



University of Basra
College of medicine

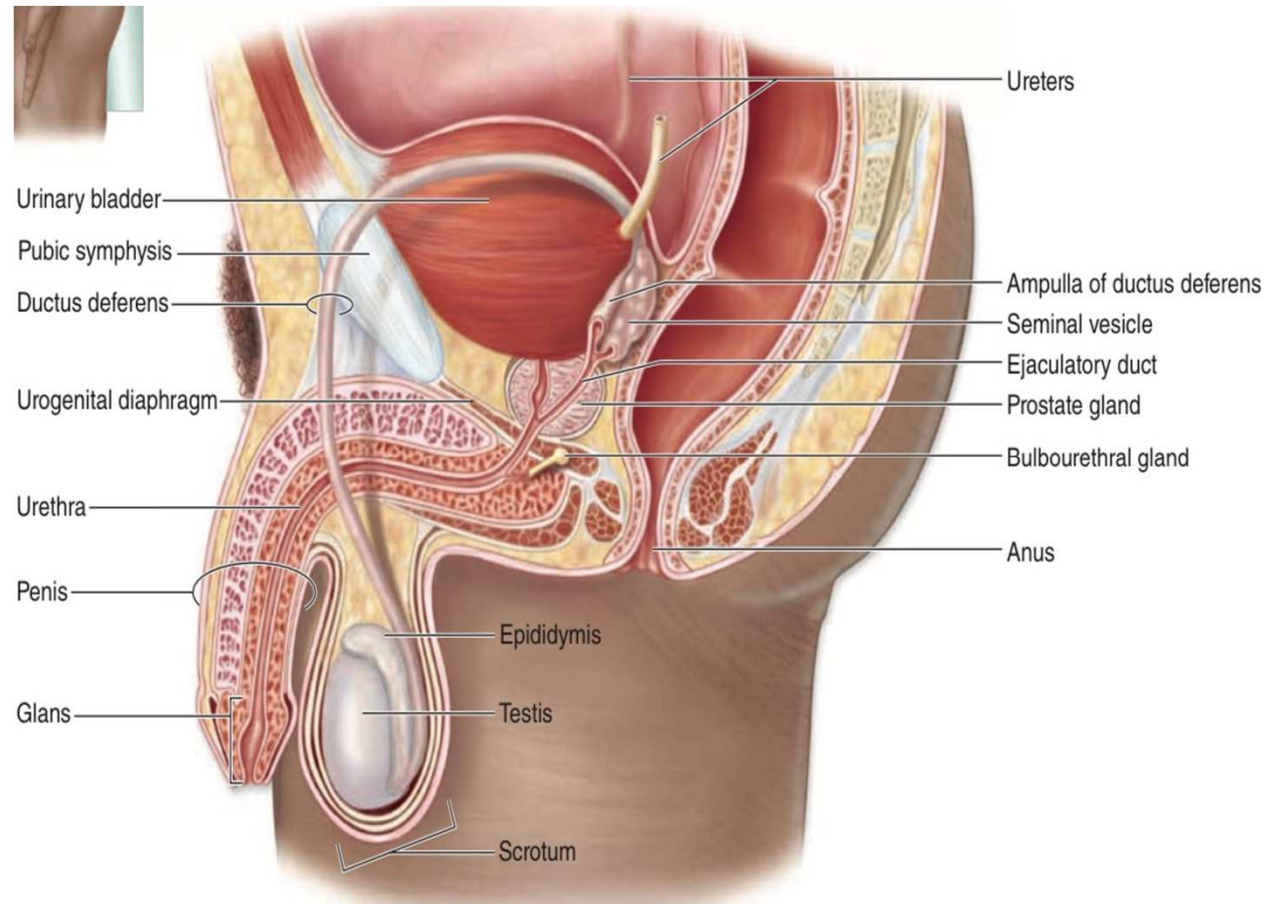
The Male Reproductive System

Dr. Zainab A. Ameen
Iraqi board of histopathology and forensic medicine

The male reproductive system

The male reproductive system consists of :

