HISTOLOGICAL DESCRIPTION OF THE RABBIT (*Oryctolagus cuniculus*) EPIDIDYMIS AND TESTICLES

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ABSTRACT

Rabbit is an attractive species for making gonad studies, due to the early development, compared to bigger mammals, as well as the fact that it is the only mammal species that has the ability of descending or maintaining testicles within the abdominal cavity or in the scrotum. The aim of the present study was to provide a histological description of the rabbit testes and epididymis, which can be useful for the male gonadal studies in order to compare healthy tissues from damaged ones. A total of thirty testicles from slaughtered rabbits which ranged from 12 to 18 months of age were obtained and processed for histopathological studies. Tissue sections of testes, including the epididymis underwent fixation, dehydration and paraffin blocking, then they were finely sliced and stained by hematoxylin and eosin. Testicle evaluation of the stained slides was performed in a light microscope. Pictures of the testicle regions were taken under a Nikon microscope (iX70) adapted to a photo-camera, images were taken using the NisElements software. Micro-photographs of various sections of the testicles and epididymis are shown and described within the text.

Key words: rabbit testicles, epididymis, histology

Introduction

The gonadal elements of male rabbits are the testes, which are the organs responsible for sperm production as well as the male hormones or androgens secretion. The testes are enveloped within the scrotum surrounded by a dense irregular connective tissue, the albugineous tunic. Covering such a tunic is a fold of the peritoneum, the visceral fold of the vaginal tunic, which has a mesothelium which is supported in a connective tissue layer that fuses with the albugineous tunic.

Objective

The present study aimed to show a description of the normal rabbit testes architecture, so that it could be used as an aid to distinguish from altered or damaged testicle tissue on rabbits that must be discharged from the rabbit farm due to reproductive problems, involving sperm production.

Methodology

A total of thirty testicles from slaughtered rabbits which ranged from 12 to 18 months of age were extracted and obtained at slaughter house, testicles were debridated from adipose tissue and kept in saline solution (9%NaCl), testicles were taken to the laboratory and were inmmediately processed for histopathological studies. Various tissue sections of the testes were performed, including the epididymis, and later underwent fixation, dehydration and paraffin blocking, then they were finely sliced and stained by using hematoxylin and eosin routine staining technique. Testicle evaluation of the stained slides was performed in a light microscope. Pictures of the testicle regions were taken under a Nikon microscope (iX70) adapted to a photo-camera, images were taken using the NisElements software.

Histological description of the rabbit testicles

The connective tissue septum originates in the albugineous tunic and enters the testicular parenchyma, with the effect of partially or fully dividing it into lobules (Fig. 1).

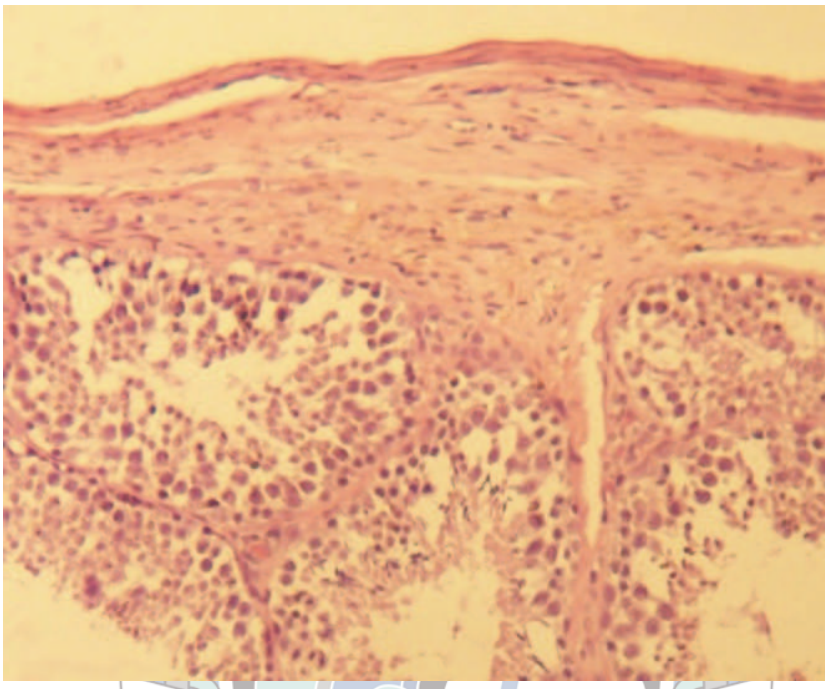

Figure 1. Rabbit testicle connective tissue and parenchyma.

