



# GENITOURINARY SYSTEM

SUBJECT : Anatomy

LEC NO. : 7

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وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Male Reproductive System

- It consists of:

Testis

Genital ducts

Accessory glands

Penis

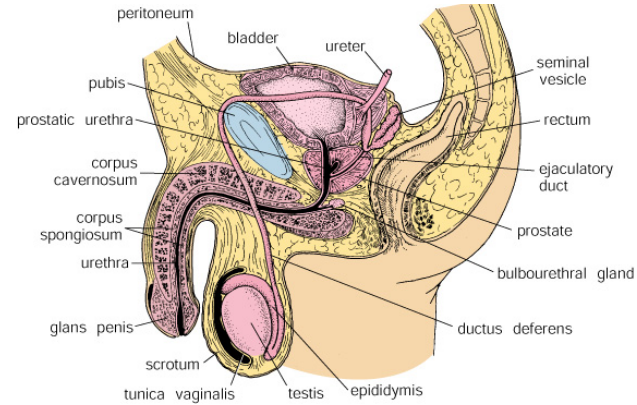
- Function

Production of spermatozoa

Production of hormones → Secretion of androgens (testosterone)

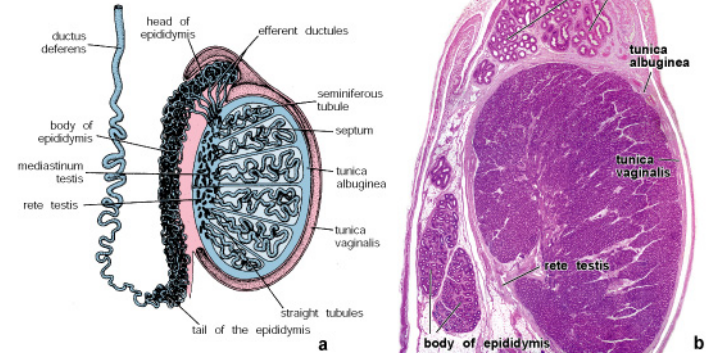
Production of secretion ↴

By accessory glands, secretions like seminal fluid which are needed in process of fertilization



# Testis

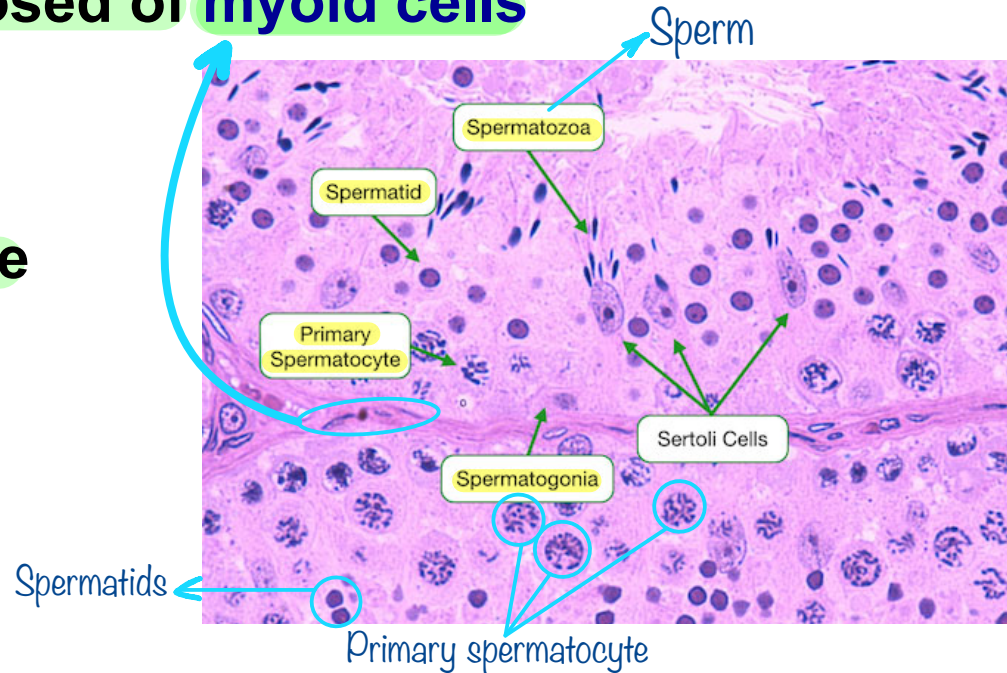
- Covered by tunica albuginea thickened posteriorly as medistinum testis
- Fibrous septa divides testis into testicular lobules
- Each one contains 1-4 seminiferous tubules
- Seminiferous tubules embedded in a loose CT rich in blood and lymphatic vessels, nerves and Interstitial cells
- Tunica vaginalis