1. Testes
2. Genital ducts
3. Accessory glands
4. Penis

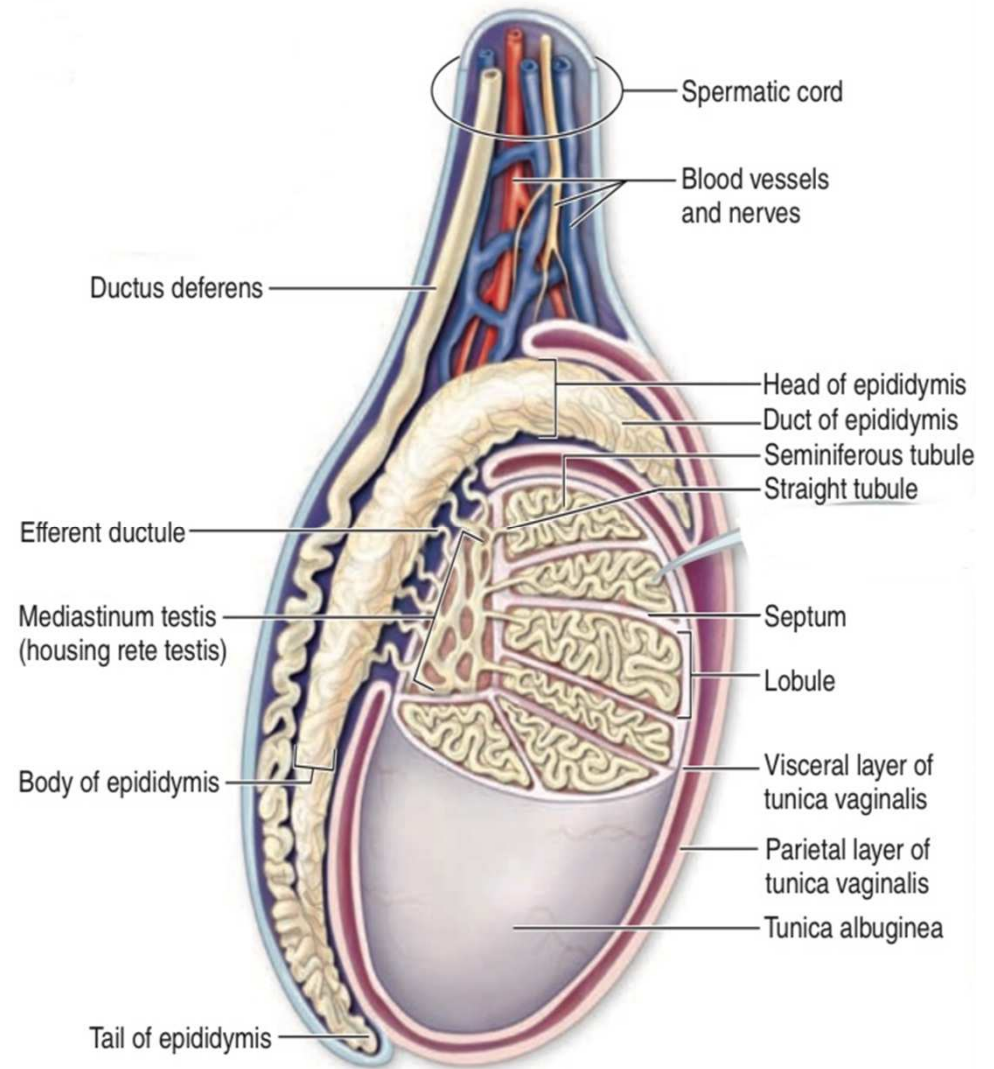


Function :

