Female Reproductive System

Objectives:

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

1- Describe the histological structure and fate of ovarian follicles.

2- Describe the histological structure of:

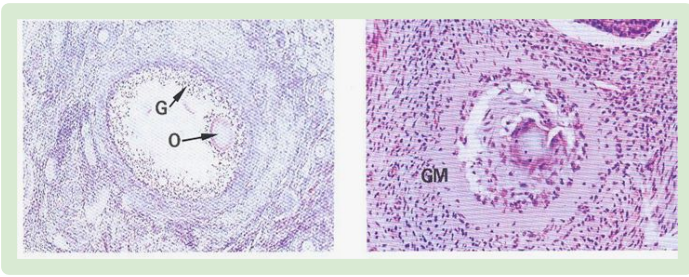
- Ovary.
- Oviducts (Fallopian tubes).
- Uterus.
- Vagina.
- Resting and lactating mammary gland.

- **Editing file**
- **Important**
- **Doctor notes / Extra**

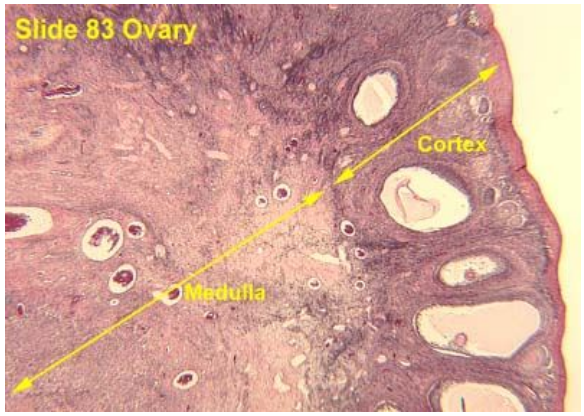
ADULT OVARY

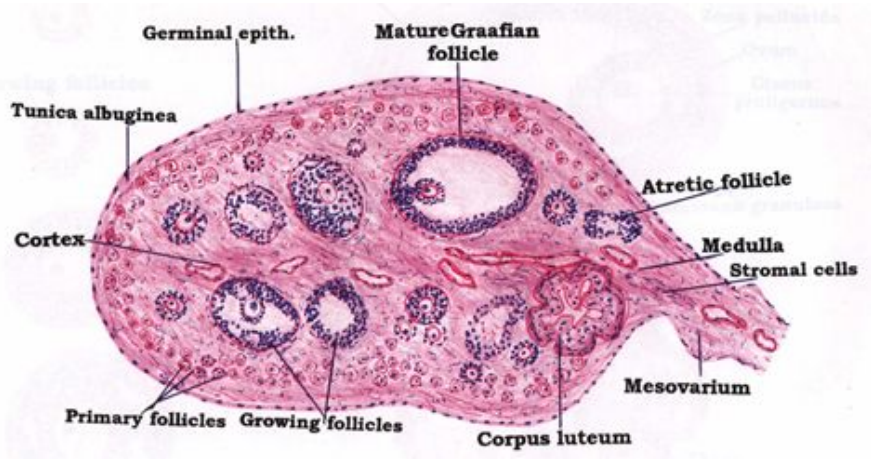
- **Germinal epithelium:** outer layer of **flat cells**.
- **Tunica albuginea:** **dense C.T** layer. tunica= Layer, albuginea= white
- **Outer cortex:** ovarian follicles and interstitial cells.

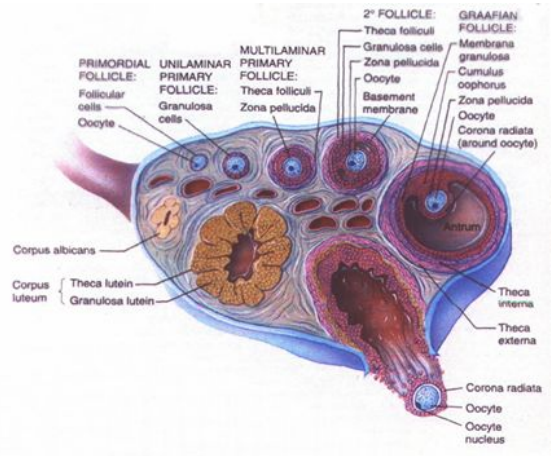
  Atretic (atrophied) Follicles:
  During growth of the ovarian follicles, many of them do not reach maturation and they degenerate, and are finally replaced completely by fibrous tissue and are called atretic follicles or corpora atretica.



