



## Motivational Corner:

"It does not matter how slowly you go as long as you do not stop."



## Objectives:

By the end of the lecture you should be able to:

- Describe the histological structure and fate of ovarian follicles.
- Describe the histological structure of:  
Ovary, Oviducts (Fallopian tubes), Uterus, Vagina, Placenta, Resting and lactating mammary gland.

## 1-

## Female reproductive system.

Extra notes: Gray

**Important notes: Red**

Revised by

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# Female reproductive system.

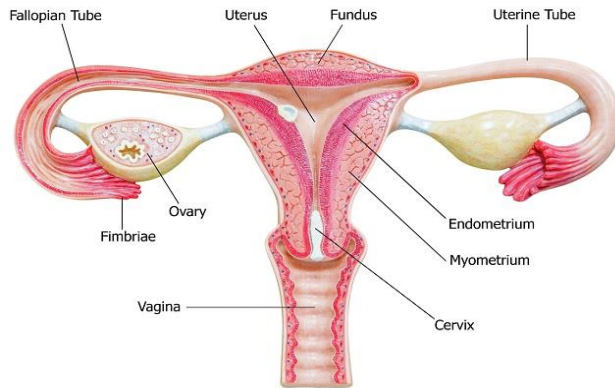


## Primary sex organs:

- 2 ovaries.

## Secondary sex organs:

- 2 Fallopian tubes.
- Uterus.
- Vagina.
- External genitalia.
- 2 mammary glands.



# Adult ovary

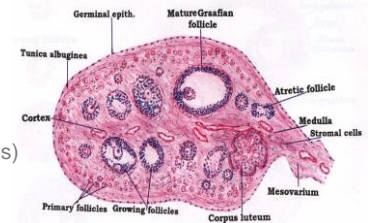
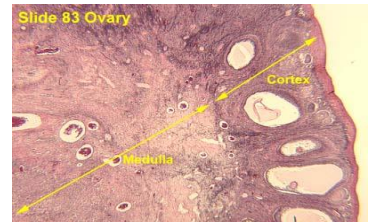
**1-Germinal epithelium:** outer layer of flat cells.

**2-Tunica albuginea:** dense C.T layer. Tunica = layer / Albuginea = white  
(1&2 could be considered as capsule )

**3-Outer cortex:** **ovarian follicles** and interstitial cells.

**4-Inner medulla:** highly vascular **loose** C.T.

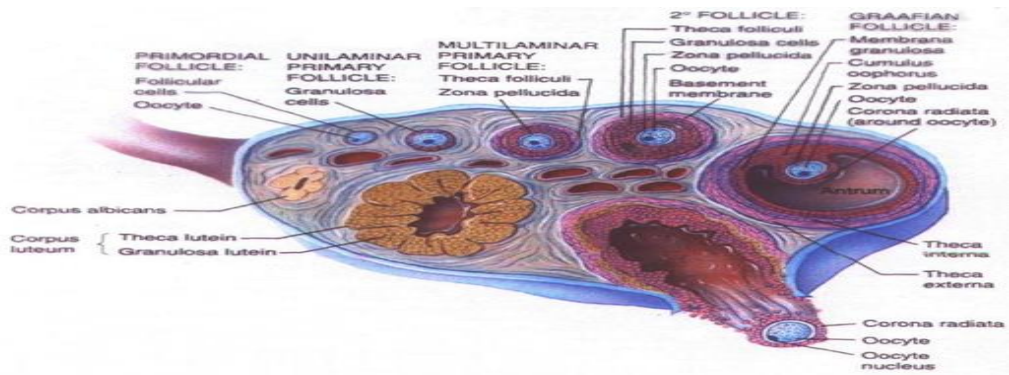
Before puberty, the cortex contains millions of primordial follicles (ova surrounded by single layer of flat cells)



## Ovarian Follicles

The cortex of the ovary in adults contains the following types (stages) of follicles:

Primordial follicles	Primary follicles	Secondary (Antral) follicles	Mature graafian follicles
<ul style="list-style-type: none"> <li>The only follicles present <b>before puberty</b>.</li> <li>The earliest and most numerous stage.</li> <li>Located superficially under the tunica albuginea.</li> <li>Each is formed of a <u>primary oocyte</u> (25 <math>\mu\text{m}</math>), surrounded by a single layer of <u>flat follicular cells</u>.</li> </ul>	<p>They develop from the primordial follicles, at puberty under the effect of <b>FSH</b>.</p> <p><b>a) Unilamilar primary follicle:</b> are similar to primordial follicles, but: -the <u>primary oocyte</u> is larger (40 <math>\mu\text{m}</math>). -the <u>follicular cells</u> are <b>cuboidal</b> in shape.</p> <p><b>b) Multilaminar primary follicles:</b></p> <ul style="list-style-type: none"> <li>1ry oocyte larger</li> <li>corona radiata</li> <li>granulosa cells</li> <li>zona pellucida</li> <li>theca folliculi</li> <li>follicular fluid (liquor folliculi)</li> </ul>	<p>-Multilaminar primary follicles become secondary follicles <b>when a complete antrum filled with liquor folliculi is formed.</b></p> <ul style="list-style-type: none"> <li>1ry oocyte is larger &amp; pushed to one side.</li> <li>Theca folliculi differentiates into <b>theca interna</b> and <b>theca externa</b>.</li> </ul>	<ul style="list-style-type: none"> <li>large, thin walled</li> <li>wide follicular antrum</li> <li>large 1ry oocyte</li> <li>zona pellucida</li> <li>corona radiata</li> <li>zona granulosa</li> <li>cumulus oophorus</li> <li>basement membrane</li> <li>theca folliculi: theca interna &amp; theca externa</li> </ul>



Under the effect of FSH, the primordial follicle increases in size and the follicular cells get changed from flat into cuboidal cells "Granulosa cells" to give primary follicle, the primary follicle may be surrounded by a single layer of cuboidal cells (Unilaminar) or multilaminar

### Atretic Follicles

- During growth of the ovarian follicles, many of them do not reach maturation and they degenerate, and are finally **replaced completely by fibrous tissue** and are called atretic follicles or corpora atretica.

### Ovulation and Corpus Luteum Formation

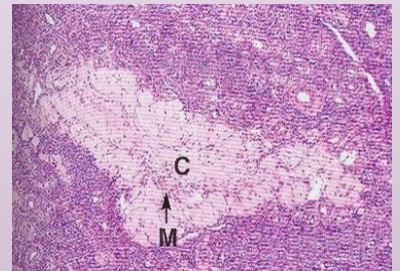
- Ovulation occurs at day 14 of the cycle, under the effect of LH.
- The follicle collapses and forms a corpus luteum.

## Corpus Luteum

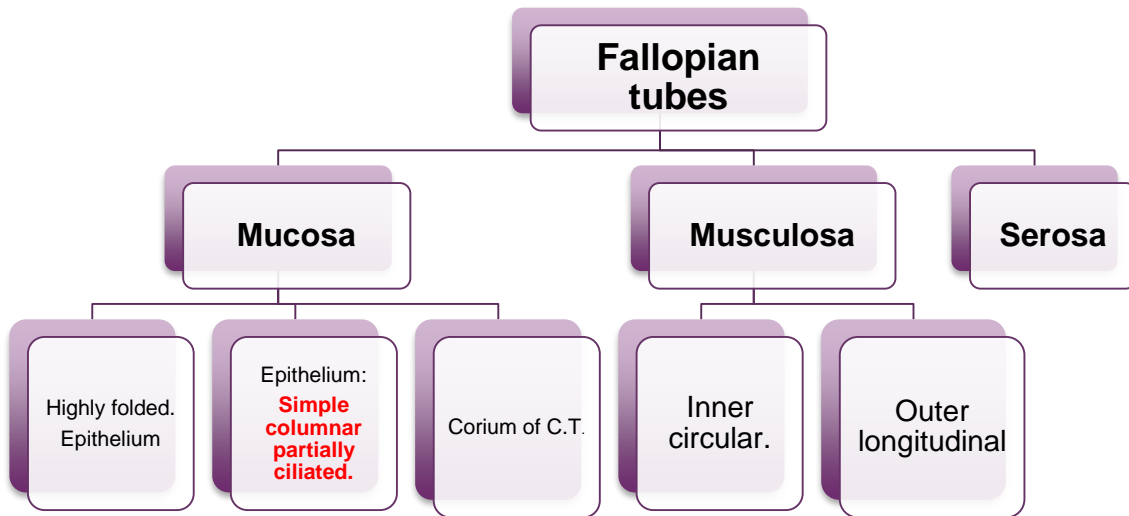
- Zona granulosa → **granulosa lutein cells**.
- Theca interna → **theca lutein cells**.
- Bleeding may occur → corpus haemorrhagicum.
- Fertilization → corpus luteum of pregnancy.
- No fertilization → corpus luteum of menstruation.
- At the end → corpus albicans.
- **Corpus luteum of menstruation** lasts about **10 days**.
- Corpus luteum of pregnancy persists for six months.
- Fate of corpus luteum: formation of a white degenerated fibrous body, corpus albicans.
- **Function of corpus luteum:**
- Granulosa lutein cells: secrete **progesterone**