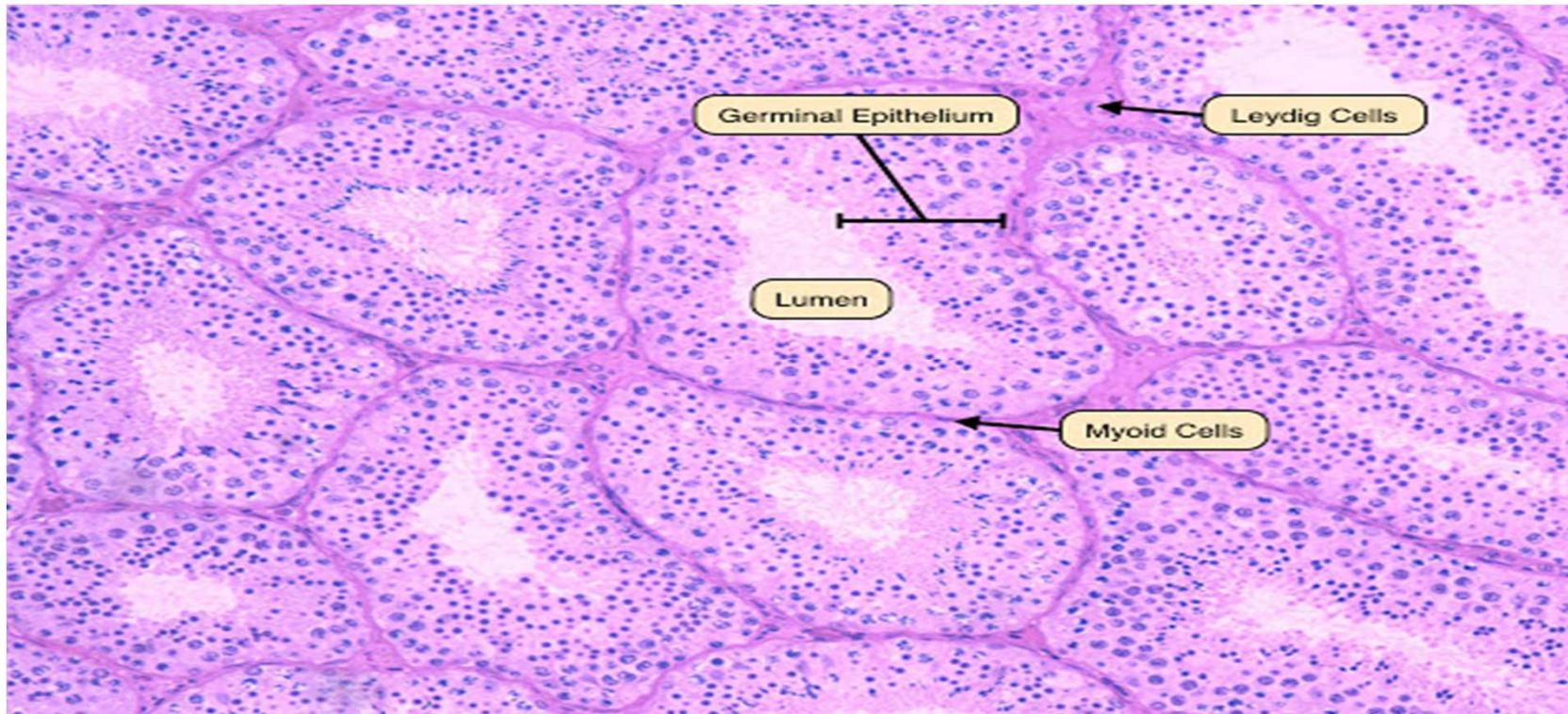
1. Production of sperms.
2. Secretion of hormones e.g. testosterone which is important for spermatogenesis , fetal sexual differentiation and control of gonadotropin secretions from pituitary gland.

1.The Testis

Each testis or testicles is surrounded by a dense connective tissue capsule, the **tunica albuginea**, which thickens on the posterior side(**mediastinum testis**) from which septa penetrate the organ and divide it into about 250 pyramidal compartments **-testicular lobules-**



.Each lobule has sparse connective tissue with endocrine interstitial cells (**leydig cells**) secreting testosterone , and 1-4 highly convoluted **seminefrous tubules** in which sperm production occurs.



The testis develop retroperitoneally in the abdominal cavity and move during fetal life to become suspended in the scrotum at the ends of spermatic cords.

During this **migration** ,it carries with it a serous sac , the **tunica vaginalis** (derived from the peritoneum),

the tunica vaginalis consists of :

A. **Outer layer** (lining the scrotum)

B. **Inner visceral** layer(cover the tunica albuginea on the anterior and lateral sides).

.The migration of testis is critical for sperm formation which can not survive at the core body temperature(37°C).

