

HUMAN ANATOMY & PHYSIOLOGY-II- BP201T

UNIT: 5 (REPRODUCTIVE SYSTEM)

CLASS: 1

TOPIC: Male Reproductive System**INTRODUCTION**

Reproductive system ensures the continuation of species. Gonads are the primary reproductive organs which produce the gametes. In some organisms like earthworms and snails, both sexes may be present in the same organism and this condition is known as hermaphroditism.

Reproductive organs include:

1. Primary sex organs

2. Accessory sex organs

Primary Sex Organs

Testes are the primary sex organs or gonads in males. Accessory Sex Organs

Accessory sex organs in males are:

1. Seminal vesicles

2. Prostate gland

3. Urethra

4. Penis.

External and Internal Genitalia

Reproductive organs are generally classified into two groups, namely external genitalia (genital organs) and internal genitalia. External genital organs in males are scrotum, penis and urethra. Remaining sex organs constitute the internal genitalia.

TESTES

Testes are the primary sex organs or gonads in males. There are two testes in almost all the species. In human beings, both the testes are ovoid or walnut-shaped bodies that are located and suspended in a sac-like structure called scrotum. Each testis weighs about 15 to 19 g and measures about 5×3 cm. Testis is made up of about 900 coiled tubules known as seminiferous tubules, which produce sperms. Seminiferous tubules continue as the vas efferens, which form the epididymis. It is continued as vas deferens. Vas deferens is also called

ductus deferens, spermatic deferens or sperm duct. From epididymis in scrotum, the vas deferens extends on its one side upwards into abdominal cavity via inguinal canal.

Terminal portion of vas deferens is called ampulla. Ampulla of vas deferens joins ducts of seminal vesicle of same side, to form ejaculatory duct. There are two ejaculatory ducts each of which receives sperm from vas deferens and secretions of seminal vesicle on its own side. Both the ejaculatory ducts empty into a single urethra.

Each testis is enclosed by three coverings.

1. Tunica Vasculosa

Tunica vasculosa is the innermost covering. It is made up of connective tissue and it is rich in blood vessels.

2. Tunica Albuginea

Tunica albuginea is the middle covering. It is a dense fibrous capsule.

3. Tunica Vaginalis

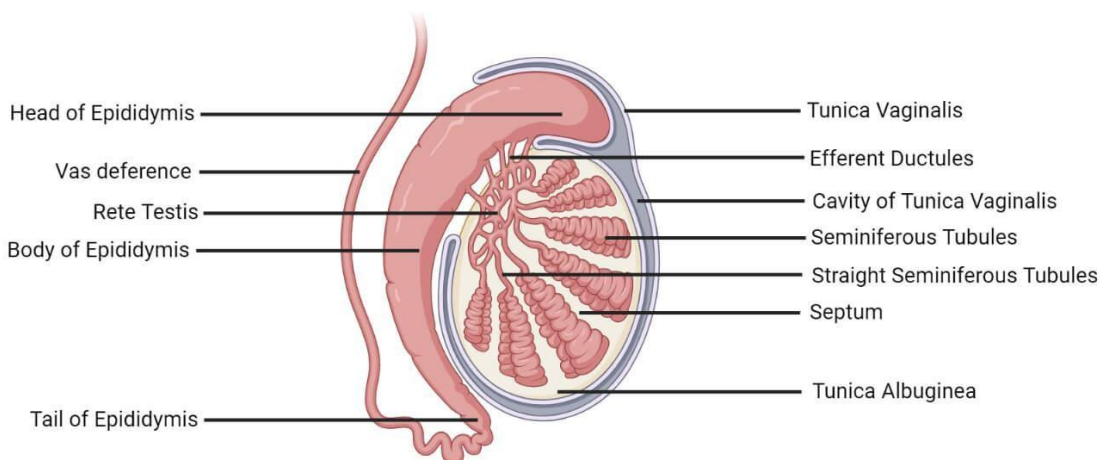
Tunica vaginalis is the outermost closed cleft like covering, formed by mesothelial cells. It is formed by visceral and parietal layers, which glide on one another and allow free movement of testes.

Anterior and lateral surfaces of testis are covered by all the three layers. Posterior surface is covered by tunica albuginea only. Tunica albuginea on the posterior surface of testis is thickened to form the mediastinum testis. Testis is divided into a number of pyramidal lobules, with bases directed towards the periphery and the apices towards the mediastinum.

Each lobule contains 1 to 4 coiled tubules known as the seminiferous tubules, which are surrounded and supported by interlobular connective tissue. Rete testis is a network of thin-walled channels present in mediastinum. All the seminiferous tubules open into the rete testis. From rete testis, 8 to 15 tubules called vas efferens arise.

Vas efferens join together and form the head of epididymis and then converge to form the duct of epididymis. Duct of epididymis is an enormously convoluted tubule, with a length of about 4 meter. It begins at head, where it receives vas efferens. Interstitial cells of Leydig are the hormone secreting cells of testis, lying in between the seminiferous tubules.