- Testis are inside scrotum for support it serves as a capsule
- In embryology testis are formed next to kidney then it descends, while they're descending down from the lumbar region down to scrotum they take with them a layer of peritoneum then they enter inguinal canal through internal ring until they reach their final destination the scrotum
- Testis are surrounded with double layer of peritoneum called the tunica vaginalis, inner layer the visceral layer, outer layer the parietal layer, the difference here this peritoneum while it descends it got separated as a serous sac and loses its contact with original peritoneum but sometimes this connection isn't lost there will be a connection between the peritoneum and serous sac surrounding the testis, this connection will be a source for collection of serous fluid forming hydrocele, this hydrocele can still happen even if they're separated
- Visceral and parietal layers of peritoneum surround the whole testis except from the posterior, serous sac around testis is for lubrication and to ease the movement of testis which can ascend and descend according to temperature and physical condition of the testis
- After serous sac we will find a dense connective tissue capsule that surrounds the testicular for support called the tunica albuginea which sends septa into the testis dividing it into smaller areas the lobules each one contains from one to three seminiferous tubules, tunica albuginea surrounds testis from all sides with 1mm thickness except for the posterior side there will be an increase in the connective tissue with about 3mm thickness this area is called mediastinum testis

# Seminiferous tubule Special type

- Is lined with a complex stratified epithelium called seminiferous epithelium or germinal epithelium
- Surrounded by several layers of fibrous tissue
- Innermost layer composed of myoid cells
- Spermatogonia
- Primary spermatocyte
- Secondary spermatocyte
- Spermatid
- Sperm

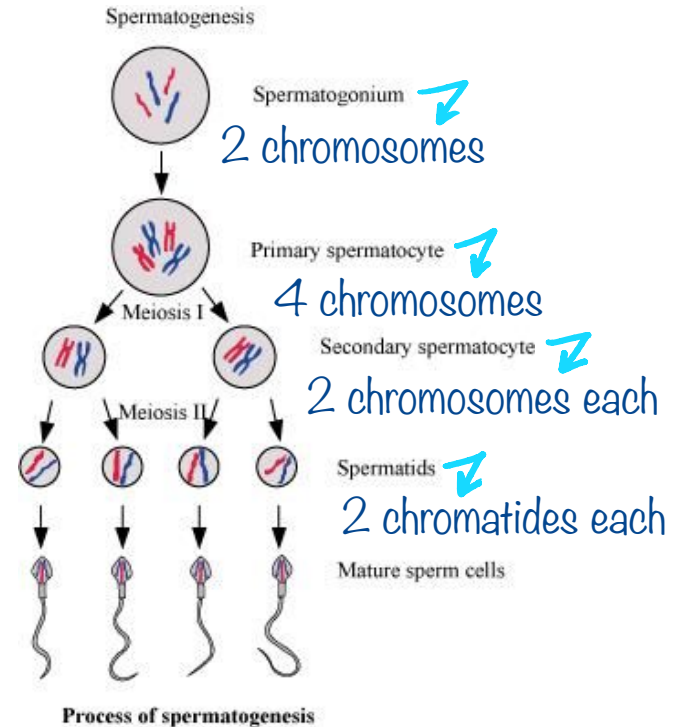


- Seminiferous tubule is a very long tube which is coiled not straight when we make a cross section many circles because of the coiling, number of lobules 250 so approximately we have 750 seminiferous tubules in each testis, each tube has a base and an opened end called a straight tubule (tubuli recti), the coiled duct will end with straight ducts, we have 250 lobules = 250 ends = 250 straight ducts all of them drain into rete testis in the medistinum testis, rete testis will give 10 to 20 efferent tubules from the other side, these tubules end in the epididymis which is composed of head, body, tail then the epididymis end with vas deferens, right and left vas deferens meet the ducts of seminal vesicles to form the ejaculatory duct which opens in the ureter
- There's a basement membrane which the cells set on, there's cells with variable sizes some have small nucleus other have big one, we have different types of cells in the process of maturation of the sperm
- Myoid cells are flat muscular cells that can contract, this is one way to propel the sperm towards its final destination, these cells are located on the inner layer of the capsule