Each lobule is formed by four to six seminiferous tubules that are delimited by slightly manifest areolar connective tissue (Fig. 2).

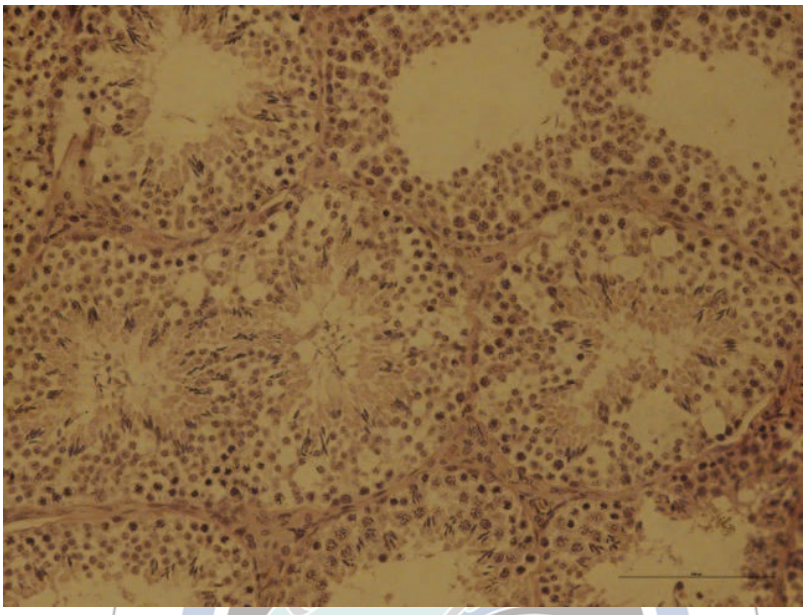

Figure 2. Rabbit seminiferous tubules.

At the center of the testicle is the septum fused with the areolar connective tissue of the testicular mediastinum (Fig. 3).

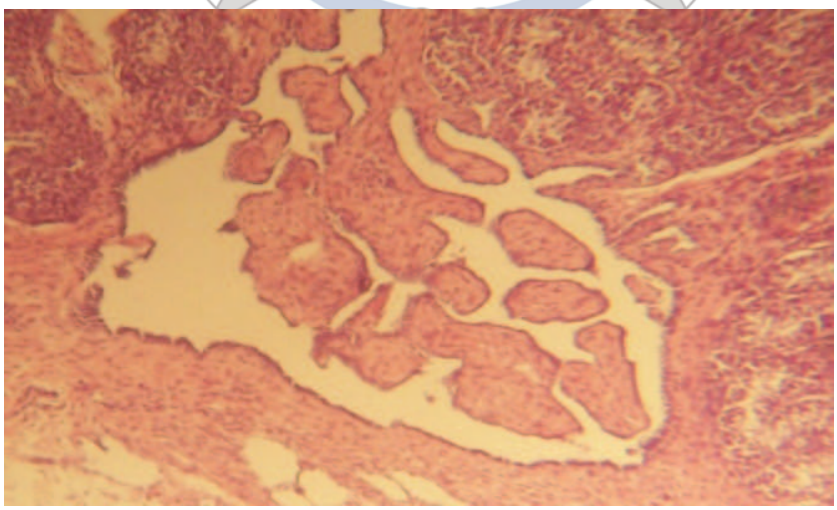

Figure 3. Center of the rabbit testicle.

Testicular lobules contain the seminiferous tubules covered by stratified epithelium of spermatogenic cells and Sertoli cells (Fig. 4).

