
بسم الله الرحمن الرحيم

MALE GENITAL SYSTEM

TESTIS

Stroma

- **Tunica albuginea:**

white collagenous fibers.

- **Tunica vasculosa:**

C.T. rich in blood vessels.

- **Trabeculae:**

divide the testis into 250 compartments.

- **Reticular tissue**

parenchyma

Exocrine parenchyma → Seminiferous tubules

Endocrine parenchyma → Leydig cells

Lining cells:

- spermatogenic cells.
- Supporting Sertoli cells.

Spermatogenic cells

- These are the main cells which line the seminiferous tubule.
- They undergo the process of spermatogenesis which results in the production of mature spermatozoa.

Spermatogenesis

- spermatocytogenesis

spermatids production from the spermatogenic cells

spermiogenesis

morphological changes which occur in the spermatid to be changed into spermatozoa).

Spermatocytogenesis

STEPS

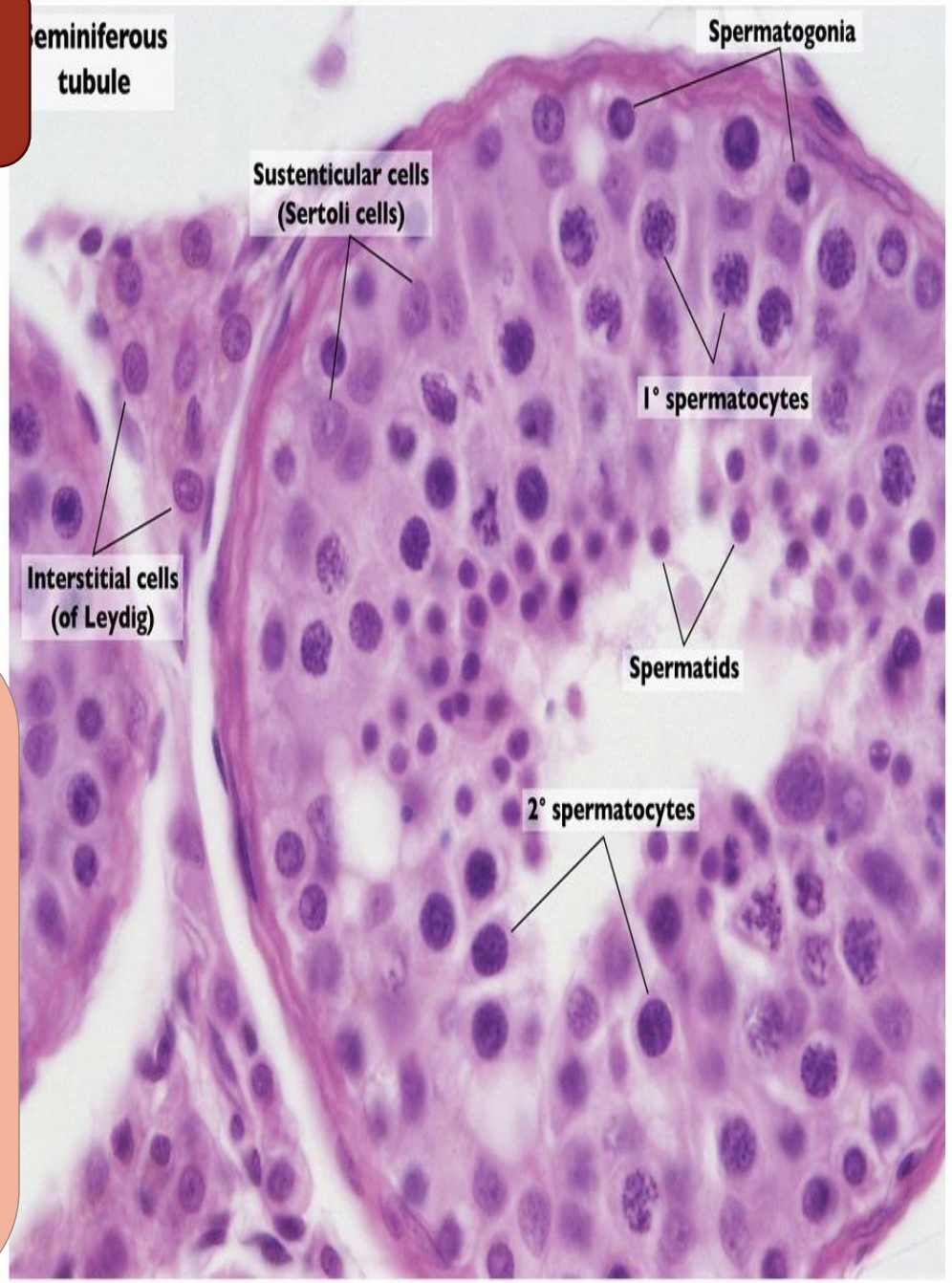
- **a) Spermatogonia:**

Contain 46 d- chromosomes.

b) **Primary spermatocytes:**

Size: the largest cells.
Nuclei:
- Contain 46 d- chromosomes.

Changes (Fate):
They enter the first meiosis at puberty to form secondary spermatocytes with half number of chromosomes (23 chromosomes) and separation of X and Y chromosomes.



c) Secondary spermatocytes:

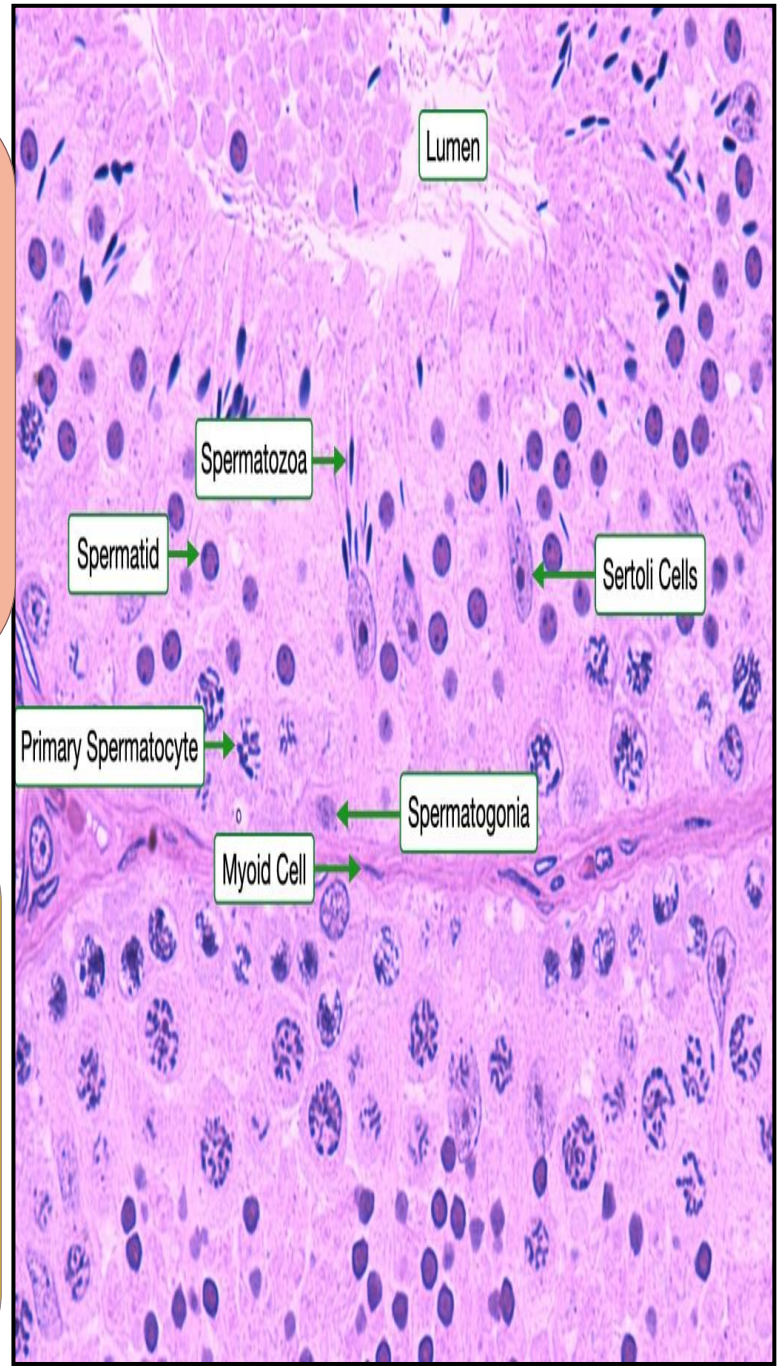
Size: smaller than primary spermatocytes

Nuclei:

Contain 23 d-chromosomes and some cells have X chromosomes and others have Y chromosomes.

Changes (Fate):

They rapidly form spermatids.



Spermatids:

Nuclei:

Small, deeply stained.

Contain 23 S. chromosomes.

Changes (Fate):

undergo spermiogenesis and change into spermatozoa.

Spermiogenesis

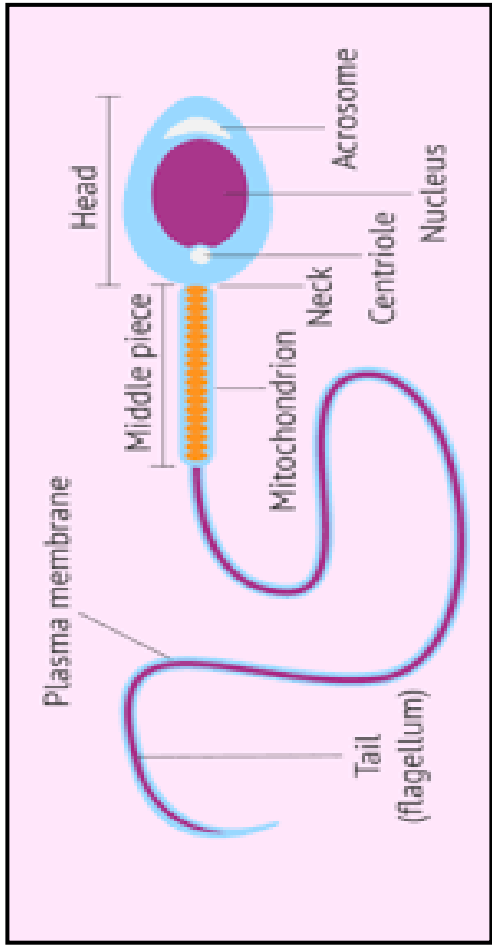
- **Changes:**

a) The nucleus:

- It is found at one pole of the cell.
- It becomes more condensed, elongated and flattened.

b) Golgi apparatus:

- This vesicle encloses the anterior 2/3 of the nucleus to form the ***head cap***.
- A dark granular mass appear in the vesicle which is called ***acrosome.***
- The head cap and acrosome are called ***acrosomic system***.
- This system contains hyaluronidase enzyme which help the spermatozoa to penetrate the ovum.



c) The centrioles

- The 2 centrioles migrate to the caudal pole of the nucleus.
- One of them becomes attached to the nucleus.
- The other is elongated to form the flagellum which is structurally similar to cilium.

D) mitochondria

- They are arranged as a sheath around the proximal part of the flagellum to form the middle piece of the spermatozoa.
- They provide energy for the motility of the spermatozoa.