The permissive temperature(34°C) is maintained by :

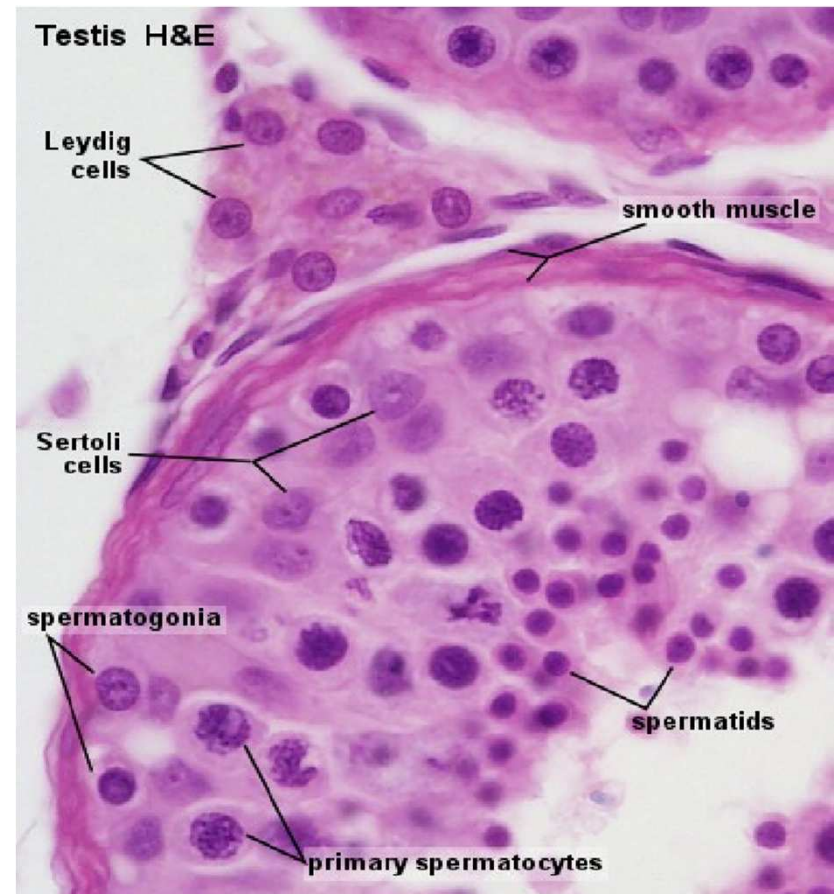
1.Pampiniform venous plexus: surrounding and cooling the arterial blood.

2.Evaporation of sweat from the scrotum.

Interstitial tissue

.It is the sparse connective tissue that lies between the seminiferous tubules, it contain fibroblasts, lymphatics and blood vessels.

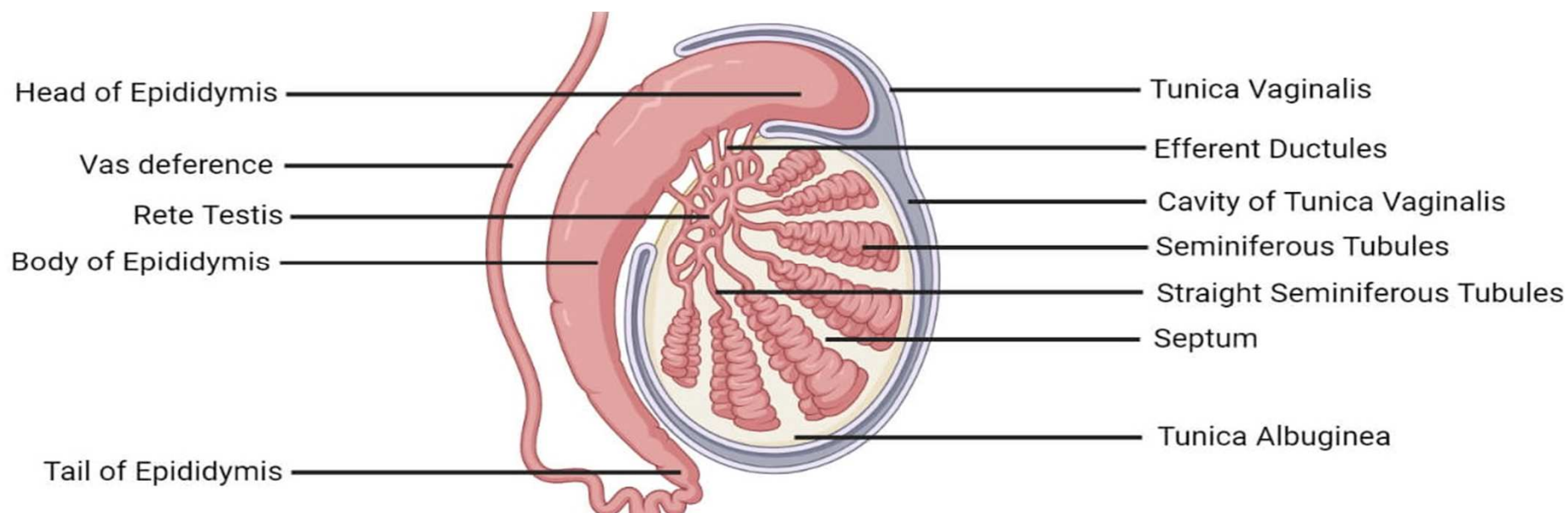
.During puberty, **interstitial cells** or **leydig** cells develop as a large round-polygonal cells with central nucleus and eosinophilic cytoplasm rich in lipid droplets, they produce testosterone (promote the male secondary sexual characteristics) under the influence of LH.