# Spermatogenesis

- Production of sperms from spermatogonium
- Spermatocytogenesis
- Spermiogenesis



- Moving upward cells at the base are called spermatogonia embryologically from yolk sac, spermatogonia A divide by mitosis and keeps dividing from the 5th week intrauterine life until the boy reaches puberty all of a sudden one cell will differ in its histology called dark cell / spermatogonia B, at puberty both spermatogonia A&B will be produced, spermatogonia B at one time will differentiate and give spermatogonia B2 which has double chromosomes (that's why nucleus looks like it's divided) and larger size called primary spermatocyte then it undergoes division giving secondary spermatocyte with smaller size and half number of chromosomes, they're not in the section because they undergo division instantly giving spermatides very small with dark nucleus and with half number of chromatides, then spermatides will undergo morphological changes to give sperm
- Process of spermatogenesis starts at the base and with each stage we will be going up towards the lumen of seminiferous tubule, each primary spermatocyte gives 4 sperms
- The term spermatogenesis we start from primary spermatocyte, the term spermatocytogenesis we start from spermatogonia A, the term spermiogenesis the process of morphological changes of spermatides to give sperms



## Sertoli Cells \*Largest cell in seminiferous tubules

- **Pyramidal cells occupy the whole width of seminiferous tubules**

- **Partially envelope cells of spermatogenic lineage** \*Called supporting cells

- **The base is on the basal lamina while the apex at the lumen of the tubule**

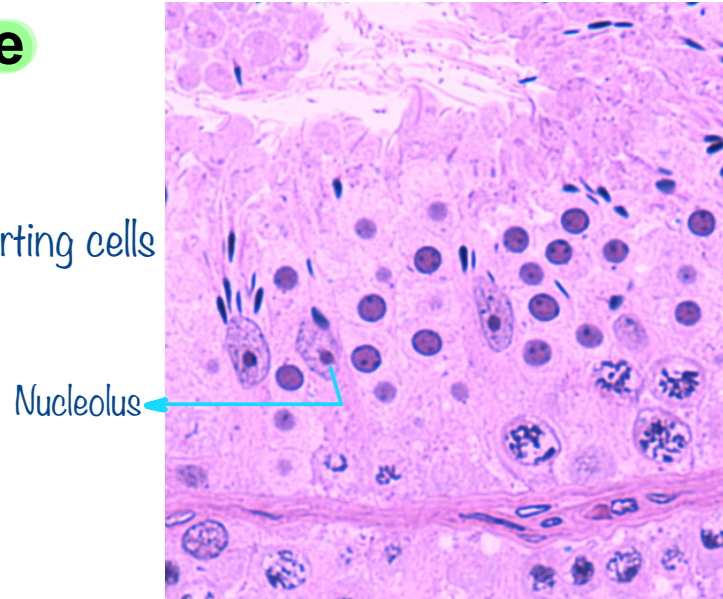
- **Borders are ill defined**

- **Nucleus is pyramidal with prominent nucleolus**

- **Occluding junction at the basolateral part of the cell forming the blood-testis barrier** ← \*كل هدول الخلايا مربوطين مع بعض ب tight junctions التي هو ال major factor ب

- **Gap junctions provides ionic and chemical coupling of the cells.**

↳ For free transport, we need the medium surrounding seminiferous tubules to be the same to give the same effect