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





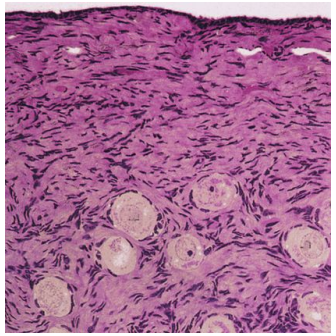


Ovarian Follicles:

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

1-Primordial Follicles

- The **only** follicles present before puberty.
- The **earliest and most numerous** stage.
- Located superficially under the tunica albuginea.
- Each is formed of a primary oocyte (25 µm), surrounded by a single layer of **flat** follicular cells.



2-Primary Follicles

They develop from the primordial follicles, at puberty under the effect of FSH.

A-Unilaminar primary follicles:

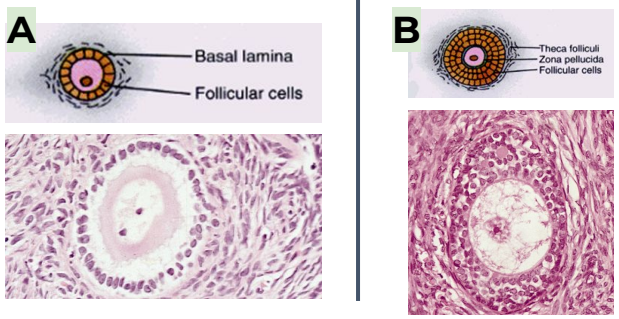
similar to primordial follicles, but:

- the primary oocyte is larger (40µm).
- the follicular cells are **cuboidal** in shape.

B-Multilaminar primary follicles:

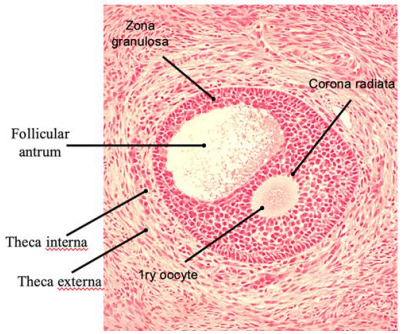
Explained in next slide

- 1ry oocyte larger (70-80 µm)
- corona radiata
- granulosa cells
- zona pellucida
- theca folliculi
- follicular fluid (liquor folliculi)



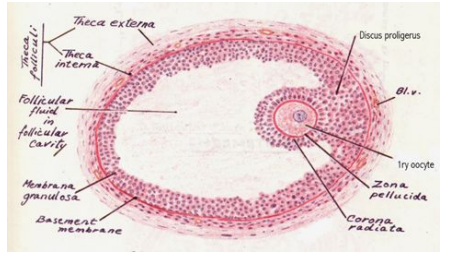
3-Secondary (Antral) Follicles

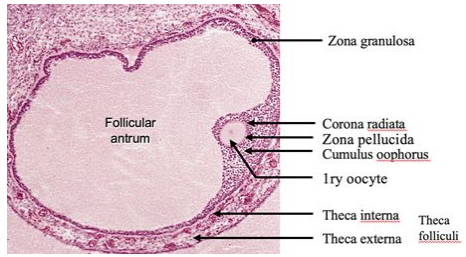
- Multilaminar primary follicles become secondary follicles when a complete antrum filled with liquor folliculi is formed.
- 1ry oocyte is larger & pushed to one side. (150 µm)
- Theca folliculi differentiates into theca interna cellular layer and theca externa fibrous layer.
- we know it's Secondary (Antral) Follicles stage when the small follicular fluid drops merge together forming a lake-like large drop of fluid.