Sertoli cells

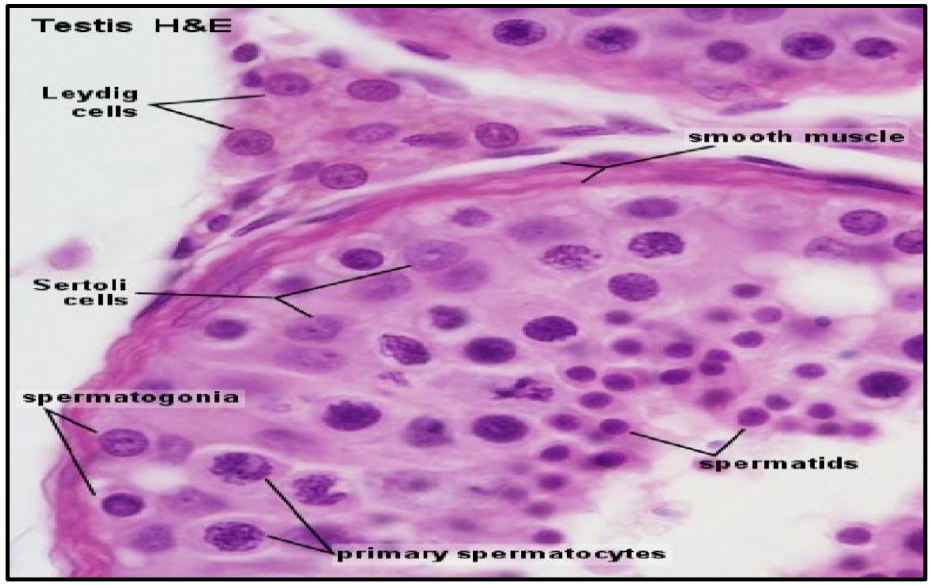
LM:

Shape: Tall irregular columnar cells

Site: insinuated between spermatogenic cells and extend from the basal lamina to the lumen.

nucleus: ovoid, near the base, pale stained with dispersed chromatin and 1-2 prominent nucleoli.

cytoplasm: pale stained and contains lipochrome pigment and lipid droplets.



Interstitial Cells of Leydig

Site:between seminiferous tubules.

LM:

Nucleus: Pale rounded

Cytoplasm: Pale stained, acidophilic due to dissolved lipid droplets.

Function: They secrete testosterone.

The process of transformation from spermatid to spermatozoa is called:

A. Spermatogenesis
B. Spermatocytogenesis
C. Maturation
D. Spermiogenesis
E. Fertilization

Which of the following cells is responsible for secretion of testosterone?

a. **Leydig cells.**

b. **Sertoli cells.**

c. **spermatogonia.**

d. **spermatocytes.**

e. **spermatids.**

Epididymis

- **Lining epithelium:**

It is lined with pseudo stratified columnar ciliated epithelium.

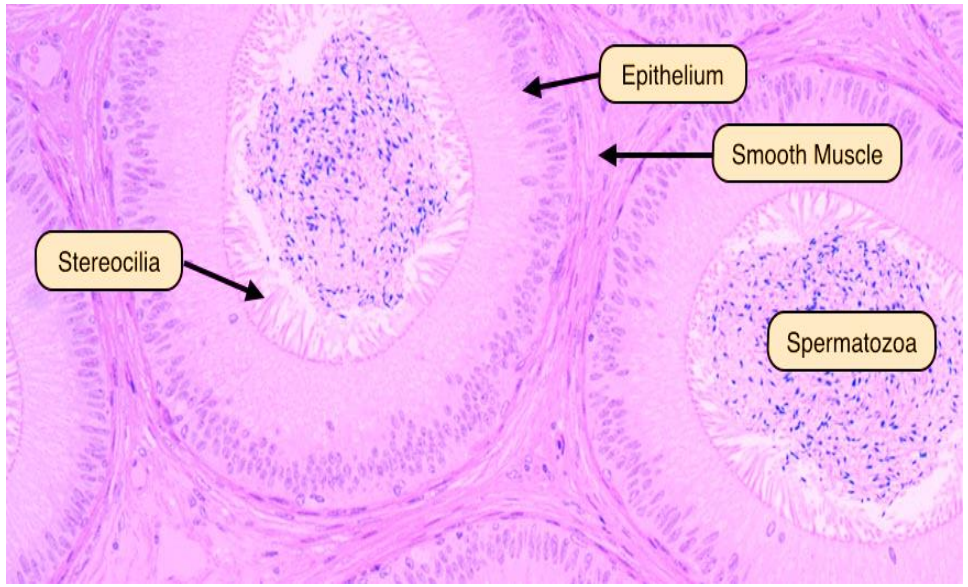
The cilia is stereo cilia (contain tonofilament only).

It is considered as long microvilli to:

Facilitate the process of transportation of the secretion from the cell to lumen and facilitate the process of absorption of cytoplasmic fragments from the process of spermiogenesis.

Capacitation:

- **It is a series of biochemical changes which occur in the sperm to have the full capacity of fertilization.**
- **Begin in the lumen of epididymis.**
- **Complete in the uterus and fallopian tube.**



VAS DEFERENS

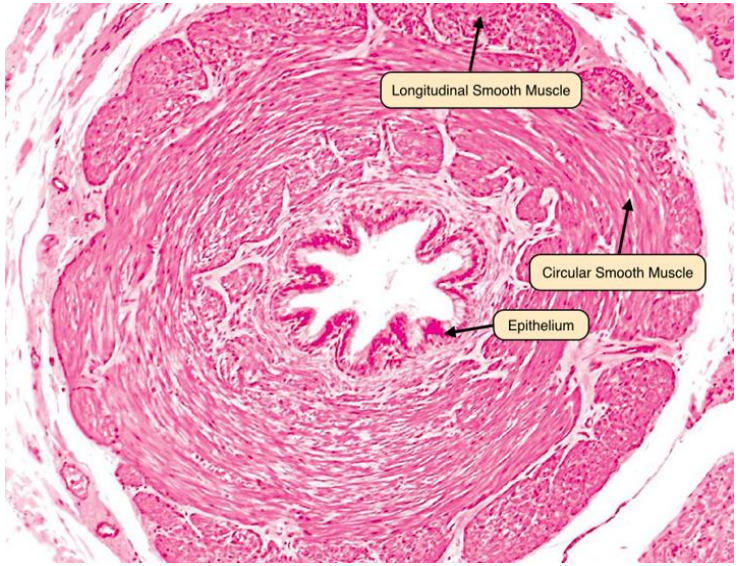
- **Structure:**
- **1-mucosa:**

a. **Epithelium:** Pseudostratified columnar with stereo cilia.
b. **corium**

- **2-Musculosa:**

Both contain inner longitudinal, thick middle circular and outer longitudinal layers of smooth muscle fibers.

- **3-Adeventia**

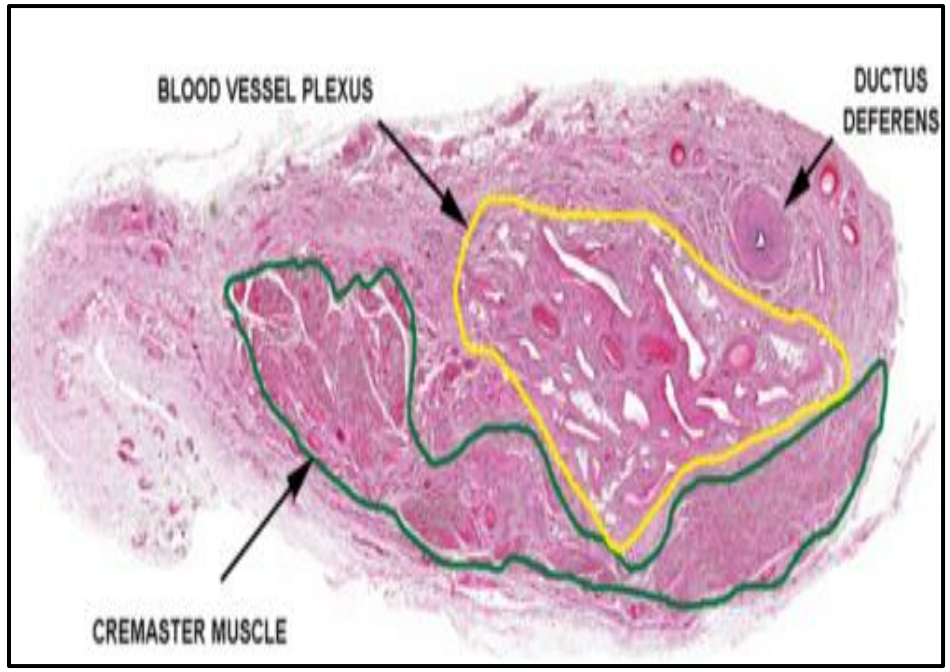


SPERMATIC CORD

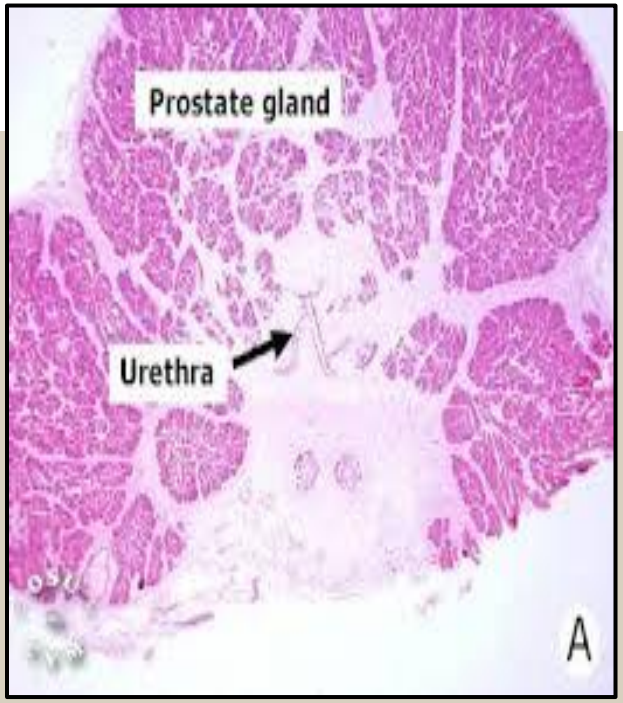
It arises from the scrotum and enters the inguinal canal.

Contents:

1. **Vas deferens.**
2. **Pampiniform plexus of veins.**
3. **Cremasteric striated muscle.**
4. **Testicular artery and vein.**
5. **Nerve fibers.**



Prostate Gland



- **Site:**

It surrounds the first part of the male urethra which is a V-shaped urethra

1-Stroma

- **Capsule:**
- **It is formed of thick fibroelastic tissue rich in smooth muscle fibers and blood vessels.**
- **Trabeculae:**

- They are rich in smooth muscle fibers which condense around the urethra to form the internal urethral sphincter.

- **Reticular Fibers**

Each lobules contains 3 types of acini which are:

a. Mucosal acini:

- **The smallest type.**
- **Lie in periurethral tissue.**
- **Open by small ducts in the prostatic urethra.**
- **In old age, they enlarge obstruction (prostatic adenoma).**

b. Submucosal acini:

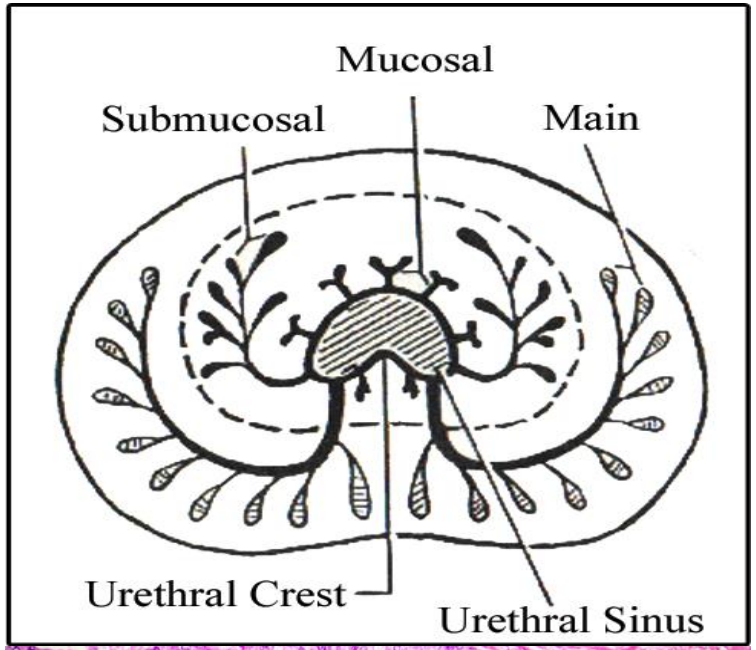
- **They lie outer to the mucosal acini**
- **They are larger in size than the mucosal acini.**