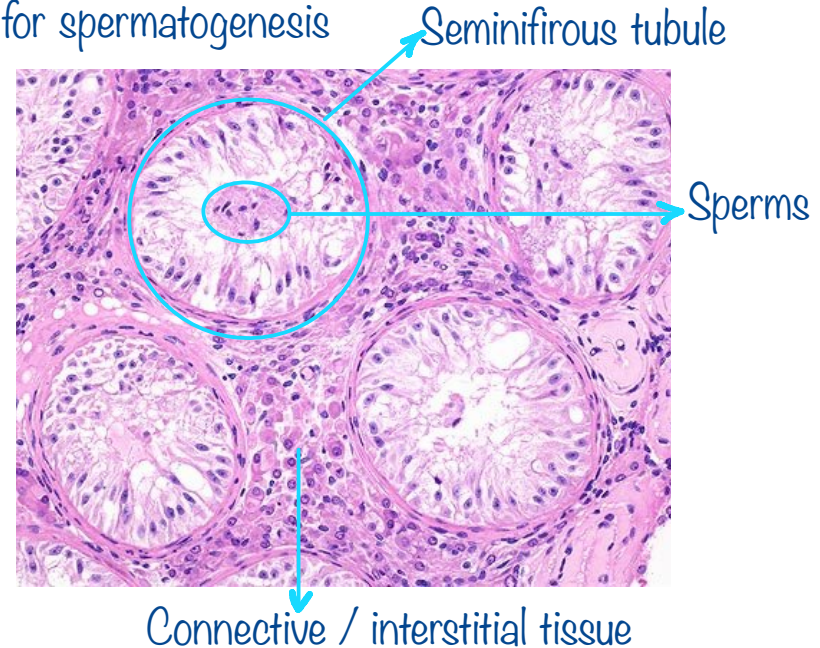


\*Blood testis barrier » to prevent any substance in the connective tissue from entering the lumen of seminiferous tubules

\*They have very important role in maturation of sperms

## Functions Sertoli Cells

- **Support, nutrition, and protection of developing spermatozoa**
- **Phagocytosis** → Facilitates the entry of testosterone for spermatogenesis
- **Secretion of androgen binding protein**
- **Production of Anti-Müllerian hormone**
- **Blood testis barrier**
- **Production of inhibin B**



- Inhibin B » one of the substances secreted by sertoli cells which inhibits follicular stimulating hormone secretion
- Anti-mullerian hormone » at one stage in intrauterine life both males and females will be exactly the same with the same organs, when the infant is male ( has xy chromosome ) this hormone will be produced to prevent female genital hormones, in females ( XX chromosomes ) there's no anti-mullerian hormone allowing female genital hormones to act normally, if this hormone isn't produced during development of male this person will be a male and female at the same time
- Phagocytosis » in the process of morphological changes of spermatide to give sperm not the whole cell will stay the same, some parts in the cytoplasm we need to get rid of, that's why one of the functions of sertoli cells is phagocytosis to rid rid of the excess of the spermatide

# Interstitial Tissue

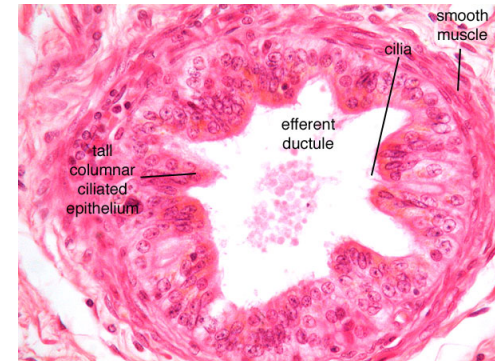
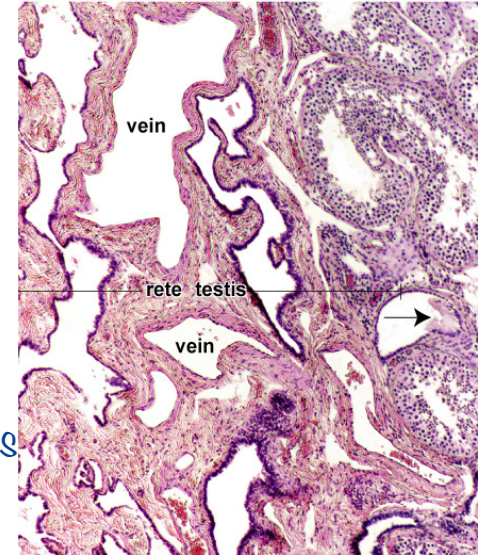
- The space found between seminiferous tubules
- Filled with loose connective tissue
- It contains fibroblasts, mast cells, macrophages, and undifferentiated connective tissue cells. + reticular cells and fibers
- At puberty, additional cell type, the Leydig cell is found
- It has the characteristics of steroid secreting cell
- It synthesizes and secretes testosterone