Seminiferous tubules

.It is the site of sperm production, at a rate of 2×10^8 per day in the young adult.

.Each testis has 250-1000 tubules in its lobules, each tubule is a loop linked by a very short narrow segment (**straight tubule**), to the **rete testis** (epithelial lined channels embedded in the mediastinum testis. About 10-20 **efferent ductules** connect the rete testis to the head of the **epididymis**.



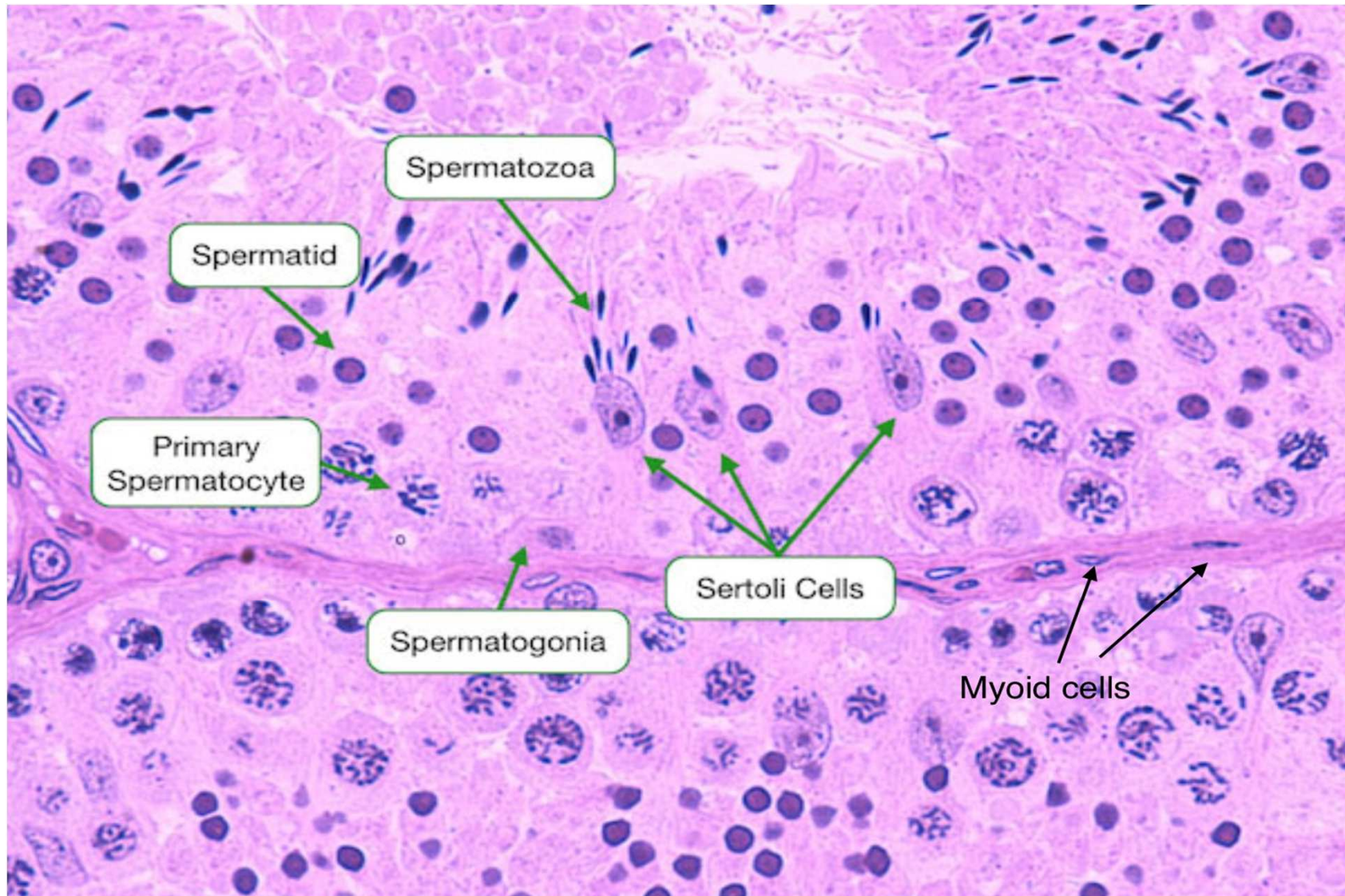
Each seminiferous tubule is lined by a complex specialized stratified epithelium called the germinal or spermatogenic epithelium. The basement membrane is covered by fibrous connective tissue, with an inner most layer containing flattened, smooth –like **myoid** cells which allow weak contractions in the tubule.