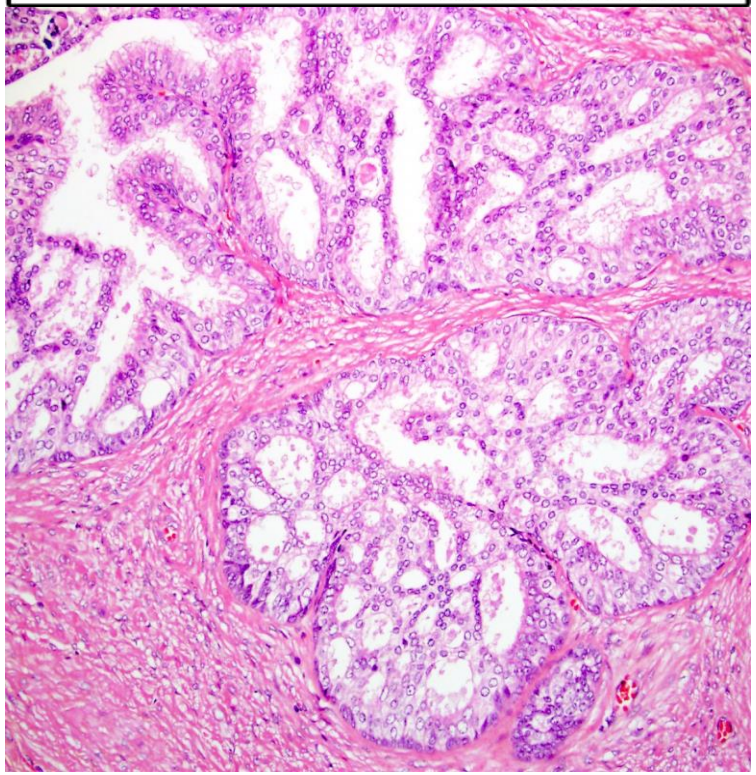
C. Main acini:

The largest type.

Lie in the outer part of prostate gland

- **Some prostatic acini are lined with pseudo stratified columnar epithelium, others are lined columnar or even cubical cells depending on the activity of the gland.**

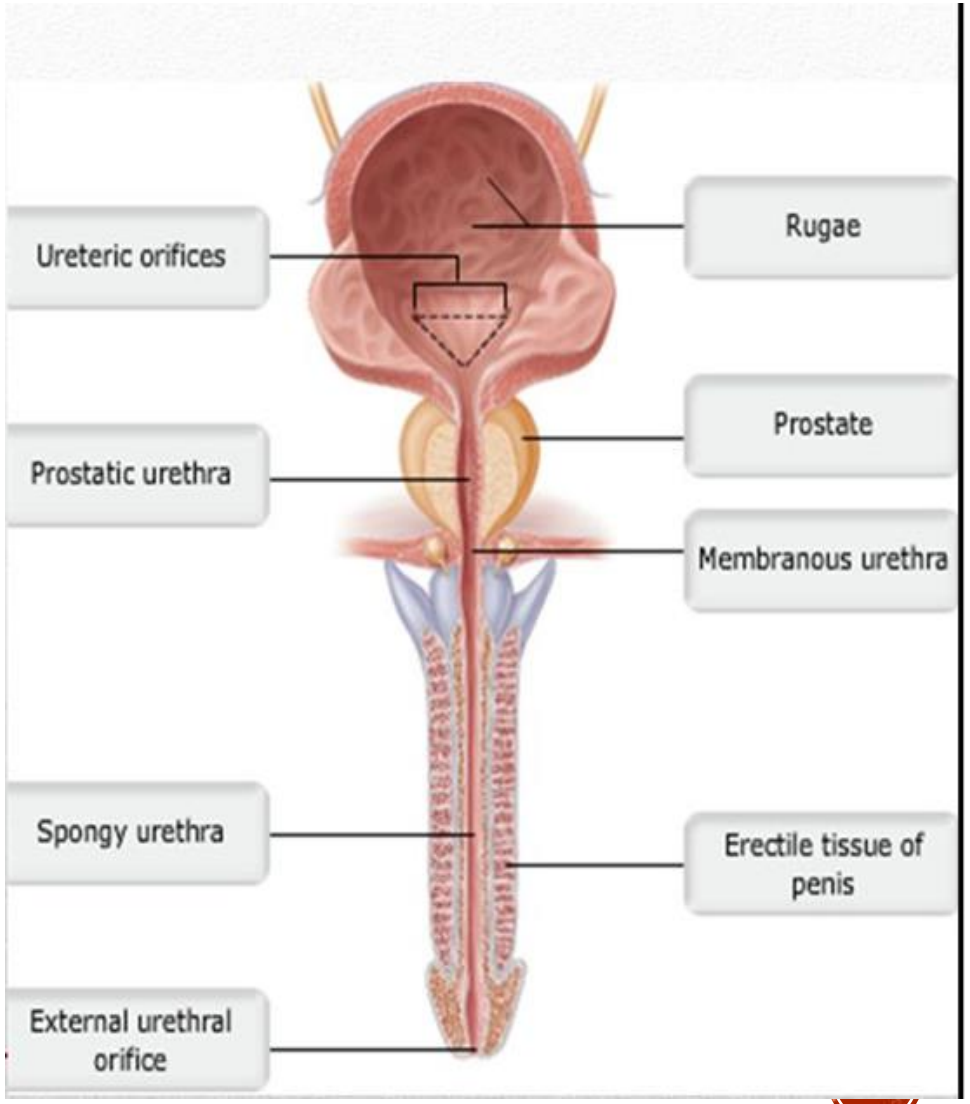




Male urethra

- The male urethra is long (20cm) twisted tube, that conducts urine from bladder (and seminal fluid from male genitalia) to the outside of the body.
- Many glands open in the course of the urethra: (prostatic gland, glands of Littre and bulbo-urethral gland).

Prostatic urethra → **Membranous urethra** → **Penile urethra**



The Male Urethra

1-Prostatic urethra	➢ **Transitional epithelium proximally.** ➢ **Pseudostratified columnar distally.** **Internal urethral sphincter (smooth muscle fibers)**	**surrounded by prostate**
2-Membranous urethra	➢ **Stratified columnar epithelium.** **External urethral sphincter (Striated muscle)**	**surrounded by Cowper's glands**
3-Penile Urethra	➢ **Stratified columnar epithelium proximally.** ➢ **Stratified squamous distally.**	**surrounded by glands of Littre.**

The pseudostratified columnar ciliated epithelium with stereocilia is found in:

A. Rete testis
B. Vasa efferentia
C. Epididymis
D. Penile urethra
E. Seminiferous tubule

The epithelial lining of the proximal part of penile urethra is:

a. simple squamous epithelium.

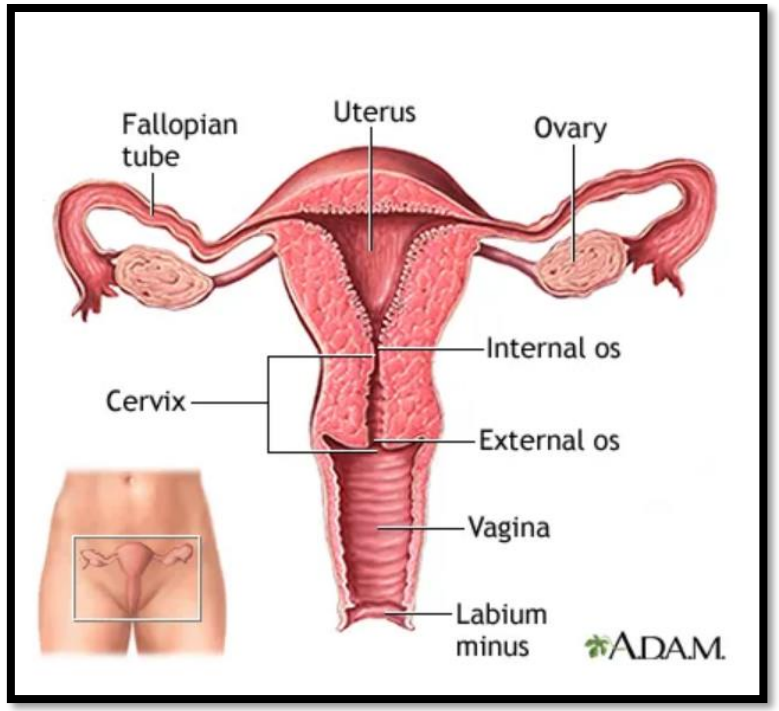
b. ciliated columnar epithelium with goblet cells.

c. pseudostratified epithelium with stereocilia.

d. stratified columnar epithelium.

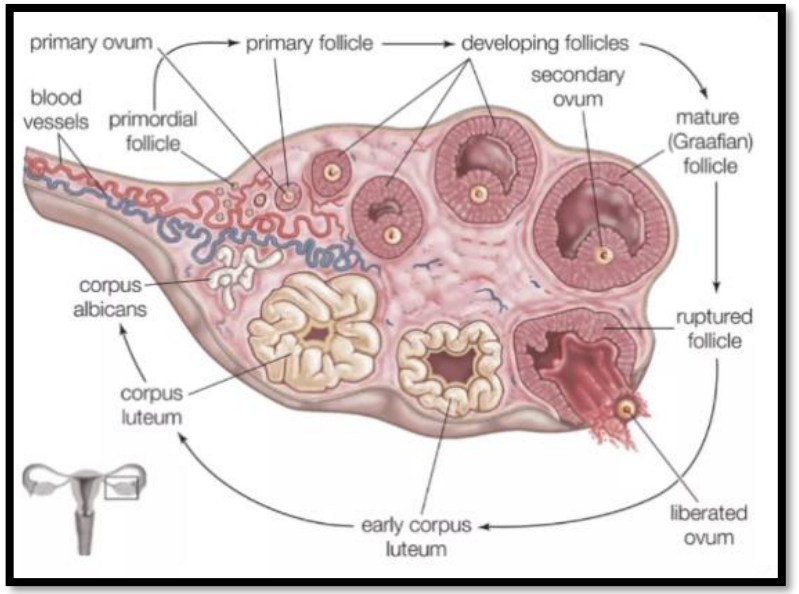
e. transitional epithelium.

Female genital system



THE OVARY

- **Covering Epithelium**
- **In adult, it is simple squamous epithelium.**
- **In young girls, it is simple cubical epithelium.**



The Cortex

The cortex of the ovary consists of:

A- Ovarian follicles.

1- Primordial follicles.

2-primary follicles.

3-Growing (Secondary) follicles.

4-Mature graffian follicles.

5-Corpus Luteum

B- Interstitial gland.

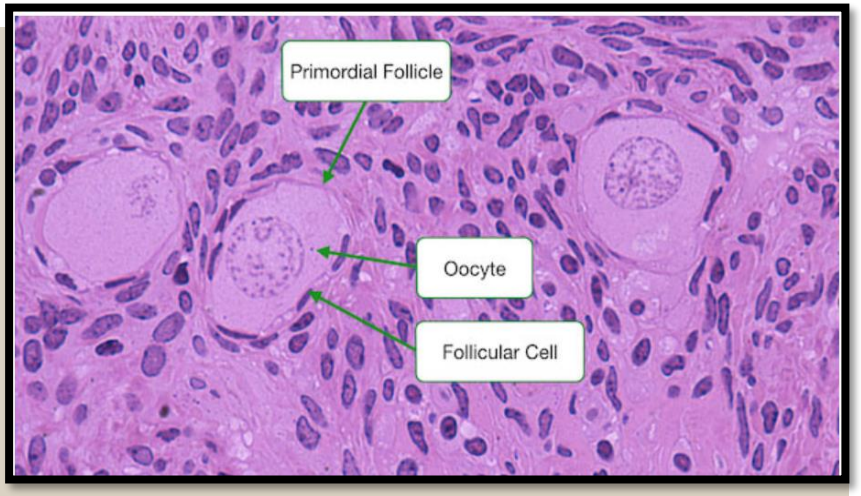
- **These are polygonal cells with central rounded nuclei and contain lipid droplets.**

They secrete estrogen.