# Genital Ducts

- At the end of seminiferous tubule, the spermatogenic lineage disappear except for Sertoli cells
- Tubuli recti  
Start where Sertoli cells disappear  
Lined with simple cuboidal epithelium supported by dense connective tissue
- Rete testis → Receive drainage from tubuli recti of seminiferous tubules  
Found in the medistinum testis  
Lined with simple cuboidal epithelium
- Ductuli efferentes  
10-20 in number  
Lined with ciliated and non ciliated cuboidal epithelium  
They end in epididymis

\*Irregular lumen »  
simple cuboidal to  
columnar epithelium

\*Cilia » facilitate movement of sperms





# Genital Ducts Cont.

\*Secretory cells » they secrete part of seminal fluid in the epididymis

- **Ductus epididymis:** \*Regular lumen

Highly coiled tube and is 4-6 m in length

Lined with pseudostratified ciliated columnar Sits on a basal lamina and supported by smooth muscle fibers

↳ Mainly responsible for contraction to propel sperm

- **Vas deferens:** → Starts with the end of tail of epididymis

Thick muscle wall

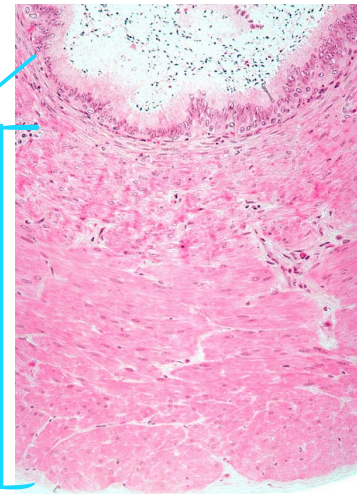
Narrow lumen ↳ Like the ureter

Pseudostratified ciliated

epithelium ↳ Differs from the ureter by lining » transitional epithelium

At the beginning 2 layers

At the end 3 layer » 2 circular, one longitudinal



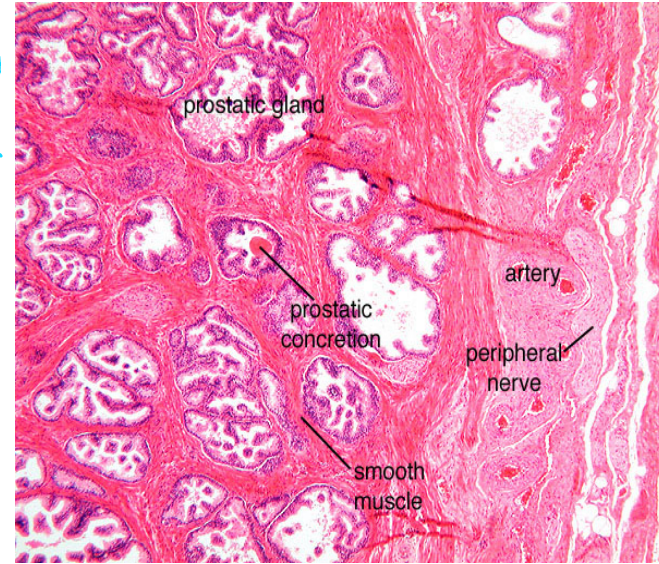
\* Not the whole lumen is ciliated



# I. Prostate Gland

- Surrounded by **fibroelastic capsule** → Compound
- Consists of **30-50 branched tubuloalveolar glands**  
Lined with **cuboidal to pseudostratified columnar epithelium**  
+ Cuboidal
- **Rich fibromuscular stroma**
- **It secretes prostatic fluid** → Fructose, zinc  
\* هاي العملية الي بتخلي
- **Prostatic concretions**  
ال sperm صالح للتلقيح
- **Prostatic hyperplasia and prostatic malignancy**  
Capacitation

\*Surgical removal of prostate = no capacitation  
= less ability of sperm to fertilize



\*Exfoliated epithelial cells in the lumen of the gland, can form calcifications and confuse as stones, they increase with time