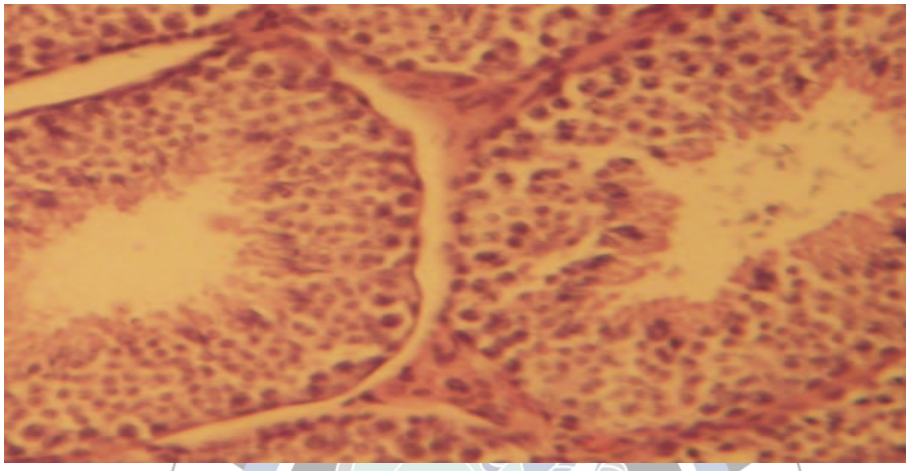

Figure 4. Rabbit testicular lobules.

Spermatogenic cells form spermatozoids. Spermatogonia are the most immature cells of the germ line and can be found in the basal membrane. These are small, oval or spherical cells that have the chromatin of their nuclei with varying degrees of condensation. Spermatogonia divide by mitosis to produce primary spermatocytes which are larger cells that carry out the first meiotic division. As a result of the latter, small secondary spermatocytes are produced and these are rarely visible in tissue preparations as they carry out the second mitotic division very quickly producing spermatids (Fig. 5).

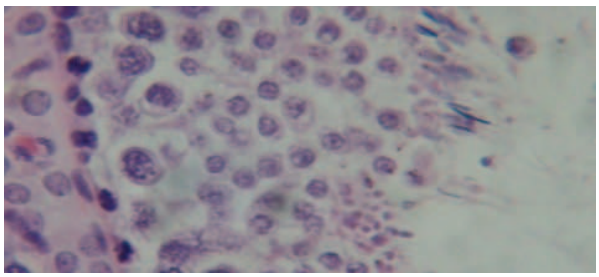

Figure 5. Secondary spermatocytes formed in the rabbit testicles.

Late-stage spermatids have small nuclei that are oval or elongated and dark, and have long tails which project into the lumen (Fig. 6).

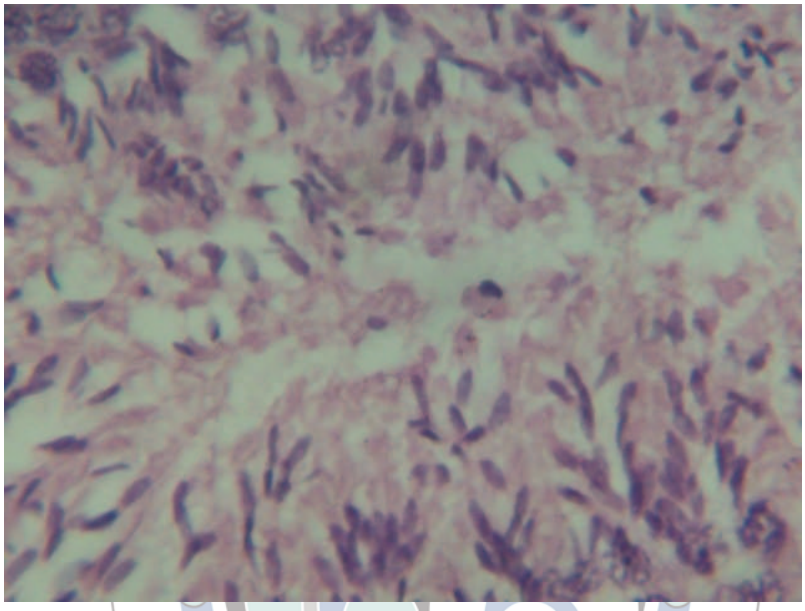

Fig. 6. Rabbit spermatids in late stage.

When spermatids are released in this stage into the tubule lumen they are known as spermatozoids (Fig. 7).