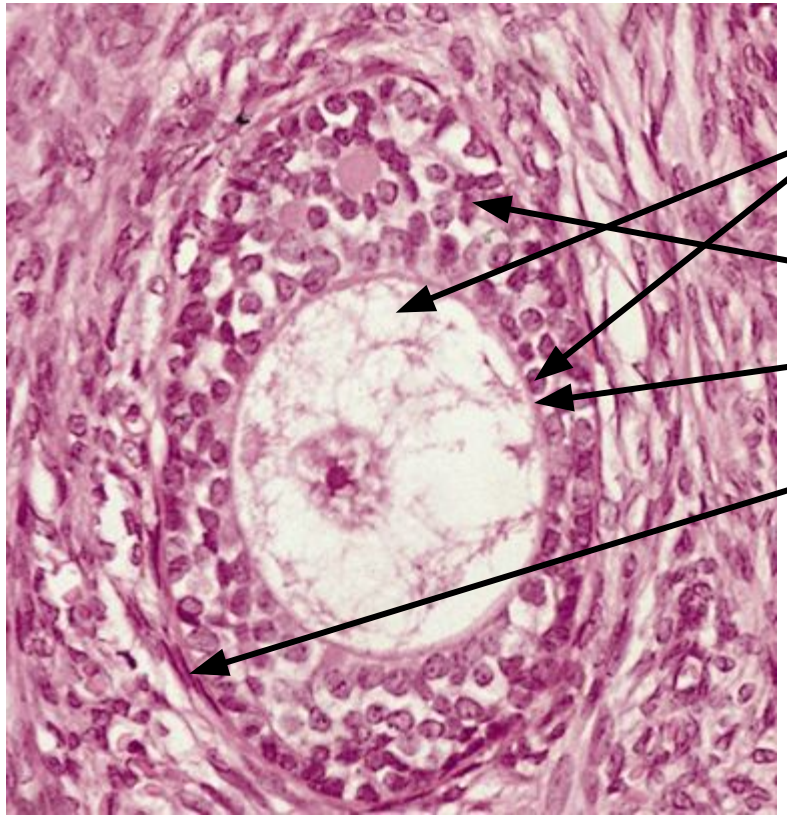
4-Mature Graafian Follicles

- large, thin walled
- wide follicular antrum
- large 1ry oocyte (200-250 µm)
- zona pellucida
- corona radiata
- cumulus oophorus (are granulosa cells acting as a neck to connect oocytes to the wall)
- zona granulosa
- basement membrane
- theca folliculi: theca interna & theca externa



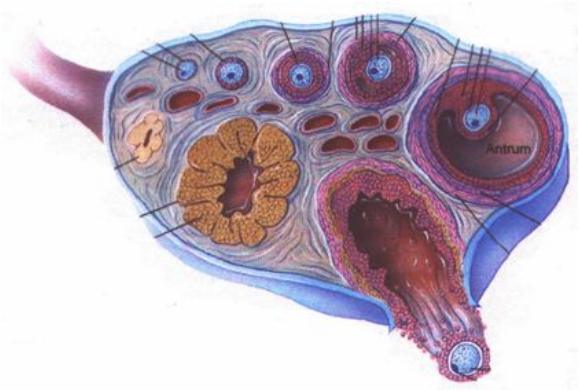


Multilaminar primary follicles



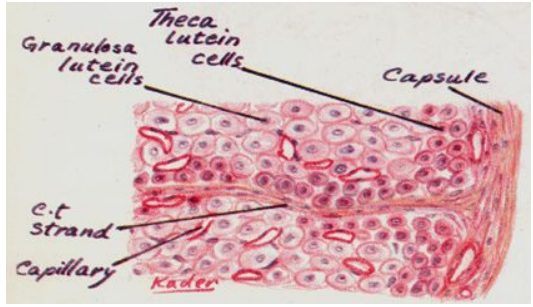
- 1ry oocyte
- corona radiata (is the layer of granulosa cells radiating around the oocyte) (corona=crown, radiata=radiating).
- granulosa cells
- zona pellucida (acting like glue between oocyte and corona radiata)
- theca folliculi (capsule-like condensed C.T. & fibers surrounding the follicle from the surrounding material)