The Medulla

- **It consists of highly vascular loose CT.**
- **It contains blood vessels, nerves and lymphatics.**
- **It also contains elastic fibers and few sm. m. fibres**

1-Primordial Follicles



Structure:

1- Primary oocyte:

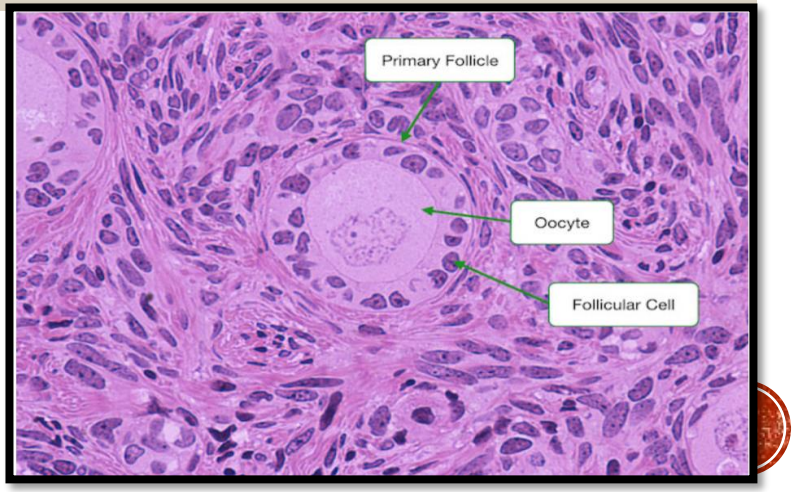
Nucleus:

Contains **46 d-chromosomes.**

2- Follicular cells:

These are flat cells, which form a single layer around the primary oocyte.

2-Primary Follicles

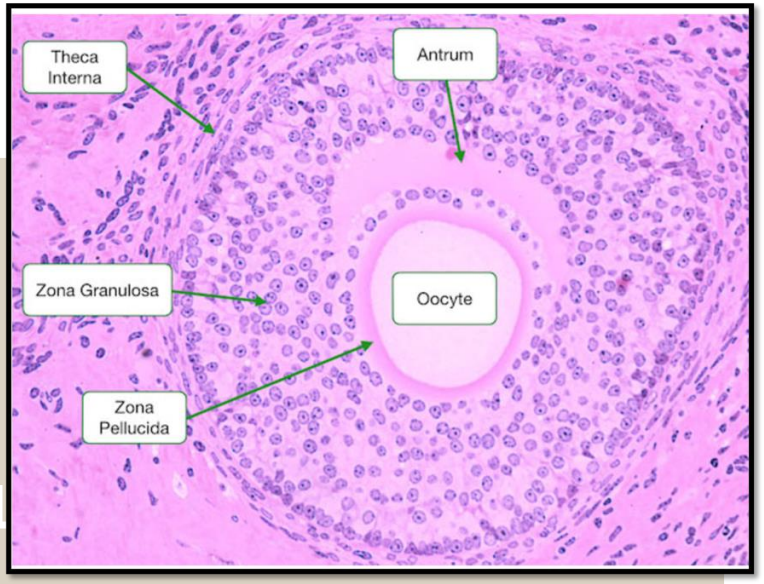


They are similar to the primordial follicles but:

-Primary oocytes are larger in size.

-Follicular cells become cubical, then columnar.

3-Growing (Secondary) Follicles



1- Primary oocyte:

It doubles its *size* .

It becomes surrounded by acidophilic membrane call

2- Zona pellucida:

- It is an acidophilic membrane around the oocyte.
- It is glycoprotein in nature (stained with PAS).
- Produced by both the oocyte and follicular cells.
- The oocyte sends microvilli into it.
- Also, the follicular cells send processes through it to provide the oocytes with nourishment.

3- Follicular cells:

- In response to **FSH**, the follicular cells **proliferate** to form many layers.
- In response to **LH**, they begin to **secrete follicular fluid**, which accumulate in multiple spaces.

These spaces join to form a single large cavity that pushes the oocyte to one side and divides the follicular cells into 2 groups:

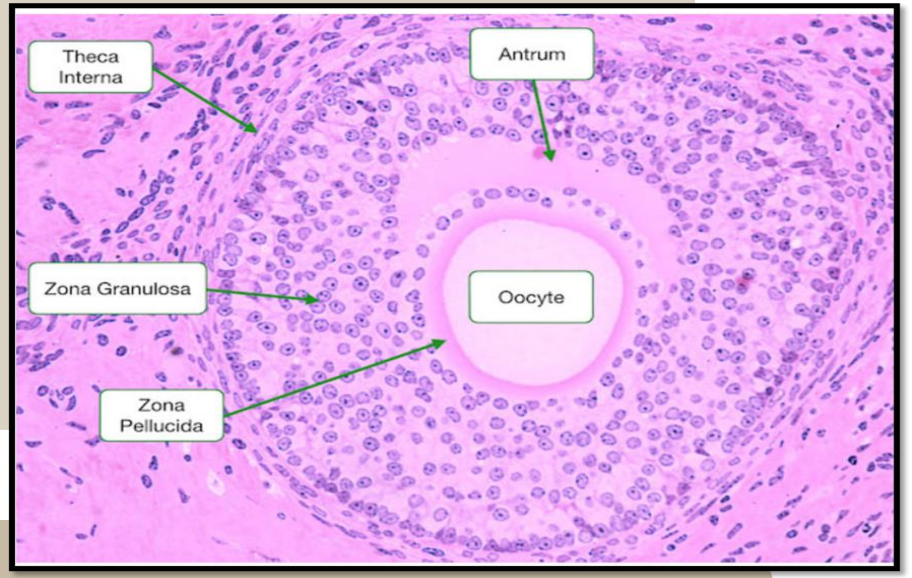
a- Cumulus oophorus:

They connect oocyte to one side of the follicle.

b- Granulosa cells:

These groups of cells line the cavity.

They secrete **estrogen** hormone.

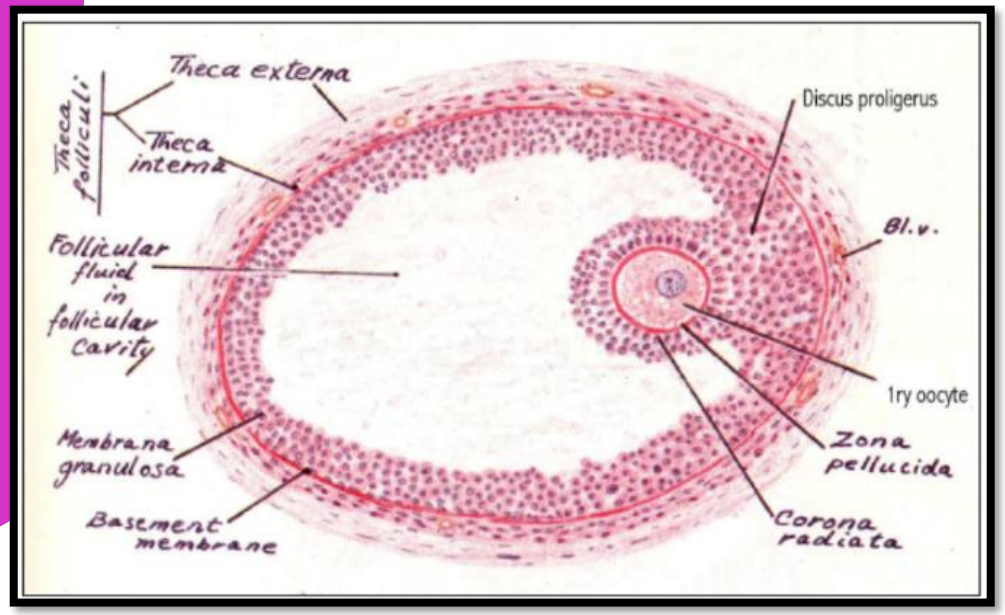


4- Theca folliculi:

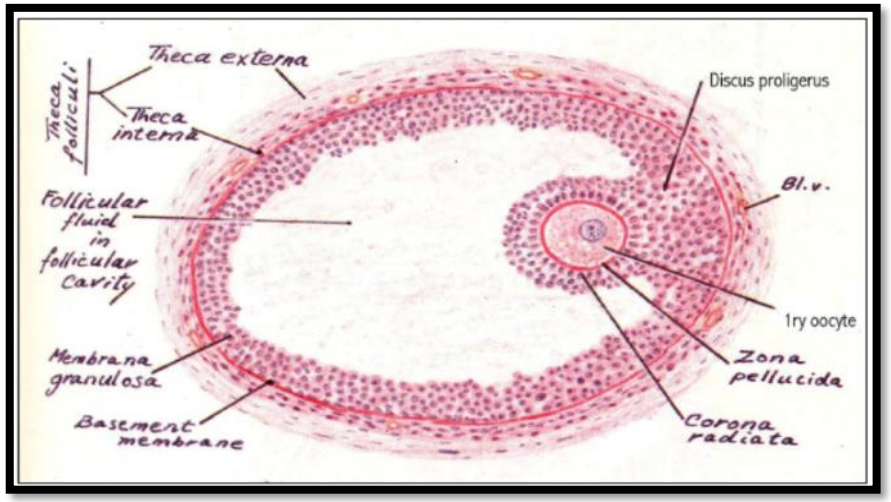
- The theca later differentiate into theca externa and theca interna

4-Mature Graafian Follicles

Site: bulging on the surface of the ovary.
Size: 1 cm.
Number: one every 28 days.
Structure:
1- Secondary oocyte:
Nucleus: contains 23 d-chromosomes.
2- Zona pellucida: as before.



4-Mature Graafian Follicles



3- Follicular cells:

- ***Granulosa cells:*** see before.
- ***Cumulus oophorus:*** see before.
- ***Corona radiata:***
- It is a layer of columnar cells surrounding the zona pellucida.
- They send processes into the zona pellucida to give nutrition to the oocyte.

4- Theca folliculi:

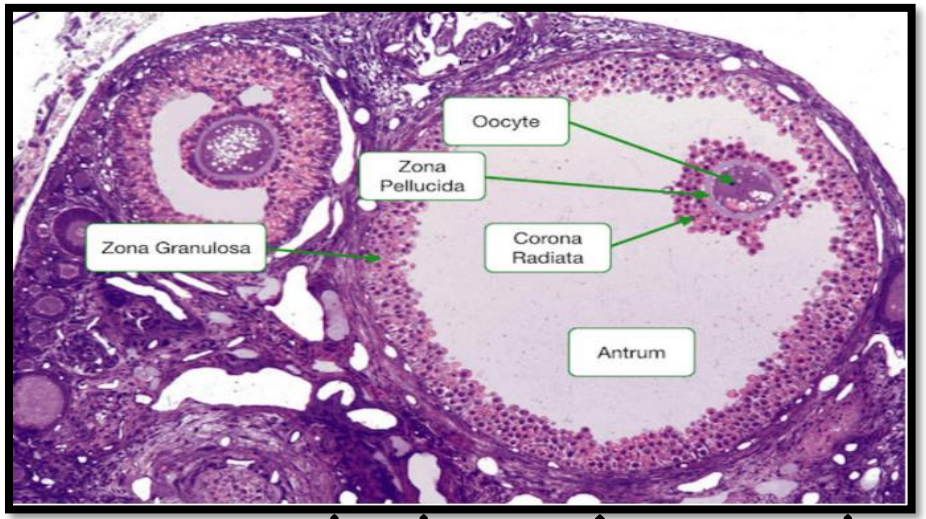
- It is differentiated into:

a- Theca interna (vasculosa):

It is cellular, vascular and secrets estrogen.

b- Theca externa (fibrosa):

