

HISTOLOGY VIRTUAL LABORATORY

MALE REPRODUCTION SYSTEM

Materials: Slides MA 1-MA 8

SPERMATOGENESIS

On **Slides MA 1, 2, & 3**, locate the **seminiferous tubules**. Each tubule is long and greatly convoluted, therefore you will see them cut only in cross or oblique sections. The tubules are lined by a specialized stratified epithelium termed seminiferous or germinal epithelium. This epithelium is composed of two major categories of cells: supporting (Sertoli) and spermatogenic (germ) cells.



Locate and study good example of each of the following:

1. **Spermatogonia** - located at the periphery of the tubule against the basal lamina. Each contains a spherical or ellipsoid nucleus with fine chromatin granules and one or two nucleoli.
2. **Primary spermatocytes** - these cells vary in size and morphology. However, they are most easily identified when they reach maximum growth. At this time, they are the largest cells seen in the epithelium. The large clumps of material within the nucleus are the bivalent chromosomes.
3. Secondary spermatocytes - rather difficult to find as they divide very rapidly. They are smaller than the primary spermatocytes, they have a round nucleus and occupy a central position within the epithelium.
4. **Spermatid** - slightly smaller than secondary spermatocytes and occupy a position nearer the lumen of the tubule. The chromatin tends to stain darker. Note the elongation of the nucleus as the spermatids undergo a transformation into spermatozoa (spermiogenesis)
5. **Spermatozoa** - the most mature spermatozoa are found within the lumen of the tubule.

TESTES (Slides MA 1-MA 4)

The **testis** has two major functions: production of sperm and synthesis of testosterone. Relate the histological features of the testes to these functions. A cross section of the testis on these slides shows that it is surrounded by a dense



connective sheath, the **tunica albuginea**. The loose connective tissue beneath the tunica albuginea is termed **tunica vasculosa** (visible on **Slide MA 4**). This layer contains blood vessels which supply the seminiferous tubules. Connective tissue septa, called **septula testes (Slides MA 2 & MA 4)**, extend deep from the tunica and separate the testis into lobules, each containing 2-4 coiled seminiferous tubules. **Sertoli cells** (supporting cells) are pillar-like cells extending from the basement membrane toward the lumen of the tubule. They are often associated with clumps of spermatids or maturing spermatozoa which they often support and nourish. They have elongated, indented nuclei with little heterochromatin and a large, distinct, irregularly-shaped nucleolus.

The seminiferous tubules are bordered by a thin basement membrane surrounded by a rim of collagen fibers, myoid cells, and fibroblasts. The angular spaces between the seminiferous tubules contain blood vessels, lymph vessels, nerves, and groups of **interstitial** or **Leydig cells** embedded in loose connective tissue meshwork. Leydig cell cytoplasm contains lipid droplets and is distinctively acidophilic. These endocrine cells synthesize testosterone and release it into the adjacent blood and lymphatic vessels.

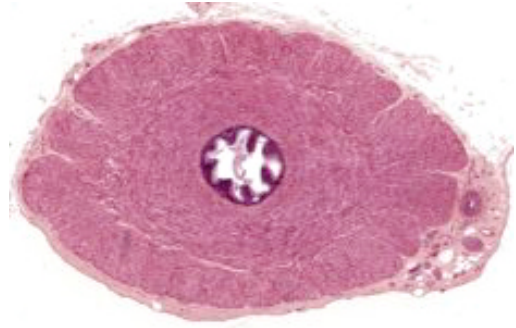
Spermatozoa leave the seminiferous tubules through **tubuli recti** or **straight tubules** (not shown on these slides) and enter a system of irregularly-shaped interconnecting spaces called the **rete testis (Slide MA 4 only)**. The straight tubules are lined by Sertoli cells and the rete testes are lined by cuboidal cells but both are embedded in a connective tissue infolding of the tunica albuginea called the **mediastinum testis**.

DUCTUS EPIDIDYMUS (not available)

Efferent ductules (not shown on the slides) connect the rete to the single coiled **duct of the epididymus**. Uniformly tall, pseudostratified columnar cells with **stereocilia** on their free surface, line the duct of the epididymus. Round basal cells are associated with the basal lamina. Only a thin layer of **smooth muscle** encircles the duct, but this becomes thicker toward the ductus deferens.

DUCTUS DEFERENS (Slide MA 7)

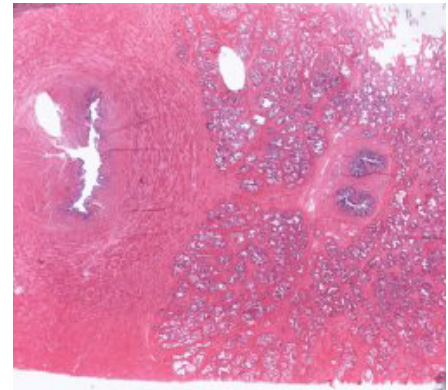
The **mucosa** of the ductus deferens is arranged into longitudinal folds, but still consists of pseudostratified columnar cells, some of which have stereocilia. The lamina propria is limited to small spaces between the epithelial folds, but the **muscularis** beneath it is greatly thickened.



Identify the **inner longitudinal**, **middle circular**, and **outer longitudinal smooth muscle** layers. These contract during ejaculation to help expel the sperm. Note the **adventitia** outside of the muscularis.

PROSTATE (Slides MA 5,6)

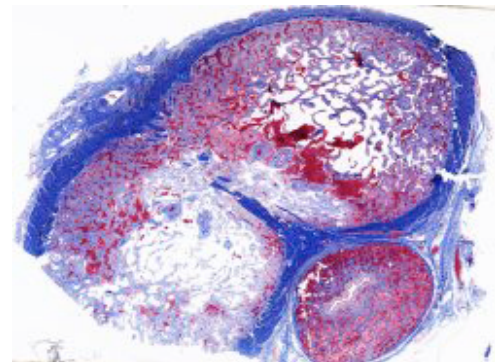
Each vas deferens terminates as an **ejaculatory duct** (right side of Slide MA 6) which empties into the **prostatic urethra** (left side of Slide MA 6). The prostate encircles the urethra just inferior to the bladder. Identify the richly vascular connective tissue **capsule** (Slide MA 5) containing many smooth muscle fibers. Locate the numerous irregular **lumina** of the **tubuloalveolar glands** which fill the prostate. They extend from the urethra into which they empty their secretions.



Pseudostratified columnar cells of variable height line the glands. **Lamellar prostatic concretions** which are believed to be condensed secretory product are sometimes seen in the lumina of the glands, especially in older people. Between the glands is a connective tissue stroma rich in **smooth muscle fibers**.

PENIS (Slide MA 8)

The **penis** is composed of three longitudinal columns of **erectile tissue**. The body of the penis contains all three columns of erectile tissue: paired **corpora cavernosa** located dorsally, and a single **corpus spongiosum** which encircles the **urethra** ventrally. Each cavernous body is surrounded by a fibrous connective tissue sheath called the **tunica albuginea**. The tunica is thicker around the corpora cavernosum than the spongiosum.



Trabeculae consisting of collagen fibers, smooth muscle cells, and elastic fibers extend from each tunica to form a three-dimensional network within each erectile tissue column. Between the trabeculae are irregularly-shaped, interconnecting **vascular spaces** (many containing blood). Each is lined by endothelium. They receive blood from arteries in the trabeculae and, in erection, become engorged with blood and cause the enlargement and rigidity of the penis.