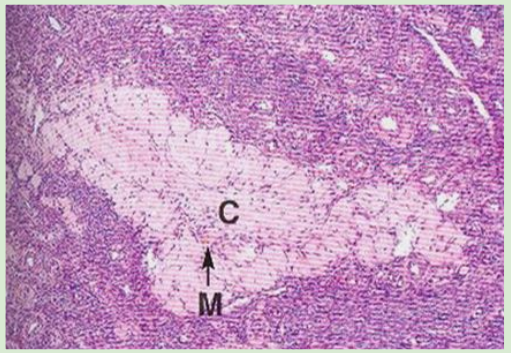
Corpus Luteum



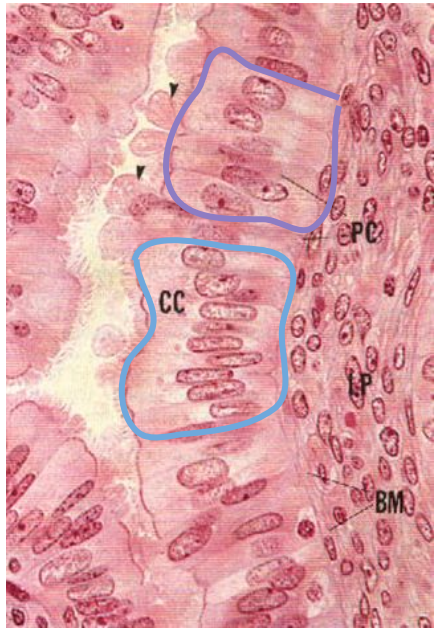
- **Ovulation occurs at day 14 of the cycle, under the effect of LH.**
- The follicle collapses and forms a corpus luteum.
- zona granulosa → **granulosa lutein cells.**
- Theca interna → **theca lutein cells.**
- Bleeding may occur → corpus haemorrhagicum.
- Fertilization → corpus luteum of pregnancy. (secretes progesterone and estrogen for nourishment of wall of utrine)
- No fertilization → corpus luteum of menstruation.
- At the end → corpus albicans. (develops after 6 months in pregnancy & after 14 days in menstruation)
- 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.

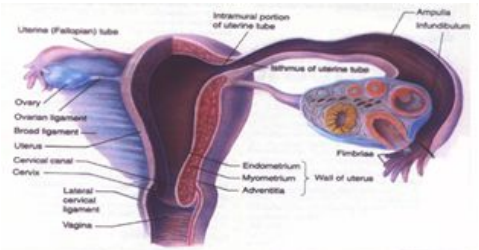
  Corpus Albicans:
  - It is a white degenerated fibrous body formed by involution (Atrophy) of corpus luteum (degenerated corpus luteum).
  - Secretory cells of corpus luteum degenerate and are phagocytosed by macrophages.
- **Function** of corpus luteum:
  - Granulosa lutein cells: secrete **progesterone.**
  - Theca lutein cells: secrete **estrogen**.

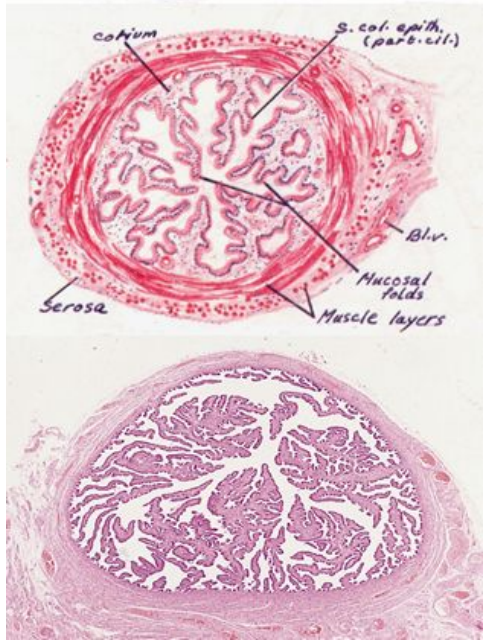




OVIDUCTS (FALLOPIAN TUBES)