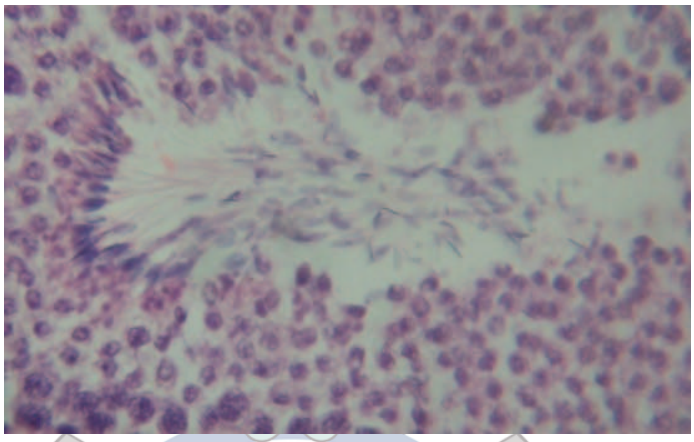

Figure 7. Lumen of the Sertoli cells of Rabbit testicles. It can be seen the sperm being released in the spermiation process.

Cells of the spermatic line are not necessarily identical within all seminiferous tubules or among different segments of the same tubule. There are various combinations of cells at certain stages of spermatogenesis that are always associated among themselves. Each cell association occupies a specific segment within the seminiferous tubule. In this manner, a transverse cut of a tubule reveals only one of such cell associations, while proximal or distal segments of the same tubule have totally different associations.

Sertoli cells are found in lesser numbers than germinal cells. These have prominent pale nuclei that are oval or triangular with frequent cleavages. The ample cytoplasm extends from the basal membrane up to the luminal edge but the lateral limits become poorly visible in conventional preparations. The plasmatic membrane of the lateral and vaginal edges invaginate to form cavities where differentiating germinal cells are located.

Outside the basal membrane of the seminiferous tubule there are flat cells known as myoid cells (Fig. 8 and 9).

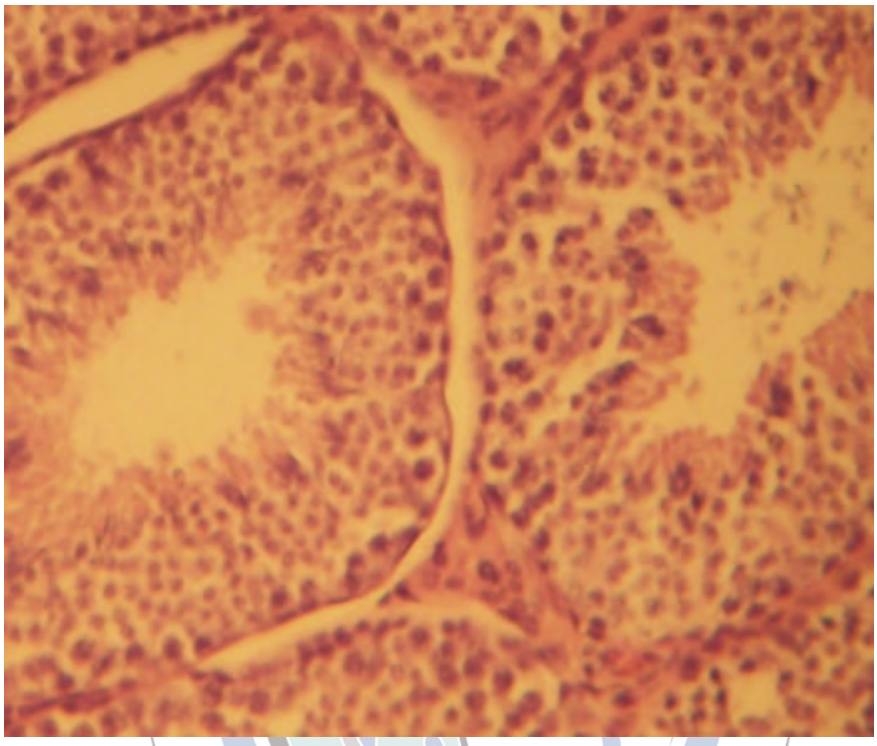

Figure 8. Rabbit seminiferous tubules.