Male Reproductive System: Testis



SEMINIFEROUS TUBULES

Seminiferous tubules are thread-like convoluted tubular structures which produce the spermatozoa or sperms. There are about 400 to 600 seminiferous tubules in each testis. Each tubule is 30 to 70 cm long with a diameter of 150 to 300 μ .

Wall of the seminiferous tubule is formed by three layers:

1. Outer capsule or tunica propria, formed by fibro-elastic connective tissue
2. Thin homogeneous basement membrane
3. Complex stratified epithelium, which consists of two types of cells: i. Spermatogenic cells or germ cells ii. Sertoli cells or supporting cells.

Spermatogenic cells or germ cells present in seminiferous tubules are precursor cells of spermatozoa. These cells lie in between Sertoli cells.

In children, the testis is not fully developed. Therefore, the spermatogenic cells are in primitive stage called spermatogonia. With the onset of puberty, spermatogonia develop into sperms through different stages.

Stages of spermatogenic cells

Different stages of spermatogenic cells seen from periphery to the lumen of seminiferous tubules are:

1. Spermatogonium
2. Primary spermatocyte
3. Secondary spermatocyte
4. Spermatid

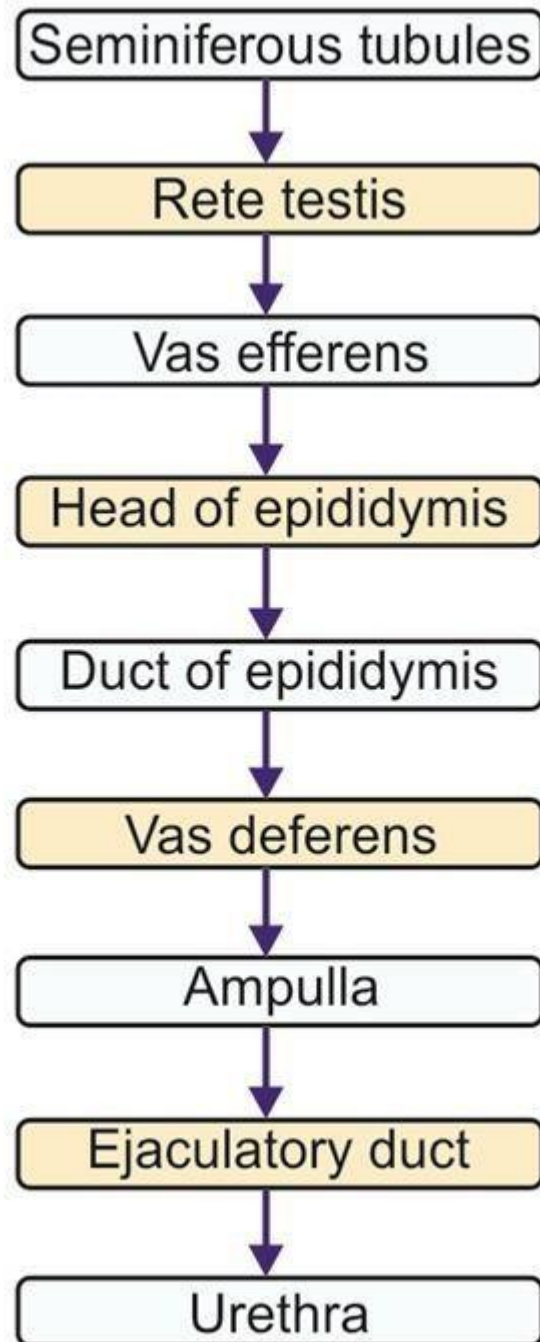


Figure: Pathway for the passage of sperms

Sertoli cells are the supporting cells for spermatogenic cells in seminiferous tubules. These cells are also called sustentacular cells or nurse cells. This attachment between germ cells and Sertoli cells exists till the matured spermatozoa are released into the lumen of seminiferous tubules.

Sertoli cells:

1. Support and nourish the spermatogenic cells till the spermatozoa are released from them
2. Secrete the enzyme aromatase, which converts androgens into estrogen
3. Secrete androgen-binding protein (ABP), which is essential for testosterone activity, especially during spermatogenesis
4. Secrete estrogen-binding protein (EBP)
5. Secrete inhibin, which inhibits FSH release from anterior pituitary
6. Secrete activin, which has opposite action of inhibin (increases FSH release)
7. Secrete müllerian regression factor (MRF) in fetal testes. MRF is also called müllerian inhibiting substance (MIS). MRF is responsible for the regression of müllerian duct during sex differentiation in fetus.

Blood-testes barrier protects the seminiferous tubules and spermatogenic cells by preventing the entry of toxic substances from blood and fluid of the surrounding tissues into the lumen of seminiferous tubules. However, blood-testes barrier permits substances essential for spermatogenic cells.

Blood-testes barrier is commonly damaged by trauma or viral infection like mumps. Whenever, the blood-testes barrier is damaged the sperms enter the blood. The immune system of the body is activated, resulting in the production of autoantibodies against sperms. The antibodies destroy the germ cells, leading to consequent sterility.

Testes performs two functions: 1. Gametogenic function: Spermatogenesis 2. Endocrine function: Secretion of hormones.