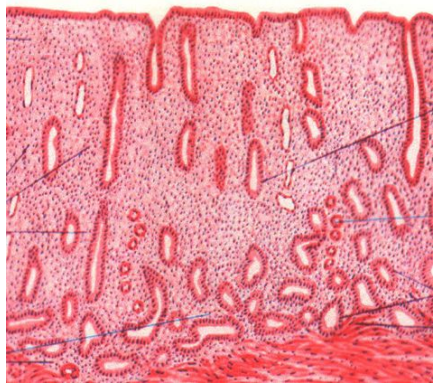


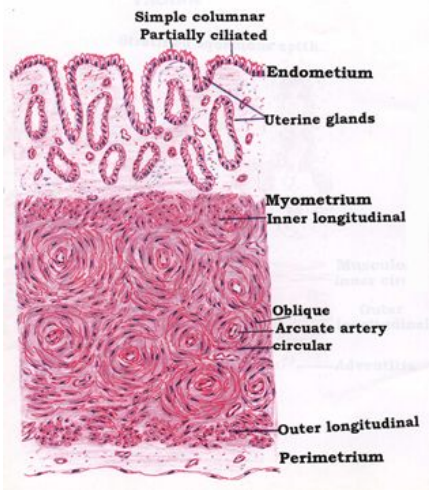
- **Mucosa:**
  - Highly folded. (to increase surface area to allow passage of large oocyte).
  - Epithelium: **Simple columnar partially ciliated.**
    - **Ciliated cells:** (wider)
      - Non-secretory.
      - Cilia beat toward uterus.
    - **Non-ciliated cells:** (thinner)
      - Thinner, also called peg cells.
      - Secretory cells.
      - Apices bulge above ciliated cells.
      - Their apices contain nutritive material to nourish gametes (sperms & oocytes).
  - Corium of C.T.
- **Musculosa:**
  - Inner circular.
  - Outer longitudinal.
- **Serosa** (because fallopian tubes are covered by peritoneum).

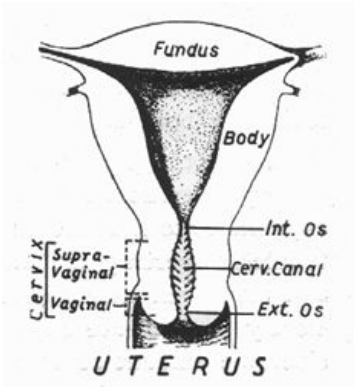
All parts of fallopian tube have similar components but they differ in diameter.

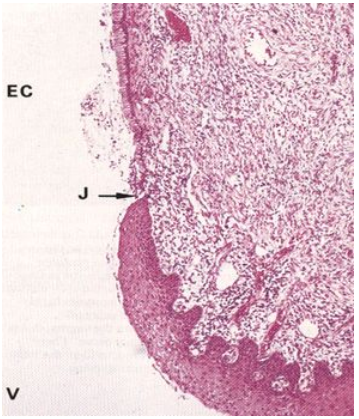
THE UTERUS

Fundus & Body			Uterine Cervix	
Endometrium (mucosa)	**Myometrium (musculosa)**	**Perimetrium (serosa)**	**Mucosa**	**Substance of the cervix**
Epithelium: simple columnar partially ciliated. **Corium:** • Endometrial glands: simple tubular. • Stromal cells. (make components of placenta) • Blood vessels. • Leucocytes. • Reticular fibers.	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.	Formed of simple squamous epith. (mesothelium) and sub-epithelial C.T.	• **Epithelium**: **simple columnar** in the cervical canal, but it **changes to stratified squamous epith.** (non-keratinized) at the external os. • **Corium**: CT containing tubulo-alveolar glands.	dense fibrous tissue with few smooth muscle fibers.