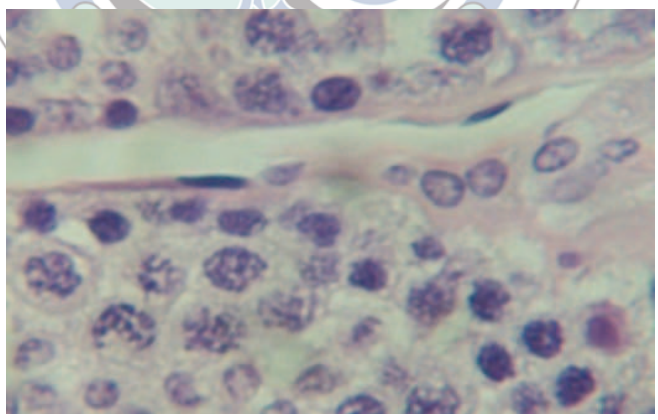

Figure 9. Myoid cells outside the basal membrane of rabbit testicles.

The connective tissue that separates the seminiferous tubules contains polyhedral cells that produce testosterone, the interstitial or Leydig cells (Fig. 10 and 11), which are recognized by their spherical nuclei and acidophilic cytoplasm that is commonly seen as foamy.

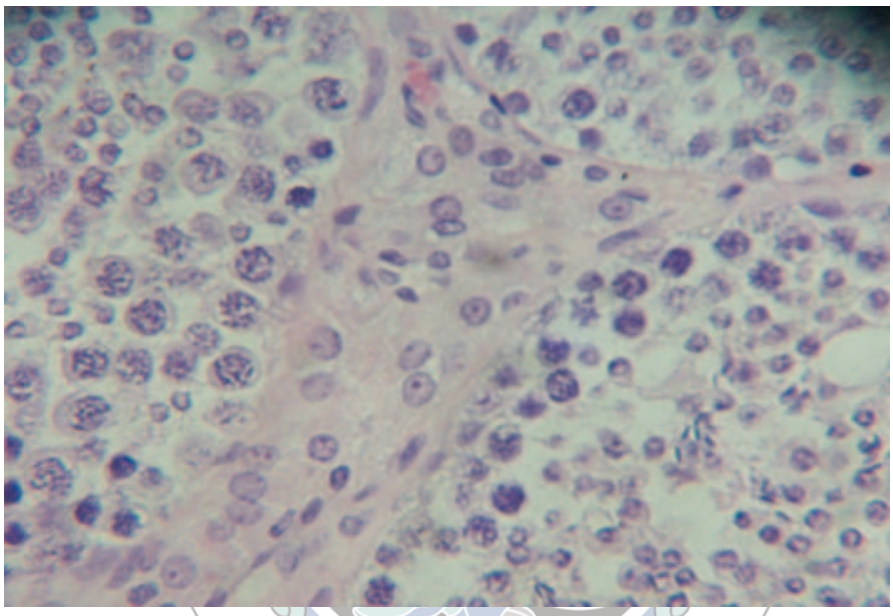

Figure 10. Connective tissue and seminiferous tubules of rabbit testicles.