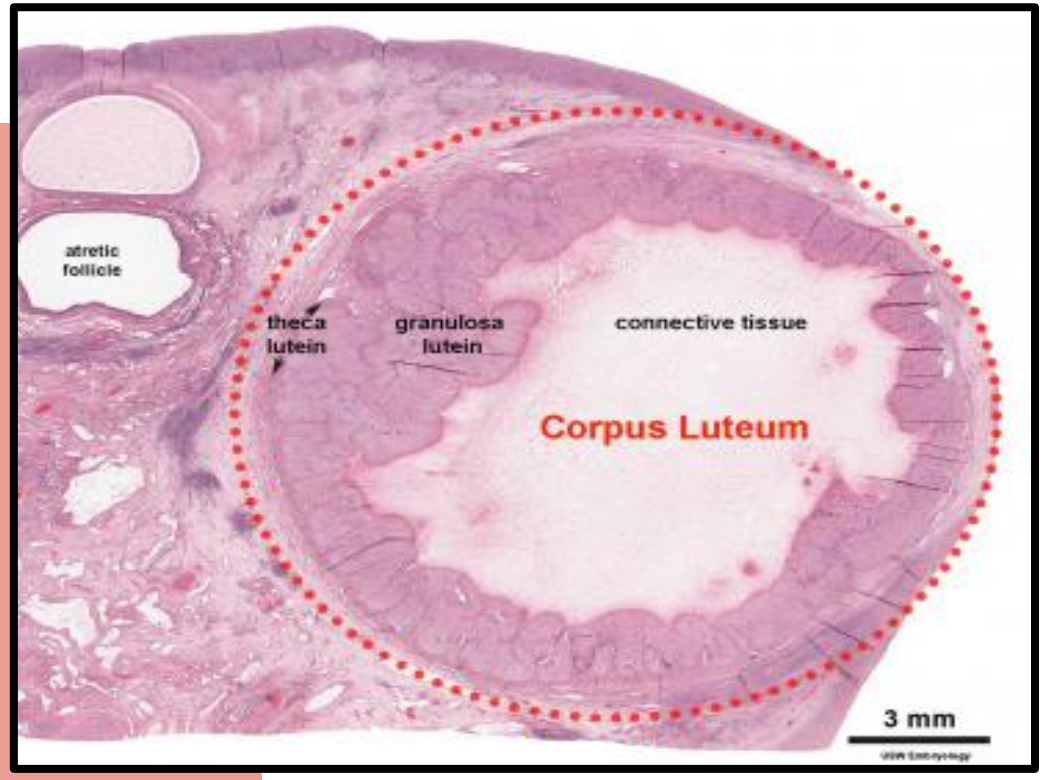
It is fibrous and less vascular.



Fate of mature graafian follicle:

When the follicular fluid is markedly increased, the follicle ruptures and releases its secondary oocyte on the surface of the ovary (ovulation).

Corpus Luteum



Structure:

1- Granulosa lutein cells:

These are the zona granulosa of follicular cells.

Shape: large polyhedral cells.

Function: secrete progesterone hormone.

2- Theca Lutein cells:

These are the theca interna cells.

They are similar to granulosa lutein cells but:

Smaller in size.

Have darkly stained nuclei.

Secrete estrogen.

3- Fibrous capsule:

It is the remaining part of the **theca externa** surrounding the corpus luteum.

Types of corpus luteum:

1-Corpus luteum of menstruation:

If fertilization does not occur, the corpus luteum is maintained for 10-12 days under effect of **LH**.

The corpus luteum then, changes into a white scar called "corpus albicans".

2-Corpus luteum of pregnancy:

If fertilization occurs, the corpus luteum continues to enlarge under effect of HCG.

Its secretion of progesterone maintains pregnancy till the 3rd month when its function is taken by the placenta.

After labour it involutes into "corpus albicans".

3- Corpus haemorrhagicum

4- Corpus albicans

5- Corpus atreticum (atretic follicle)

Which cells in the corpus luteum secrete progesterone?

A. Theca lutein cells

B. Granulosa lutein cells

C. Follicular cells

D. Oocytes

E. Stromal cells

The corona radiata surrounds which of the following?

A. Graafian follicle

B. **Zona pellucida**

C. Theca interna

D. Corpus luteum

E. Medulla

Uterus

Histological structure:

A- Endometrium (mucosa):

1- *Epithelium:*

- Simple columnar partly ciliated and partly secretory.
- Interrupted by the openings of uterine glands.

2- *Corium: (endometrial stroma):*

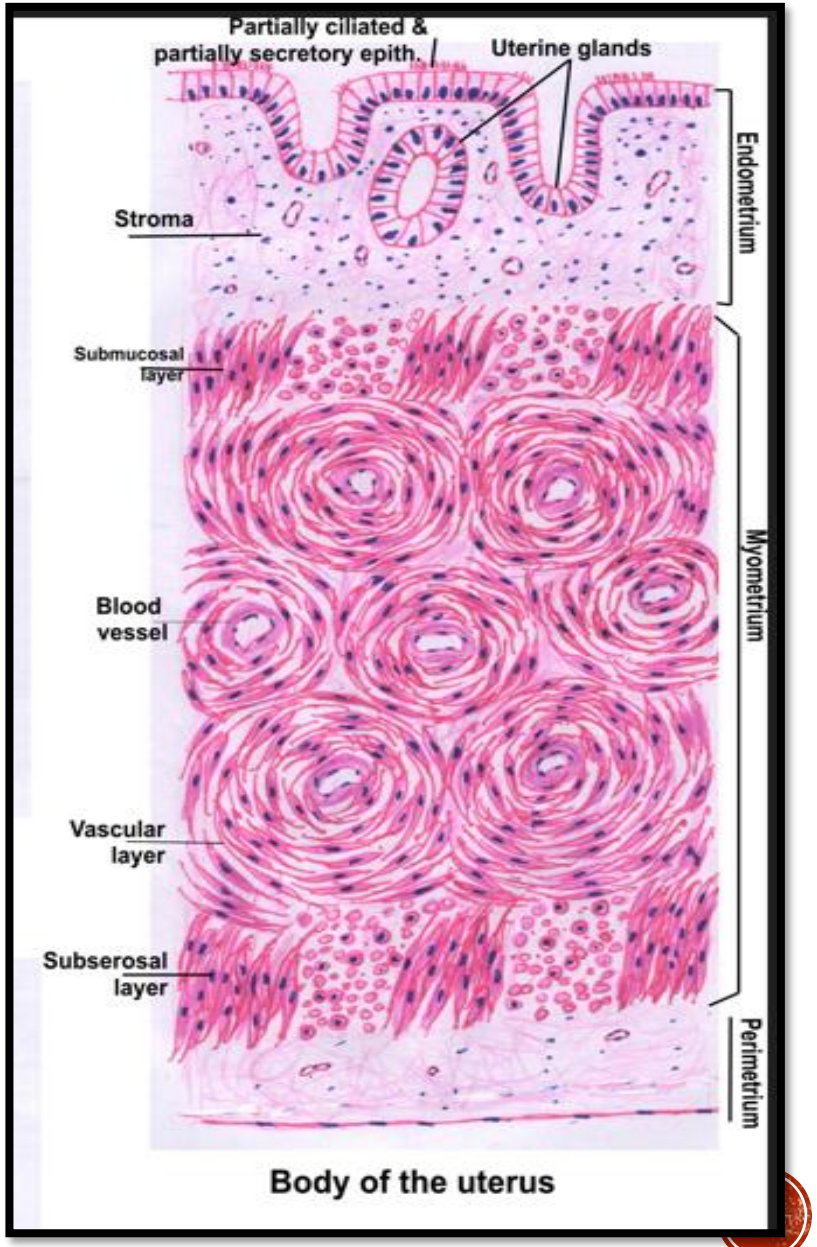
Formed of reticular network which contains:

i. Blood vessels.

ii. Decidual cells.

iii. Leucocytes and phagocytic cells.

iv. Uterine glands



Body of the uterus

Uterus

B- Myometrium (musculosa):

It is formed of three layers of sm. m. fibres:

1. Submucosal (inner) layer:

Thin layer of oblique and longitudinal fibres.

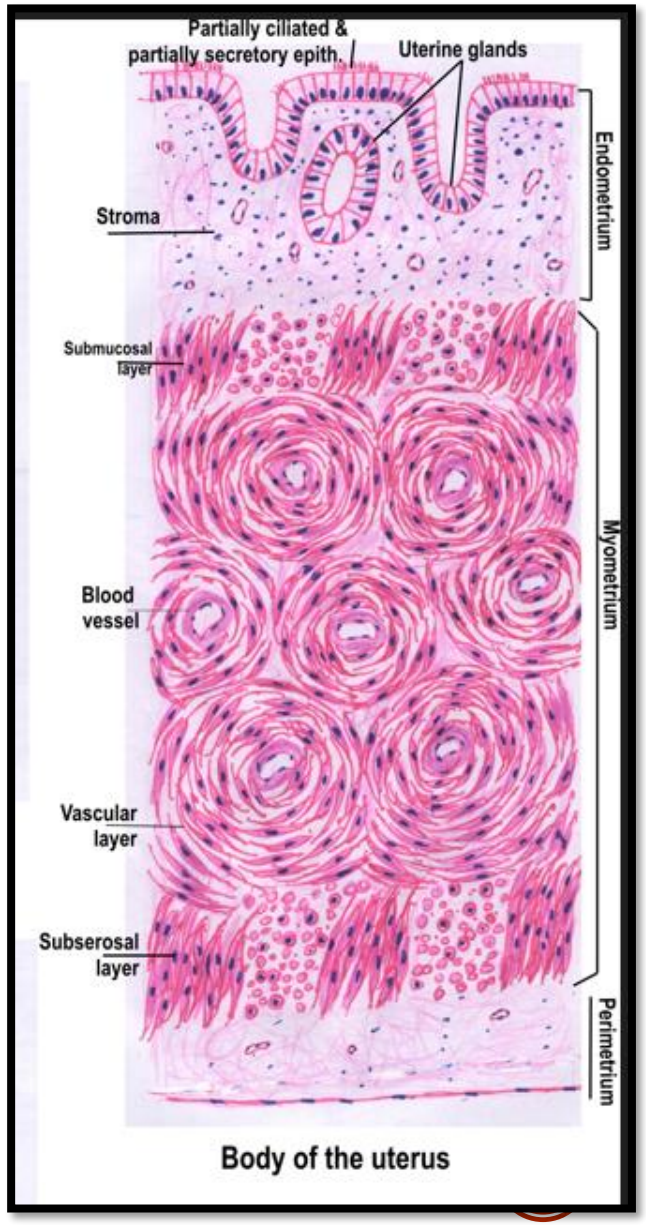
2. Vascular (middle) layer:

Thick layer of ms fibers arranged in spiral manner around blood vessels to give "8" shape.

3. Supravascular (outer) layer:

- Thin layer of oblique and longitudinal fibers.

C- Perimetrium (serosa)



Body of the uterus

THE VAGINA

A- Mucosa:

Epithelium:

Stratified squamous non-keratinized.

Rich in glycogen giving nutrition to sperms.

When glycogen is fermented, it forms lactic acid which prevents the harmful bacteria to penetrate the vagina.