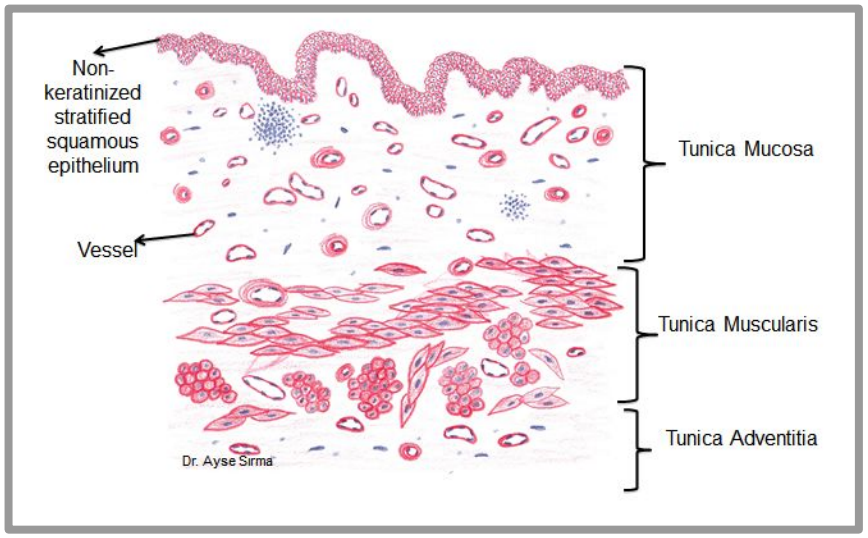


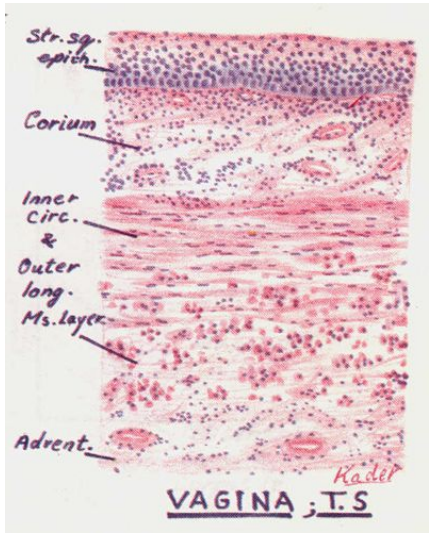




VAGINA

- **Mucosa:** shows transverse folds and is made of:
  - **Epithelium:** stratified squamous epithelium non-keratinized, rich in glycogen.
  - **Corium:** of dense C.T., very rich in blood vessels, elastic fibres and leukocytes.
- **Musculosa:**
  - formed of interlacing inner circular and outer longitudinal layers of smooth muscle fibres.
- **Adventitia:** formed of loose C.T.