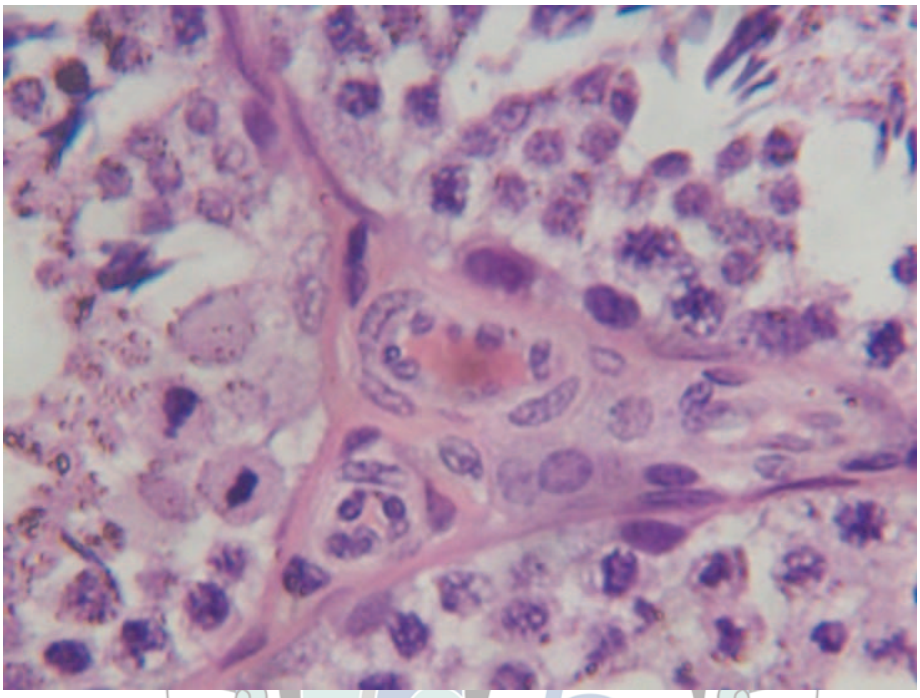

Figure 11. Instersticial or Leydig cell of rabbit testicles

The quantity of germinal cells decreases towards the end segment of the seminiferous tubules, while the Sertoli cells increase. There is a transition region or segment that is lined exclusively by Sertoli cells, which joins the seminiferous tubule to the straight tubule. Straight tubules can be lined by simple flat, cubic or columnar epithelium and they end at a network of anatomical canals known as rete testis. The rete is lined by a simple flat or cubic epithelium. The canals are embedded within the areolar connective tissue of the testicular mediastinum.

The efferent ducts originate from the rete testis, go through the albuginous tunic and enter the head of the epididymis to form the epididymis duct. The efferent ducts have a simple or pseudostratified columnar epithelium with some ciliated cells.

Histological description of the rabbit epididymis

The epididymis is a tubular body on top of the testicle at its outer edge (Fig 12), it is the place where spermatozoids acquire their fertilizing capacity. In the rabbit there are three continuous areas that correspond to the head, body and tail.

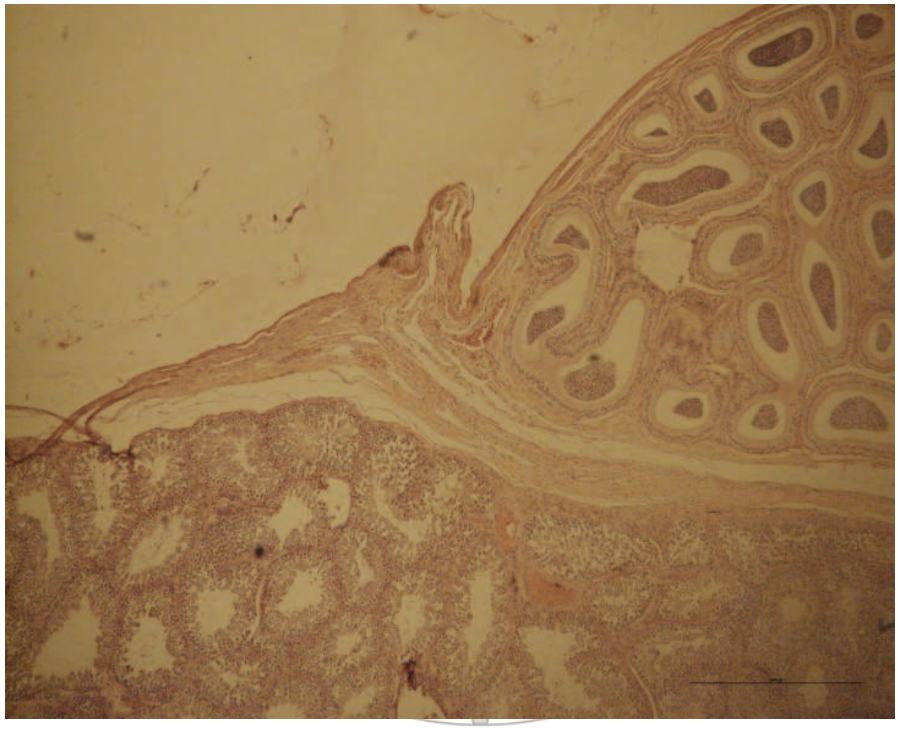

Figure 12. Outer edge of the rabbit epididymis.