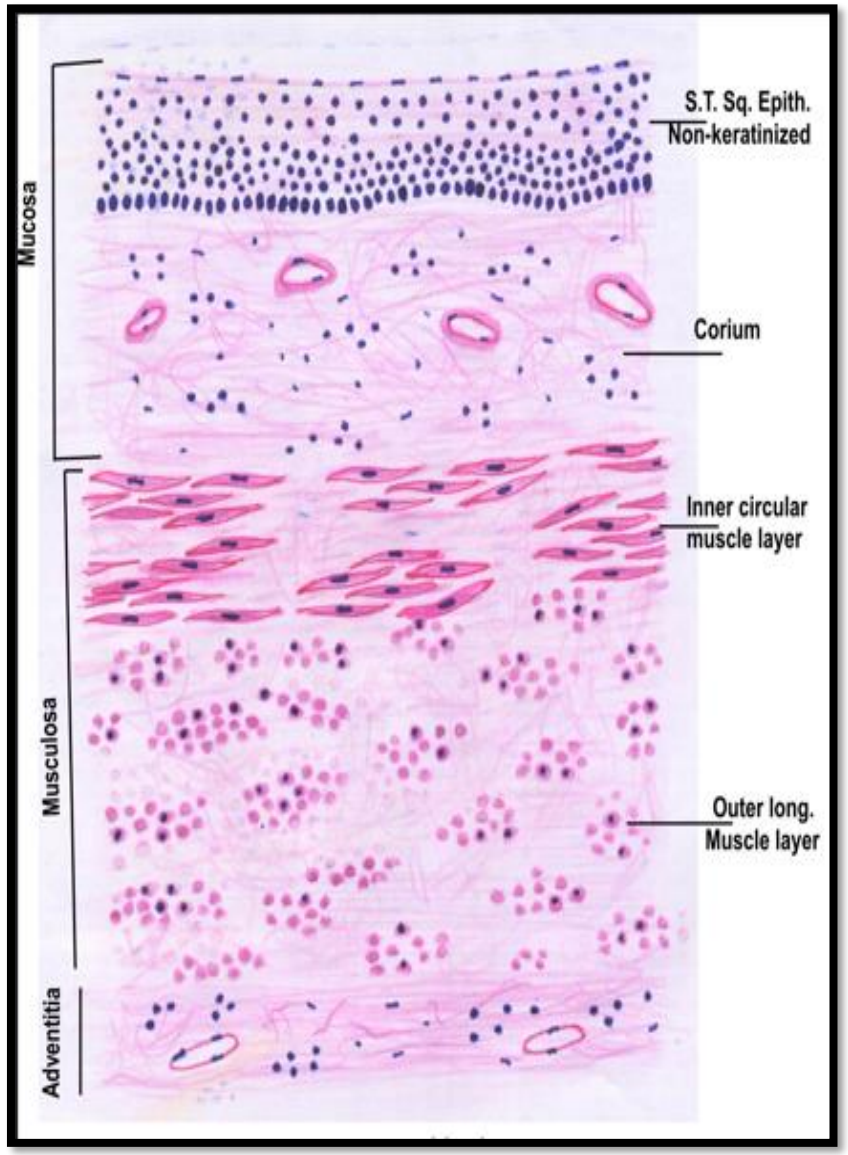
Corium:

B- Musculosa:

Thin inner circular smooth muscle fibers.

Thick outer longitudinal smooth muscle fibers.

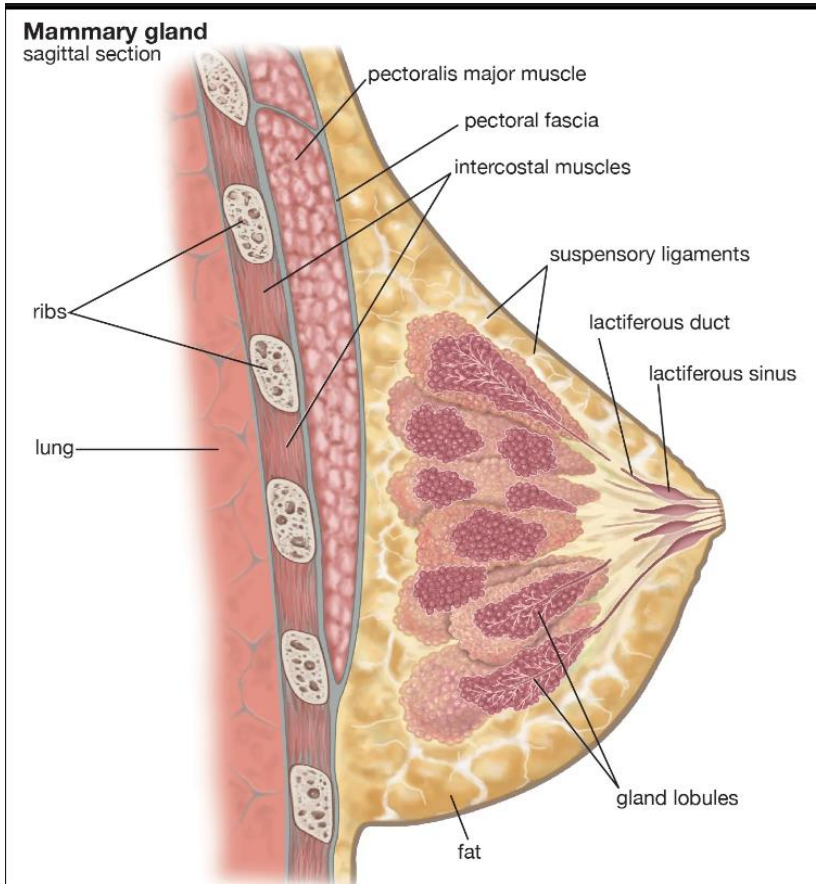
C- Adventitia



THE MAMMARY GLANDS

Type:

These are a pair of compound alveolar glands.



Structure:

I- The Resting Mammary gland

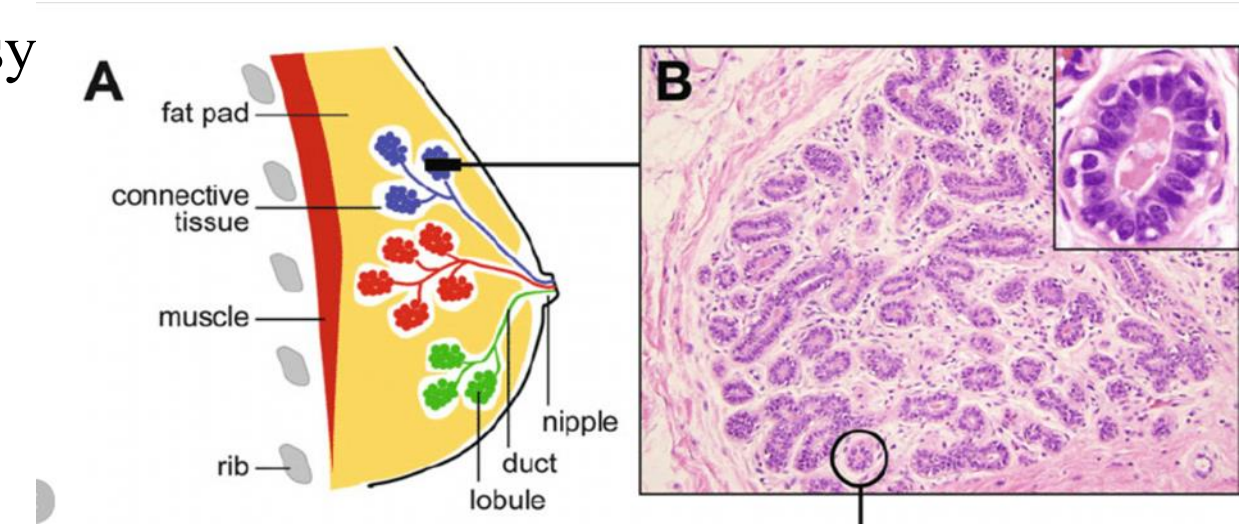
2-The Mammary gland at pregnancy.

3-The Lactating mammary gland.

I- The Resting Mammary Gland

C- Parenchyma:

The resting mammary gland consists of duct sy



Intra-lobular ducts:

- Found inside the lobule.
- Lined with two layers of cubical cells.

Lactiferous ducts:

- They result from union of intra-lobular ducts.
- Their proximal parts are lined with stratified columnar epithelium.
- The lactiferous sinuses and terminal parts are lined with stratified squamous epithelium.

II-The Mammary Gland at Pregnancy

C- Parenchyma:

Alveoli:

- They begin to appear at the 6th month.
- They are lined with columnar epithelium.
- They are surrounded by myoepithelial cells.

III- Lactating Mammary Glands

C- Parenchyma:

The alveoli:

Some are lined with columnar & others by cubical cells.

They are surrounded by myoepithelial cells.

Some are distended with milk & others are empty.

Milk secretion appears vacuolated due to dissolved fat droplets.

Hormones involved in lactation:

- Prolactin secreted by mammotrophs, stimulates the alveolar cells to form milk.
- Oxytocin → contraction of myoepithelial cells → squeezes the alveoli → ejects milk (ejection reflex).

Which of the following is the uterine epithelium ?

A. Simple cuboidal
B. Simple columnar
C. Stratified squamous
D. Transitional
E. Pseudostratified columnar

Regarding the vaginal epithelium, , which of the following is true?

A. Is simple columnar secretory.
B. **Is stratified squamous non-keratinized epithelium.**
C. Has no glycogen content.
D. Has cilia.
E. Formed of cubical epithelium.

Practical Revision

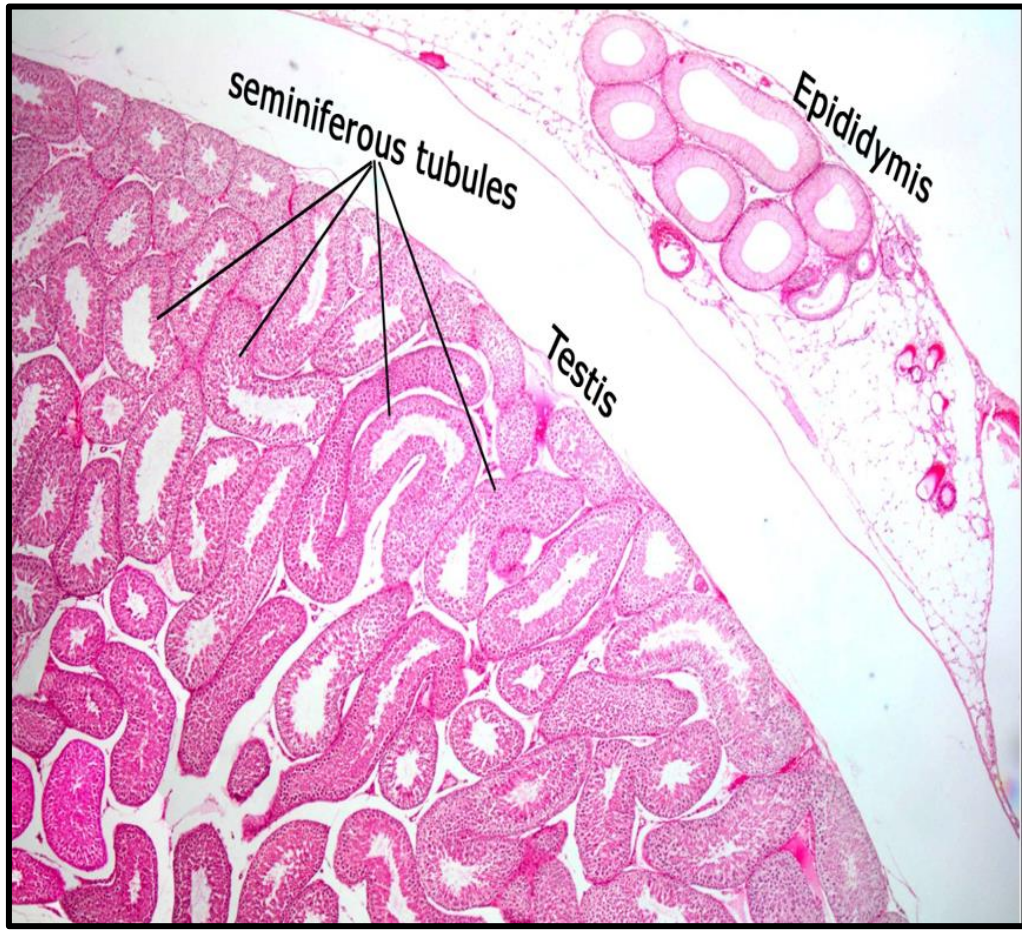
Testis & epididymis

Testis

- Round ,oval and irregular shaped seminiferous tubules.
- Tubules lined by both spermatogenic cells and Sertoli cells
- Testicular interstitium between tubules.