The **germinal** epithelium is of two types:

1. Large non dividing **Sertoli** cells (support sperm cell precursors)
2. Dividing cells of **spermatogenic lineage**.

The cells of spermatogenic lineage form 4 or more concentric layers of cells that develop from progenitor cell to fully developed sperms over a period of 10 weeks by a process called **spermatogenesis**.

Structure of the seminiferous tubules



Spermatogenesis

It begins at puberty with proliferation of stem and progenitor cells called **spermatogonia**, small round cells occupy the basal niche in the epithelial wall of the tubules next to the basement membrane and closely associated with sertoli cells. The spermatogonia (dark ovoid nuclei) which is a diploid cell (46 chromosomes) act as a stem cell and divide mitotically giving rise to:

1. **New stem cell**

2. **Type A spermatogonia**(more pale ovoid nuclei)

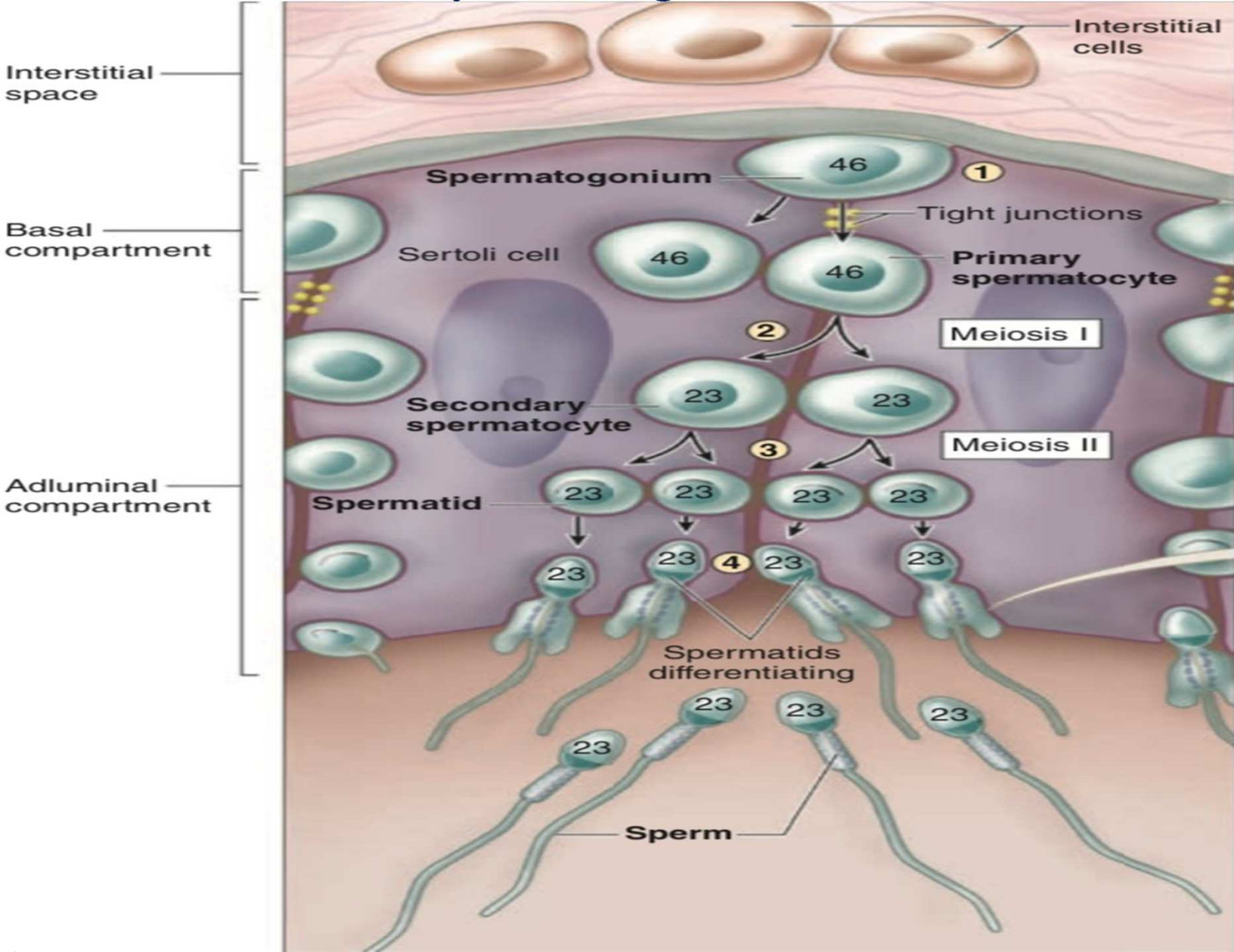
. Type A spermatogonia transform to **type B spermatogonia** which undergo a final mitotic division to produce the **primary spermatocyte** (spherical euchromatic nuclei).

. Soon after their formation the primary spermatocyte (diploid cell- 46 chromosomes) enter the **first meiotic** division(last for 3 weeks) , producing two haploid cells(23 chromosomes) called **secondary spermatocytes**.

Most of the spermatocytes in the testicular sections are in this phase of meiosis.

.The secondary spermatocytes are rare in testicular sections because they are shortly lived and quickly enter the second meiotic division producing two haploid cells called **spermatids**.

Spermatogenesis

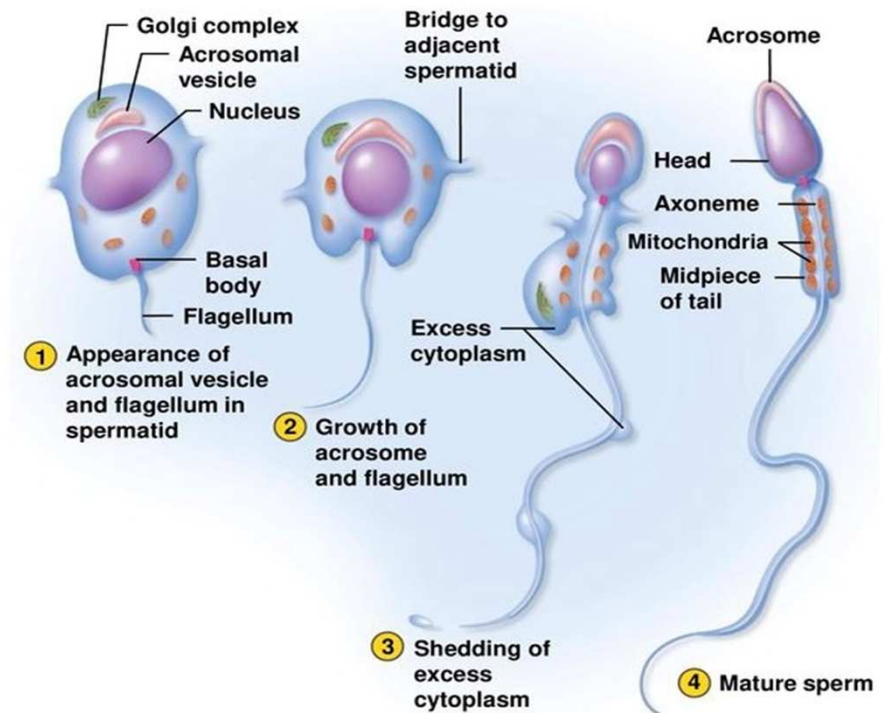


Spermiogenesis:

Is the final differentiation phase of sperm production which is a sensitive temperature process by which **spermatids** differentiate into **spermatozoa** (no cell division occur at this phase), it involves the following:

1. Formation of acrosomes.
2. Condensation and elongation of nucleus.
3. Development of flagellum.
4. Loss of most of the cytoplasm.

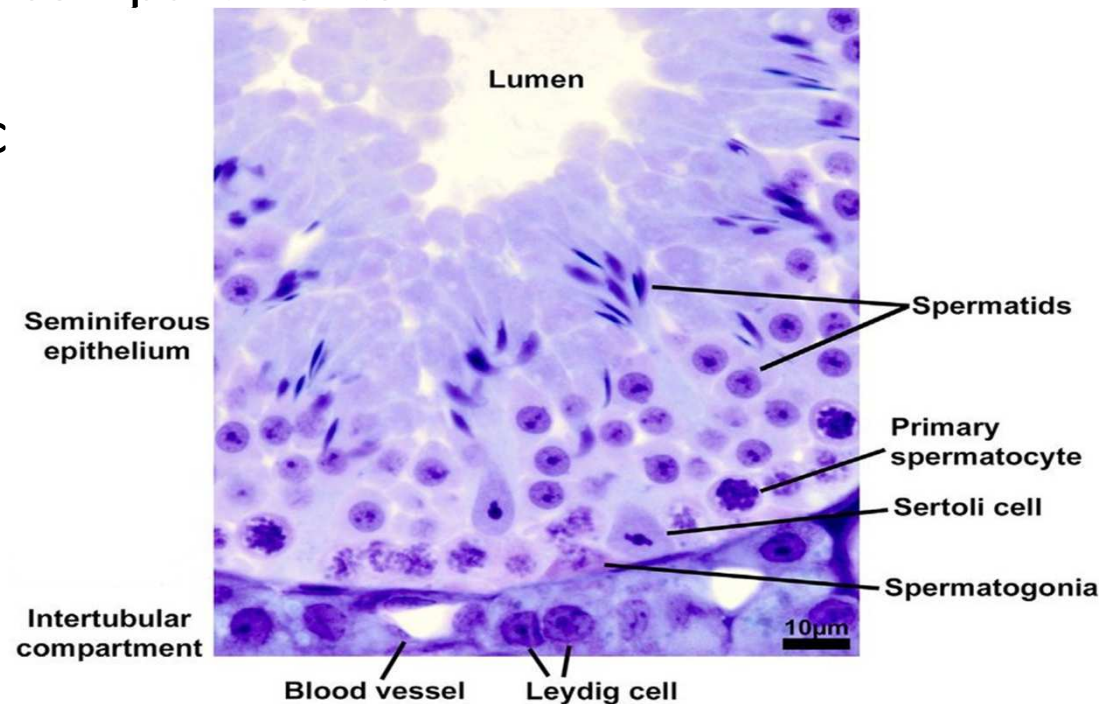
The end result is the formation of spermatozoa which is released from the sertoli cell surface into the tubular lumen.



Sertoli cells

.They are tall **columnar** epithelial cells, which nourish the spermatogenic cells and divide the seminiferous tubules into two(basal and adluminal) compartments.

. All cells of spermatogenic lineage are **closely associated** with sertoli cells and depend on them for their metabolic and physical support.



. Their nuclei are ovoid or triangular , euchromatic and have a prominent nucleolus.

The **major functions** of sertoli cells:

- 1. Support, protection and nutrition** of the developing spermatogenic cells(isolating sperms from plasma by the formation of a physical barrier called **blood- testis barrier**)
- 2. Exocrine and endocrine** function:
 - secretion of water carrying the sperms out of testis.
 - production of nutrients and androgen binding protein (ABP)
 - secretion of inhibin
- 3. Phagocytosis** of the excess cytoplasm shed by residual bodies during spermiogenesis.