A capsule of moderately vascularized regular dense connective tissue was observed, which corresponds to the albugineous tunic of the organ (Fig 13).

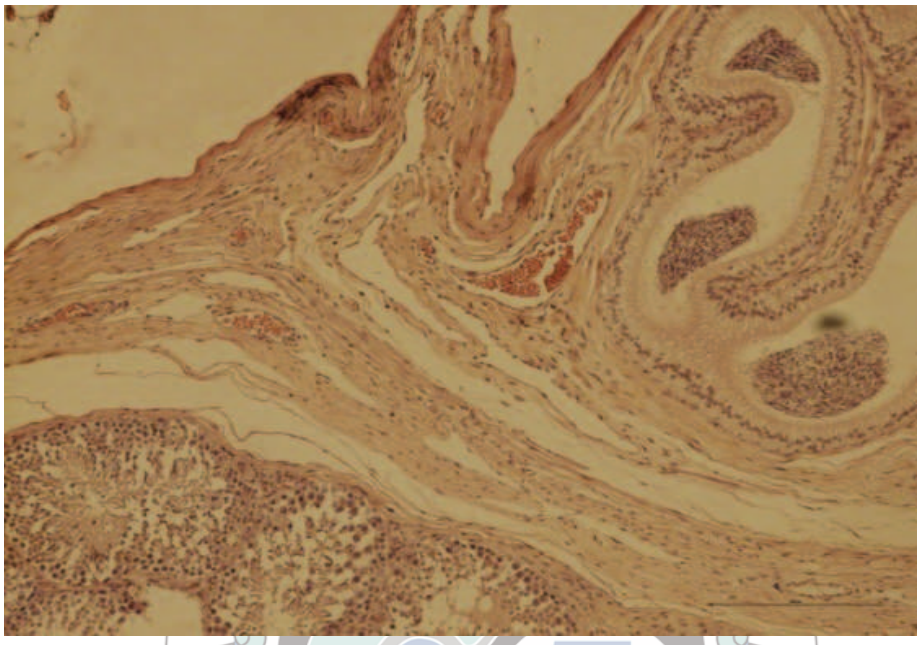

Figure 13. Albugineous tunic of the rabbit testicle.

The albuginous tunic projects as septa consisting of collagen and elastic fibers among histologically separate areas: the head, body and tail (Fig. 14).

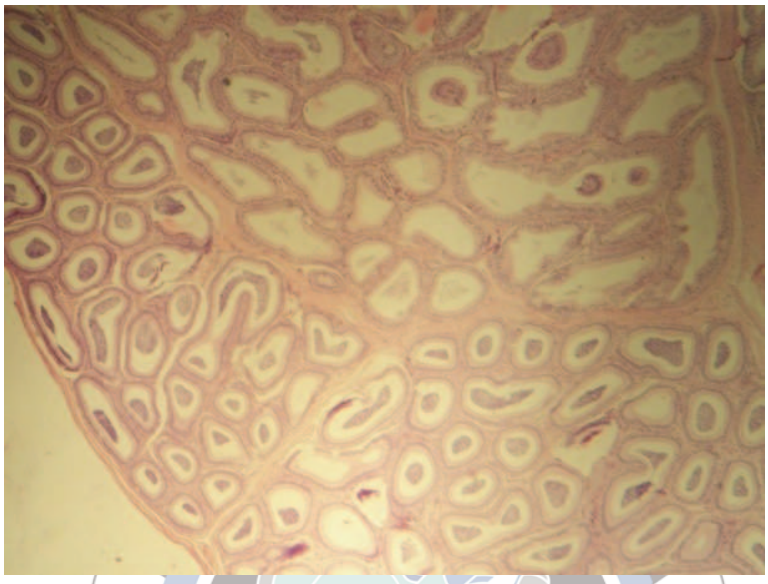

Figure 14. Albugineous tunic separating the different regions of the rabbit epididymis.