## Corpus Albicans

- It is a white degenerated fibrous body formed by involution of corpus luteum (degenerated corpus luteum).
- Secretory cells of corpus luteum degenerate and are phagocytosed by macrophages.



# Oviducts (Fallopian tubes)

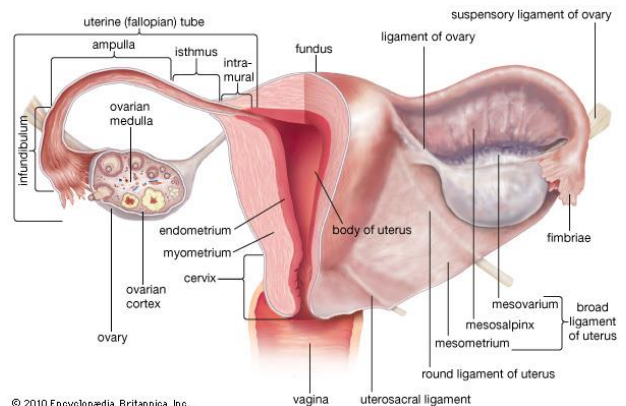


## ❖ Cells of fallopian tubes:

Ciliated cells	Non-Ciliated cells
<ul style="list-style-type: none"> <li>▪ <b>Non-secretory</b></li> <li>▪ Cilia beat toward uterus</li> </ul>	<ul style="list-style-type: none"> <li>▪ Thinner, also called <b>peg cells</b>.</li> <li>▪ <b>Secretory cells</b>.</li> <li>▪ Apices bulge above ciliated cells.</li> <li>▪ Their apices contain <u>nutritive material</u> to nourish gametes</li> </ul>

# Uterus

- Thick-walled muscular organ.
- Inverted pear shape.
- Anatomically:
  - Body:** upper 2/3.
  - Cervix:** lower 1/3.
  - Fundus:** the rounded dome-shaped top of the body.



# Uterus (Cont.)



## Fundus & Body

Endometrium (mucosa)

\* **Epithelium:**  
**simple columnar partially ciliated.**

\* **Corium:**

- Endometrial glands: simple tubular.
- Stromal cells.
- Blood vessels.
- Leucocytes.
- Reticular fibers.

### Blood supply

Two types of arteries derived from vessels in the myometrium:

**Coiled arteries:**

- extend into the functional zone.
- cyclic changes.

**Straight arteries:**

- terminate in basal zone.
- no cyclic changes.