Epididymis

- Wide tubules surrounded by connective tissue.

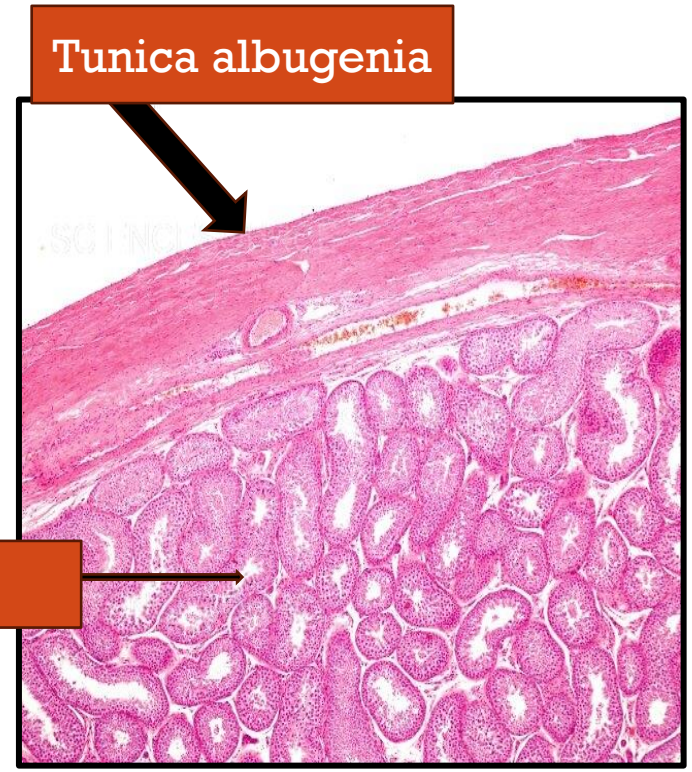


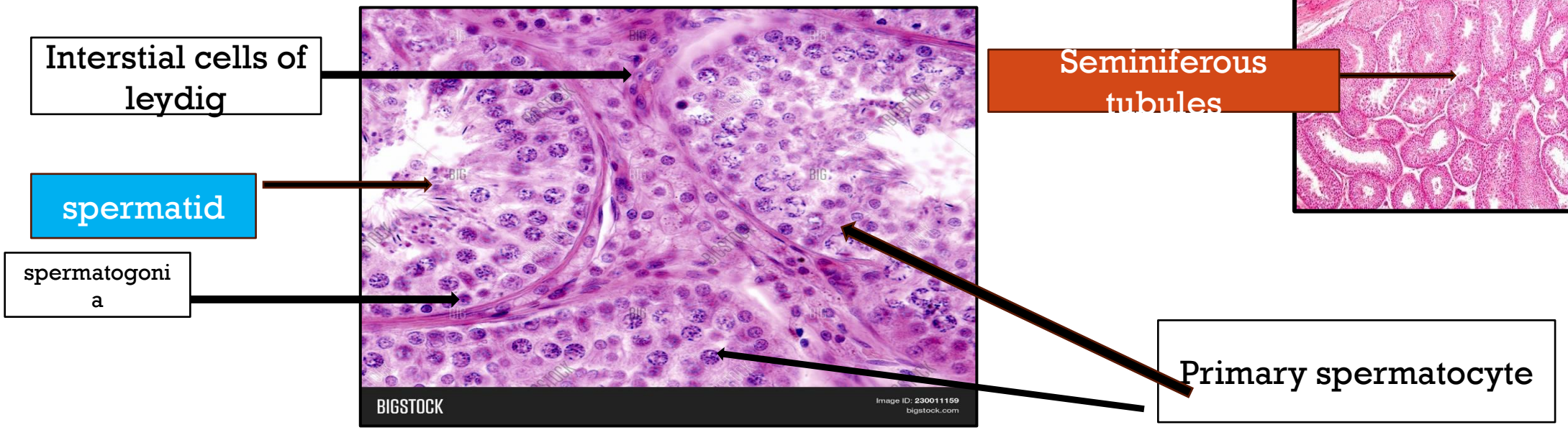
Seminiferous tubules

Seminiferous tubules lined by spermatogenic cells:

- **Spermatogonia immediate on the basement membranes**
- **Primary spermatocyte (the most prominent cells)**
- **Spermatid on the top.**

Testicular interstitium :Vascular connective tissue with Leydig cells

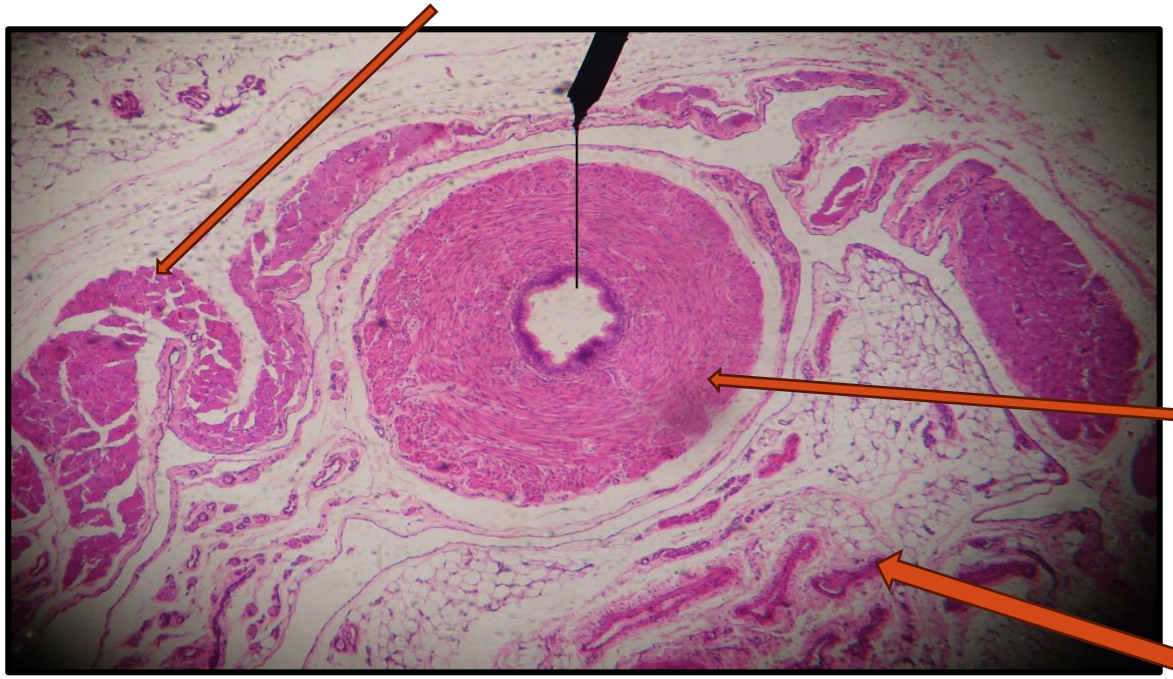




Spermatic cord

Contents of spermatic cord:

- Vas deference
- Pampiniform plexsus of veins.
- Testicular artery and vein.
- Nerves.
- Cremasteric striated muscles



Vas deference

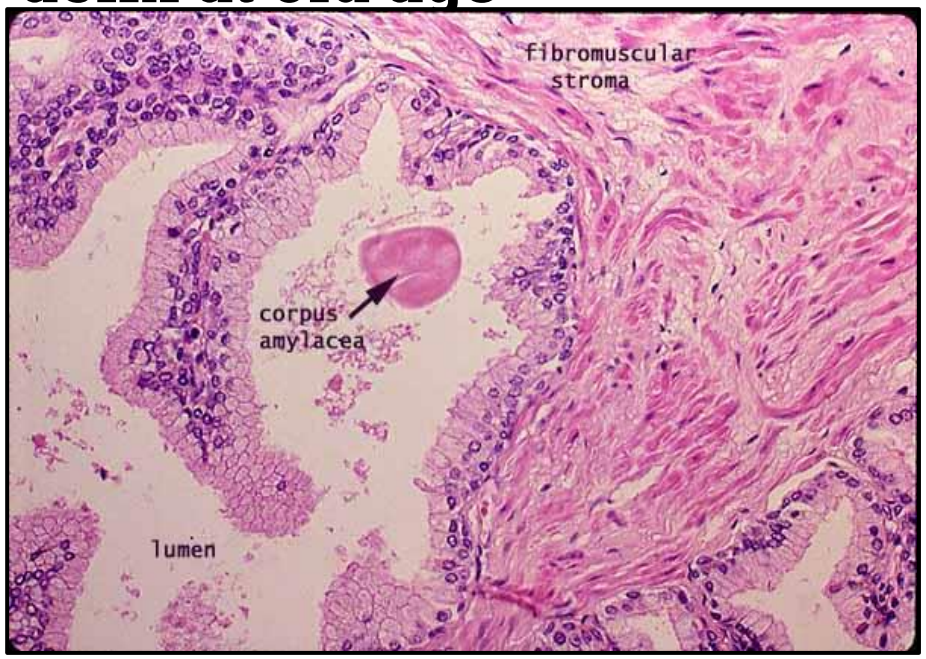
Pampiniform plexus of veins

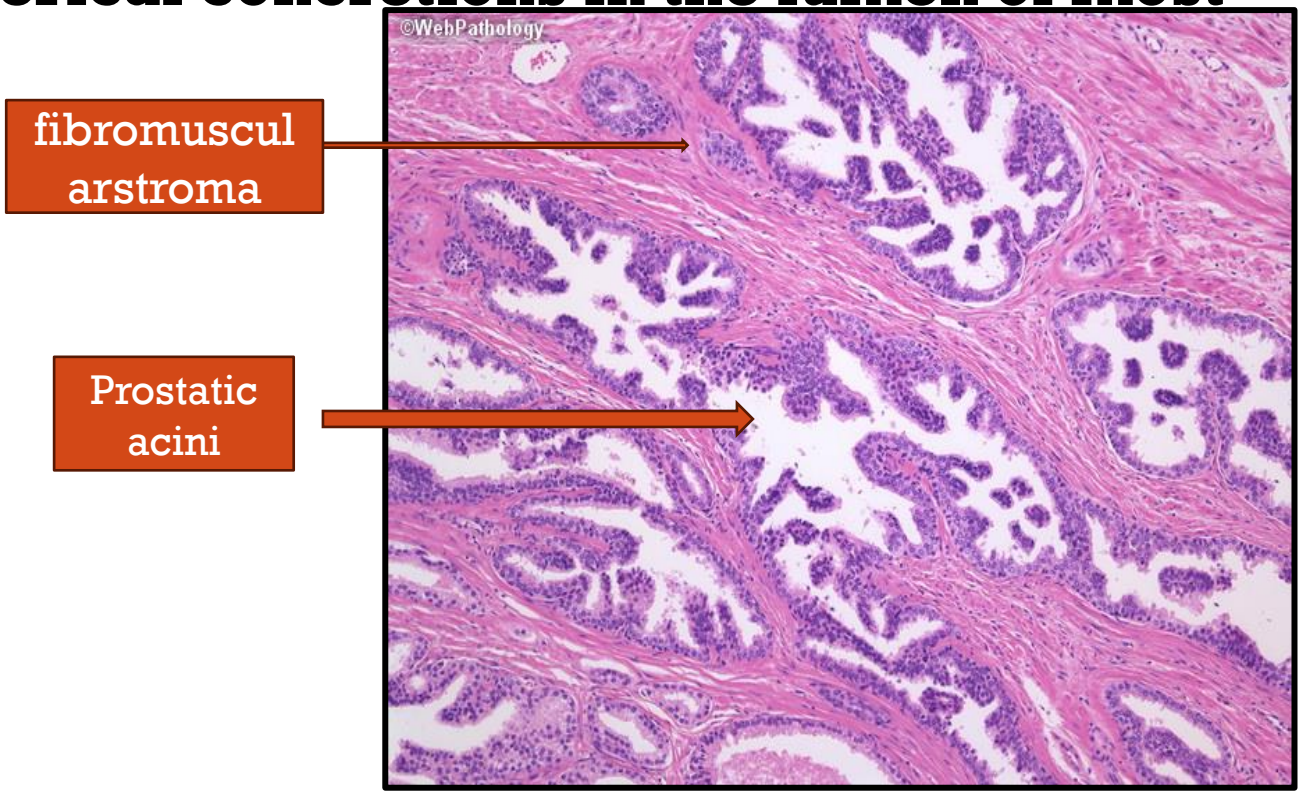
Prostate gland

- **Stroma :** Capsule and septa rich in smooth muscles
- **Parenchyma:** prostatic acini

➢ **Acini** lined either by cubical or columnar or pseudostratified.

