets were present. The lamina propria was strongly positive but the reaction was faint in the regions of the tunica muscularis and adventitia where finely dispersed lipid granules were observed (Fig. 2).

In the ampullary region, the reaction was similar to the non-glandular part, and the mucosal folds showed a strong positive reaction. The tunica muscularis showed a faint to moderate reaction. These findings are in partial agreement with the report of Goswami *et al.* (1994) in the non-glandular part of the ductus deferens in the camel. They observed large lipid globules in the basal cells and moderate globules in the supra-nuclear cytoplasm of columnar cells. The report of Rao (1994) also described that in the domestic duck, a moderate amount of lipids was seen in the ductus deferens.

Proteins

The reaction for proteins was very weak from birth up to the pre-weaning period, in all the regions. As age advanced, the reaction became mild in the pre-pubertal period and thereafter was mild to moderate up to maturity. The non-glandular part of the ductus deferens showed a moderate reaction. In the ampullary region, the reaction in the tunica muscularis was moderate whereas that in the lamina propria and epithelium was mild. The reaction in the ductus deferens showed only a slight change from mild to moderate in the non-glandular and ampullary regions, as age advanced.

The moderate positive reaction observed for tyrosine in the post-pubertal period in the present study, in both the non-glandular and ampullary regions, is in conformity with the report of Rao (1994) in the domestic duck.

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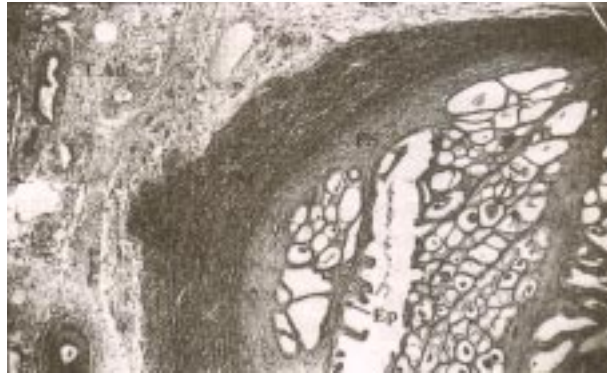


Fig. 1

Photomicrograph of the ampulla of ductus deferens in eight month-old ram showing the positive reaction for PAS and Alcian blue

T Ad – Tunica adventitia

PS – Propria-submucosa

Se – Secretory material

TM – Tunica muscularis

Ep - Epithelium

Alcian blue - PAS x 40



Fig. 2

Photomicrograph of the ductus deferens in twelve month-old ram showing the localization of lipids
Ep - Epithelium LP – Lamina propria TM – Tunica muscularis

Oil red O x 100