Myometrium (musculosa)

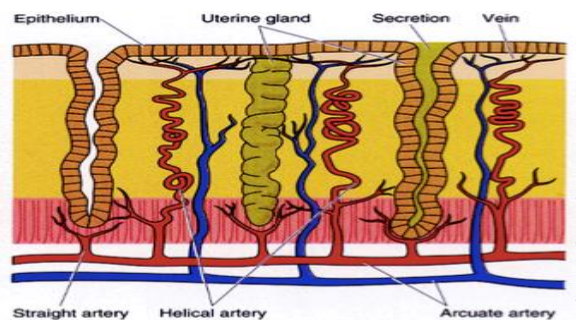
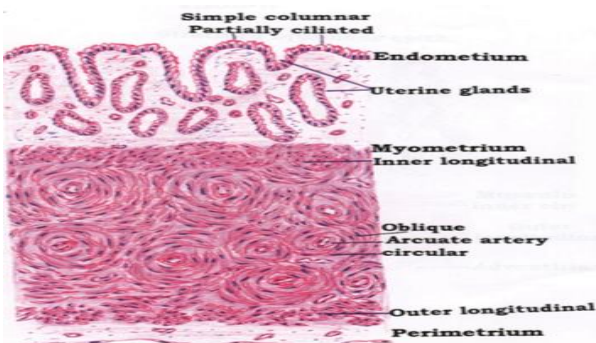
**3 ill-defined smooth muscle layers:**

**Stratum submucosum longitudinal.**

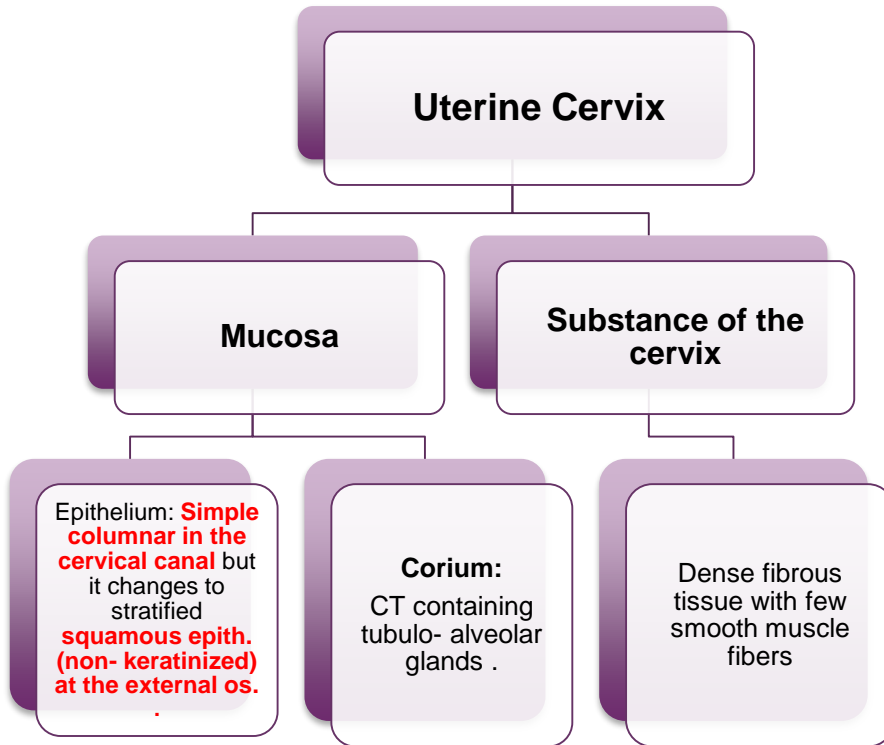
**Stratum vasculare circular smooth muscle fibres in figure of 8 arrangement around large blood vessels.**

**Stratum supravasculare longitudinal.**

Perimetrium (serosa)