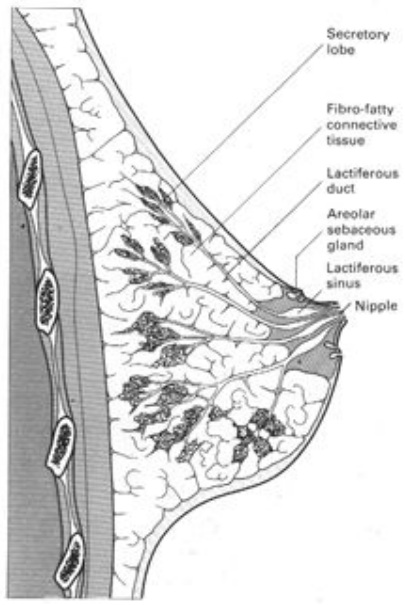


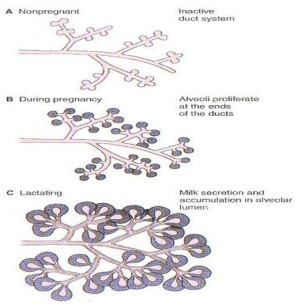


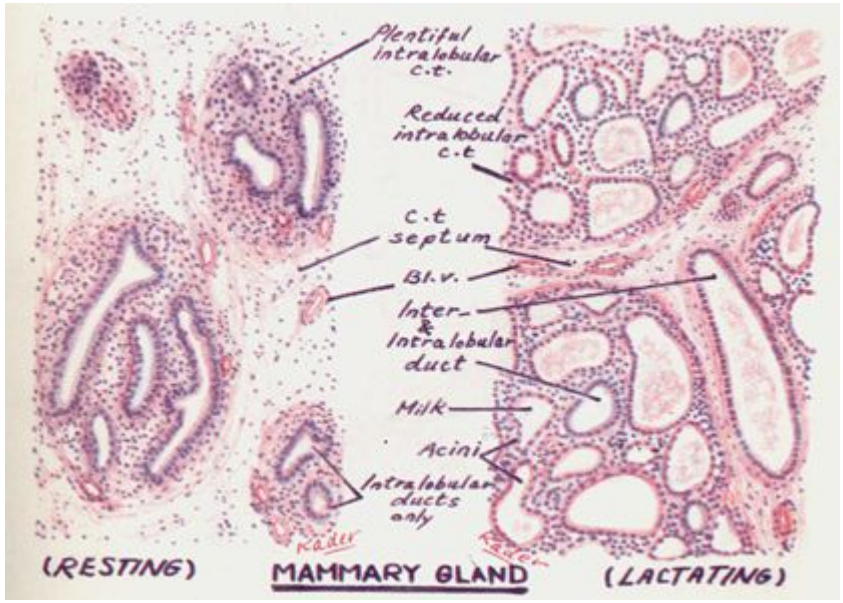
MAMMARY GLAND

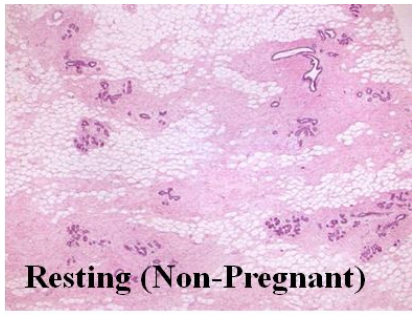
At puberty they enlarge by accumulation of fat, but contain only a duct system.
Secretory units appear only during pregnancy and are functioning only during lactation.

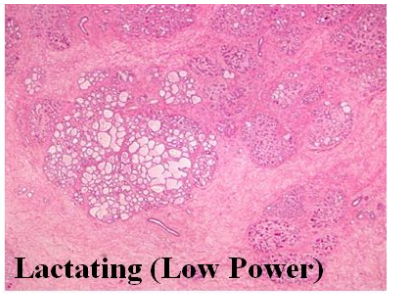
Resting Mammary Gland	Lactating Mammary Gland
• It is divided into lobes and lobules. • The **interlobular** C.T. is dense and contains numerous fat cells. • The **intralobular** C.T. is loose and contains no fat cells. • Within the lobules, there are widely separated ducts lined by simple cuboidal epithelium. • Ducts collect to form lactiferous ducts lined by stratified columnar epithelium and open at the top of the nipple.	• Interlobular and intralobular C.T. become reduced. • Lobules are made of ducts and alveoli. • Alveoli are distended with milk and lined by cuboidal or flat cells surrounded by myoepithelial cells. • Milk appears acidophilic with vacuoles of dissolved fat.

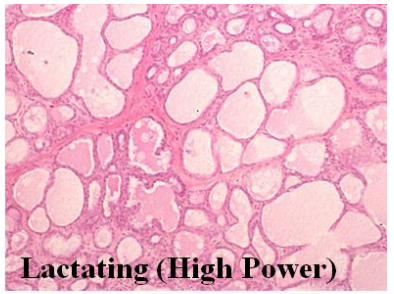












Quiz

1: : Which of the following is the normal epithelium of the oviduct?

A. Simple columnar epithelium.
B. Stratified squamous epithelium.
C. Simple columnar epithelium partially ciliated.
D. Simple squamous epithelium.

2: Which ONE of the following can be found in a mature graafian follicle?

A. Zona pellucida
B. Granulosa lutein cells
C. Theca lutein cells
D. Cytotrophoblast

3: Which of the following structures is formed of stratified squamous epithelium?

A. Vagina
B. fundus and body of the uterus
C. body of uterus
D. fallopian tubes

4: At which day ovulation commonly occur

A. at day 11 of the cycle
B. at day 28 of the cycle
C. at day 14 of the cycle
D. at day 8 of the cycle

5: Which one of the following is true about Resting Mammary Gland

A. The interlobular C.T. is loose
B. The intralobular C.T. is loose
C. The interlobular contains no fat cells
D. The intralobular contains numerous fat cells.

6: Which ONE of the following structures Is found In ovary of a 5 years old girl?

A. Corpus luteum.
B. Mature Graafian follicle.
C. Primary ovarian follicle.
D. Primordial follicle.

1C 2A 3A 4C 5B 6D

Team Leaders

- Abdullah shadid
- Sarah Alflaij

Good luck ❤️