The epididymis duct follows a highly tortuous path and its structure varies along the various levels of the epididymis. The epithelium that lines the duct is pseudostratified columnar with stereocillia that reaches its highest height at the level of the epididymis head (Fig. 15) decreasing towards the tail (Fig. 16). The duct is surrounded by a layer of smooth muscle cells that is thin at the level of the head and body of the epididymis and becomes thick at the level of the tail (Fig. 15 y 16).

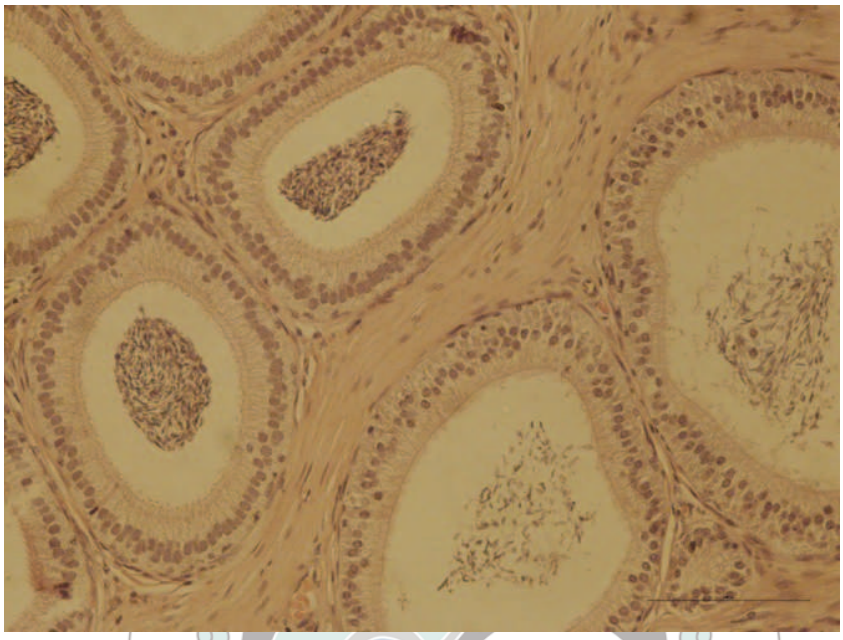

Figure 15. Rabbit epididymis head.

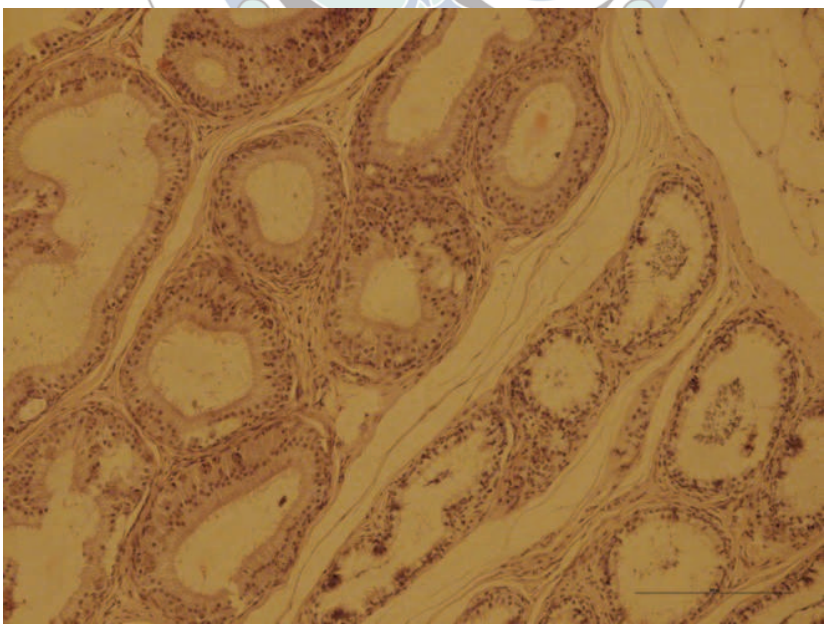

Figure 16. Rabbit epididymis body.

Conclussion

Histology studies of the testis of normal rabbits is a useful tool for determining different tissue affections in damaged testicles, which can be found in reproductive males that star to decrease their reproductive parameters, and various agents could be altering the normal testicle function, which can be reflected by the alteration of the normal cell architecture.

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