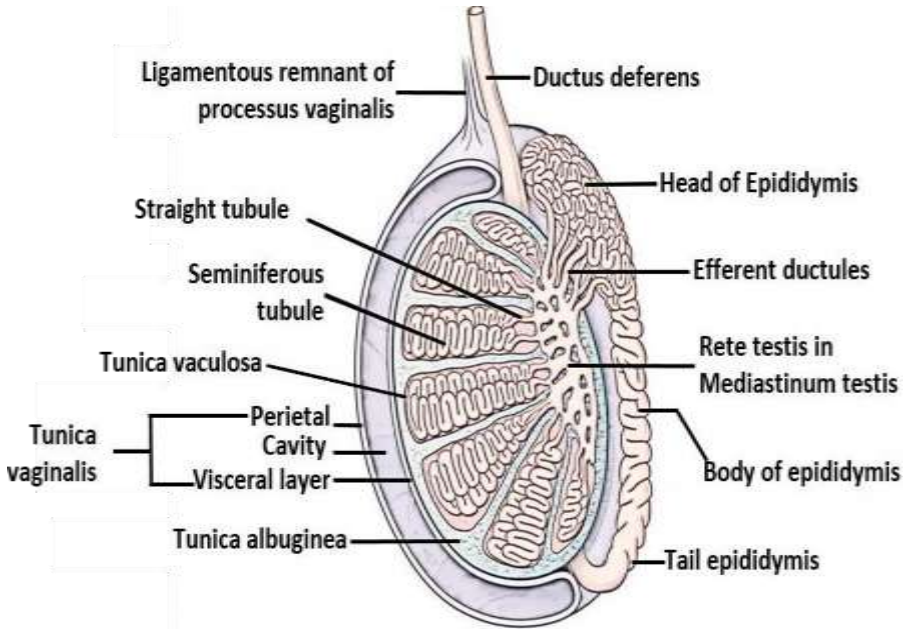
1. Endocrinology of mammalian testis and ovary

1.1. Histology of the testis



LS Testis

A pair of testes, genital ducts, accessory sex glands and a penis constitute the male reproductive system.

The testis produces **spermatozoa** and **androgens**. The testes are located in the scrotum and suspended by the **spermatic cord**.

The important and most active androgen is the **testosterone.**

In addition, the testis produces smaller amounts of weaker androgens, such as androstenedione and dehydroepiandrosterone (DHEA). The testes also produce small quantities of dihydrotestosterone. The testes are covered by three coverings: Tunica vaginalis (outer), Tunica albuginea (middle) and Tunica vasculosa (inner).

1.1.1. Tunica vaginalis

It is consisting of two layers, the **parietal** and **visceral layer**. Parietal layer is the outer one and the visceral layer is the inner one and covers the next layer of the testis: the **tunica albuginea**.

1.1.2. Tunica albuginea

The next to the **tunica vaginalis** is the **tunica albuginea**, which is thick and fibrous in appearance. This layer folds themselves in a way that create septa which results in the division oftestis into many **lobules** (250-300), and each lobule contains 1-4 highly convoluted **seminiferoustubules** (30-70 cm long).

The septa tend to meet at a point towards the midline of the posterior border of the testis to form

mediastinum testis.

Each seminiferous tubule moves towards the mediastinum testis. Each seminiferous contain two types of cells **Sertoli (sustentacular) cells**, and **spermatogonia** in various stages. Another name for Sertoli cells is **sustentacular cells** because they provide **sustenance**, or **nourishmen**t, for the developing spermatogonia. Sertoli play a supportive role in the development of spermatozoa. These cells have abundant cytoplasm and extend from the basement membrane to the lumen. Sertoli cells have a characteristic oval nucleus with a dark nucleolus.

Sertoli cells also produces inhibin and activing, growth factors, enzymes, and androgen-binding protein (ABP), and anti mullarian hormone in foetus. Sertoli cells secretes **aqueous fluid** which help in the transportation of the sperms. The spermatogenic cells constantly multiply, andthrough several phases of **spermatogenesis** differentiate into mature **sperm**, while the Sertoli cells nourish them.