# Uterus (Cont.)



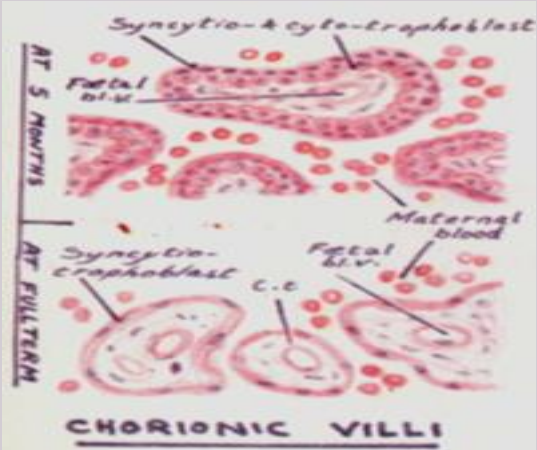
## Vagina

Mucosa	Musculosa	Adventitia
<p>shows transverse folds and is made of:</p> <p><b>1 - Epithelium:</b>  <b>stratified squamous epithelium non-keratinized</b>                      rich in glycogen</p> <p><b>2 - Corium:</b>                      Dense C.T.                      very rich in blood vessels, elastic fibres and leucocytes.</p>	<p>Formed of interlacing inner circular and outer longitudinal layers of smooth muscle fibres</p>	<p>Formed of loose C.T.</p>





# Placenta

Maternal part (decidua basalis)	Fetal part (chorionic villi)
	<ul style="list-style-type: none"> <li>Finger-like projections separated by intervillous spaces containing maternal blood.</li> <li>Each chorionic villus consists of:             <ol style="list-style-type: none"> <li>Mesenchymal CT core containing fetal blood vessels.</li> <li>Epithelial covering (trophoblast), made of 2 layers:                 <ul style="list-style-type: none"> <li>✓ <b>Outer syncytiotrophoblast:</b> deeply stained with NO cell boundaries.</li> <li>✓ <b>Inner cytotrophoblast:</b> disappears late in pregnancy</li> </ul> </li> </ol> </li> </ul>



- **Placental barrier :**  
It is the barrier between the maternal and foetal blood. It consists of:
  - The trophoblast covering the villus.
  - The basement membrane of the trophoblast.
  - The C.T. core of the villus.
  - The basement membrane of foetal capillaries.
  - The endothelium of foetal capillaries.

# Mammary gland

- At puberty they enlarge by accumulation of fat, but contain only a duct system.
- Secretory units appear only **during pregnancy** and **are functioning only during lactation**.

Resting Mammary Gland	Lactating Mammary Gland
<ul style="list-style-type: none"> <li>It is divided into lobes and lobules.</li> <li>The interlobular C.T. is dense and contains numerous fat cells.</li> <li>The intralobular C.T. is loose and contains no fat cells.</li> <li>Within the lobules, there are widely separated ducts lined by <b>simple cuboidal epithelium</b>. Ducts collect to form <b>lactiferous ducts</b> lined by <b>stratified columnar epithelium</b> and open at the top of the nipple.</li> </ul>	<ul style="list-style-type: none"> <li>Interlobular and intralobular C.T. become reduced.</li> <li>Lobules are made of <b>ducts and alveoli</b>.</li> <li>Alveoli are distended with milk and lined by cuboidal or flat cells <b>surrounded by myoepithelial cells</b>.</li> <li>Milk appears <b>acidophilic with vacuoles of dissolved fat</b>.</li> </ul>

# MCQs



- 1) Which of the following will disappear in late pregnancy ?
  - a. Outer syncytiotrophoblast
  - b. Inner cytotrophoblast
  - c. Trophoblast
  
- 2) Which of the following coriums contain tubulo-alveolar gland?
  - a. Vagina
  - b. Body of uterus
  - c. Uterine Cervix
  
- 3) Corpus luteum of menstruation last for?
  - a. 7 months
  - b. 6 months
  - c. 10 days
  
- 4) Which one of the following can be found in a Mature Graafian Follicle?
  - a. Zona pellucida
  - b. Theca lutein cells
  - c. Granulosa lutein cells

- 5) Which one of the following is located superficial and under the tunica albuginea?
  - a. Primary Follicles
  - b. Mature (Graafian) Follicle
  - c. Primordial Follicles
  
- 6) Progesterone secretes from corpus luteum by?
  - a. Theca lutein cells
  - b. Granulosa lutein cells
  - c. Non

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Thanks you for checking  
our work, Good luck.  
-Team histology.

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