- Very thick dense connective tissue capsule » if a state of hyperplasia happened it can't expand beyond the capsule
- It's composed of 50:50 » glandular tissue : connective tissue and muscle cells, half of it is perianchyma the other half is fibromuscular tissue (smooth muscle fibers and dense connective tissue)
- Produces prostatic secretions, it has many openings to the urethra  
It's not separated from the inside there's no lining but it's composed of 2 regions central region around the urethra and peripheral region » this division is pathologically related
- Testicular hypertrophy » increase in fibromuscular tissue which causes testicular enlargement but this enlargement can't get beyond the capsule so the prostate will compress the urethra, that's why the patient's first complaint is difficulty in urination, enlargement of prostate will cause configuration in the bladder causing the smallest quantity of urine in the bladder to stimulate nerve endings (false impression that the bladder is full)
- Prostatic malignancy » the origin is glandular tissue (the epithelium) until it reaches the basement membrane and invades it to reach blood vessels in the connective tissue, this takes a long time until the prostate increases in size, the blood of invaded artery will enter the gland and exit with secretion of the gland, that's why the patient will complain of hematuria, patient will complain of difficulty in urination in a very late stage unlike hyperplasia

\*Seminal fluid produced from » epididymis, prostate, seminal vesicle

5-10%

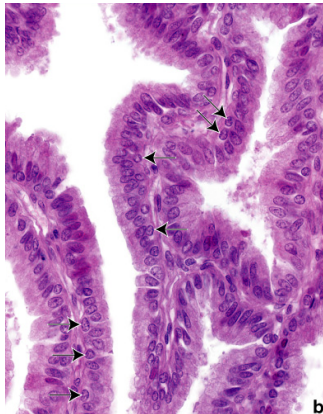
20-25%

70%

## 2. Seminal Vesicle

- Consists of tortuous tube with folded mucosa lined with cuboidal to pseudostratified columnar epithelium
- It secretes viscid yellowish secretion containing sperm activating substances mainly fructose
- Structure and function is androgen dependent

\*Located at the base of the bladder



## 3. Mucus Glands

- Bulbourethral glands \* These glands are located within the perineal membrane, ducts in the urethra

3-5 mm in diameter

**Tubuloalveolar glands**

**It secretes mucus**

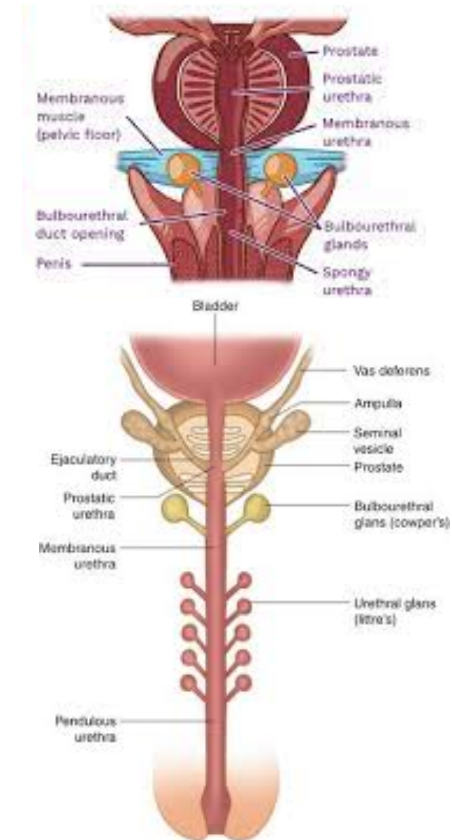
- Littre glands

**Small glands**

**along penile urethra**

**They secrete mucus**

↳ To clean urethral passage during sexual intercourse





# Penis

\*Dense connective tissue, lining epithelium like sinusoids, branches of these artery supply the sinuses during erection

- **Consists of:**

**Erectile tissue** → 1

**Corpus spongiosum (Glans Penis)**

**Corpora cavernosa**

**Urethra** → 2

**Blood supply**

**Dorsal a**

**Deep artery**

— Branches of internal pudendal

**Nutritional a**

**Helicine a**

→ Directly enter the cavernous to bring more blood, it doesn't branch to smaller arterioles and capillaries