Before entering the mediastinum each convoluted tubule becomes a straight seminiferous tubule. Straight tubules enter the mediastinum and connects with it to form a collecting chamber called **rete testis.** A specific type of cells called myoid cells surrounding the seminiferous tubules produce rhythmic contraction therefore the sperm and fluid move forward.

The seminiferous tubules are surrounded Leydig cells, which contain testosterone secreting cells. The shape of the Leydig cells are polyhedral with a large prominent nucleus, an eosinophilic cytoplasm and numerous lipid filled vesicles. They produce testosterone in the presence of luteinizing hormone (LH).

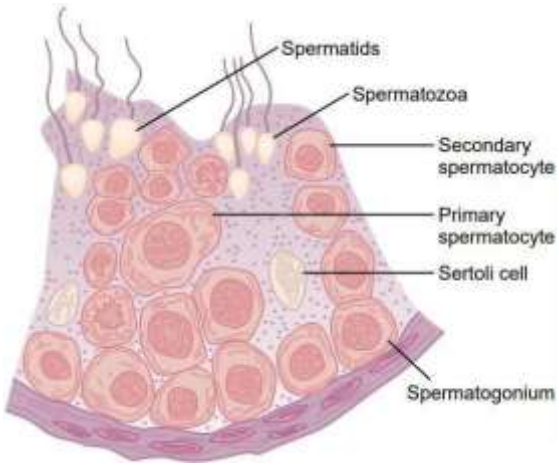
1.1.3. Tunica vasculosa

It is the innermost layer of the testis which lines the individual lobules.

1.1.4. Duct system

The rete testis gives rise to 12-20 efferent ductules that penetrate the capsule and connect with the epididymis, where sperm cells become mobile and gain the ability to fertilize an egg. The epididymis has three components, the **head of epididymis**, **and body of the epididymis** and **tail of the epididymis**.

1.2. Spermatogenesis



Stages in the development of sperm from spermatogonia

Spermatogenesis is the process of the formation of **spermatocytes** from germ cells in the male reproductive organ, and the spermatocyte is converted by **spermiogenesis** into **spermatozoa**. Spermatozoa are mature male gametes that are present in organisms which are sexually reproductive.

Spermatogenesis occurs in the seminiferous tubules in a many stages, and then the spermatozoa mature in the epididymis and after maturation, they are passed out as semen along with other glandular secretions.

Spermatogonia proliferate inside the testis by mitotic division. The diploid spermatogonium (2n) in the seminiferous tubules become progressively modified and enlarged to form large primary (1º) spermatocytes (2n).

Each 1º spermatocytes, in turn, undergoes meiotic division (M1) to form two secondary spermatocytes (n). After another few days secondary spermatocytes also **divide (M2)** to form **spermatids (n)**.

The entire period of spermatogenesis, from spermatogonia to spermatozoa, takes about **74 days**. When the spermatids are first formed, they still have the usual characteristics of **epithelioid cells**, but soon they begin to differentiate and elongate into **spermatozoa** by the process of **spermiogenesis**, each spermatozoon is composed of a **head** and a **tail**.

1.2.1. Hormonal Factors That Stimulate Spermatogenesis

Testosterone, secreted by the Leydig cells located in the **interstitium** of the testis, and it is essential for growth and division of the testicular germinal cells, which is the first stage in forming sperm.

Luteinizing hormone, secreted by the anterior pituitary gland, stimulates the Leydig cells to secrete testosterone.

Follicle-stimulating hormone, also secreted by the anterior pituitary gland, stimulates the Sertolicells; without this stimulation, the conversion of the spermatids to sperm (spermiogenesis) will not occur.

Estrogens, formed from testosterone by the Sertoli cells when they are stimulated by follicle stimulating hormone, are probably also essential for spermiogenesis.

Growth hormone (as well as most ofthe other body hormones) is necessary for controlling background metabolic functions of the testes. Growth hormone specifically promotes early division of the spermatogonia themselves; in its absence, as in pituitary dwarfs, spermatogenesis is severely deficient or absent, thus causing infertility.