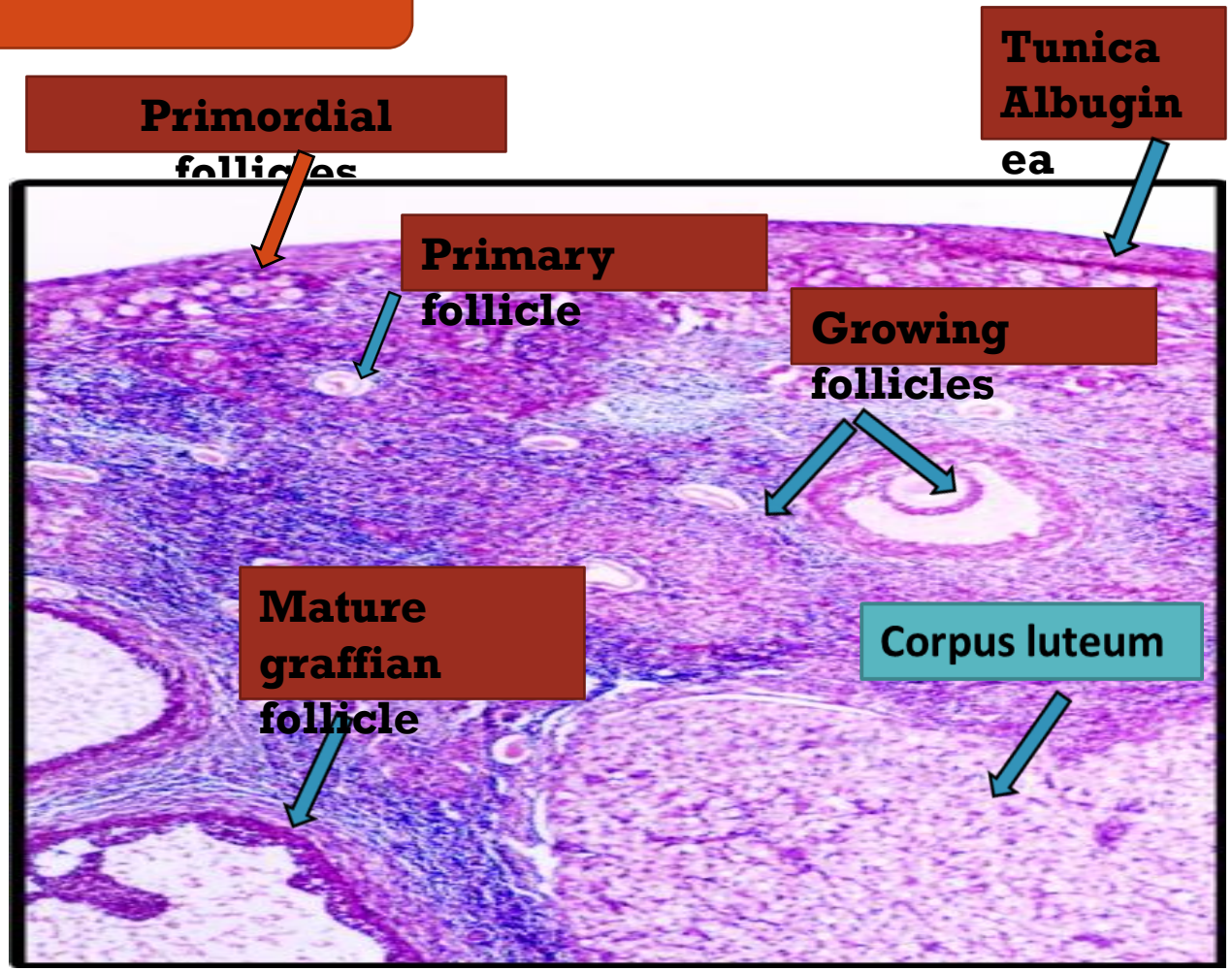
➢ **Corpora amylacea** :small spherical concretions in the lumen of most acini at old age





The adult ovary

- Surrounded by thick tunica albuginea.
- The outer cortex contains many primordial and primary follicles in groups.
- The inner cortex contains growing and mature graffian follicles and corpus luteum.



The Uterus

Endometrium (mucosa):

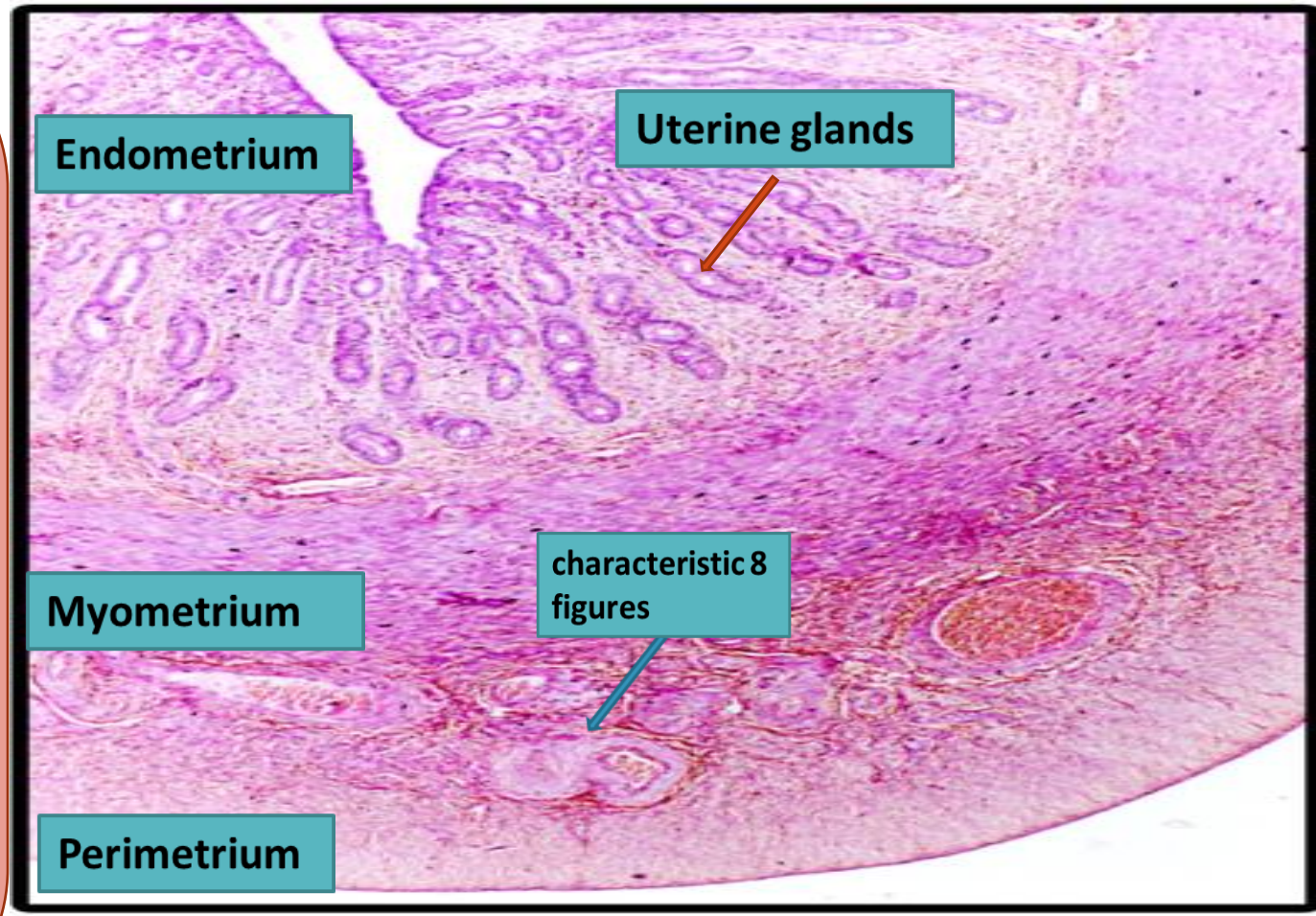
Lined with simple columnar partially secretory partially ciliated epithelium.

Myometrium (Musculosa):

It forms the main thickness of the wall

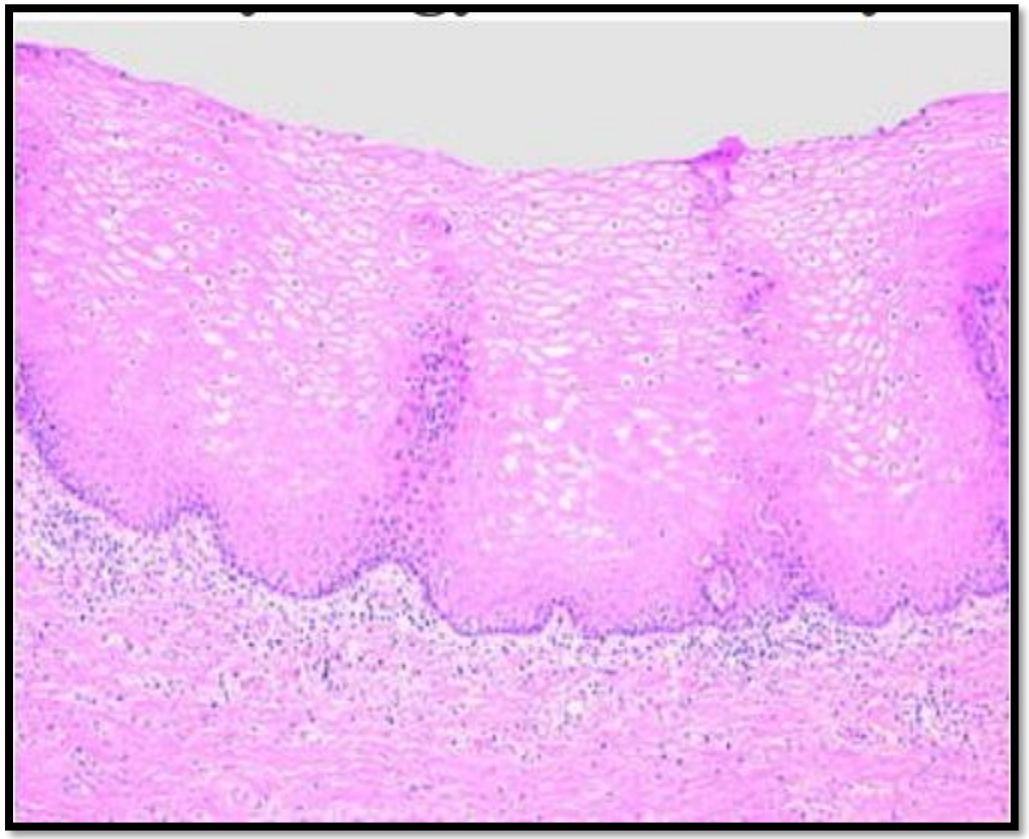
Smooth ms. Fibers arranged around blood vessels in spiral manner (characteristic 8 figures)

Perimetrium (Serosa):



Vagina

- The epithelium is stratified squamous non-keratinized **rich in glycogen**.
- There is no submucosa or mucous glands.
- Thin inner circular, thick outer longitudinal layer of smooth muscle fibers.




Thank
you!