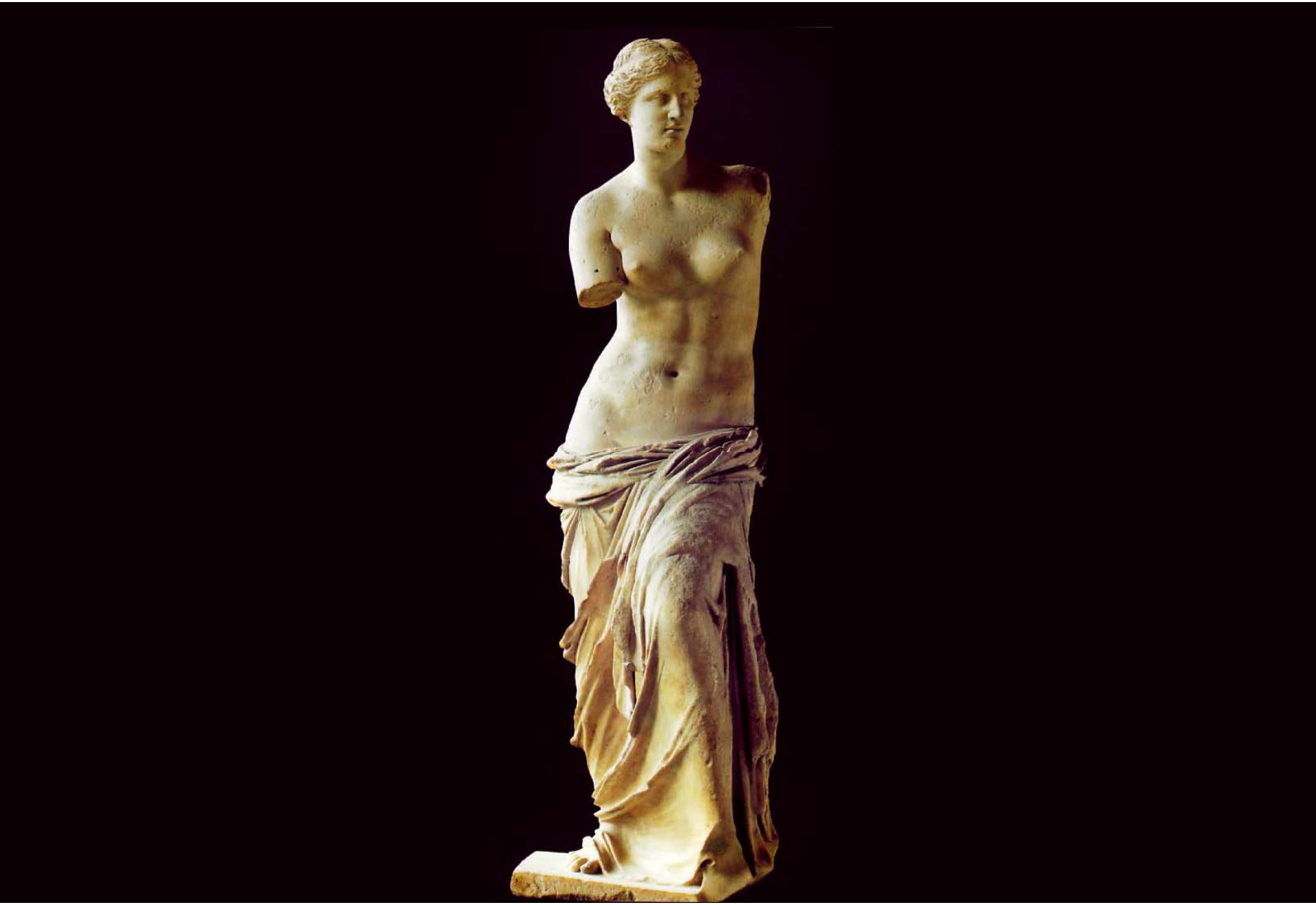
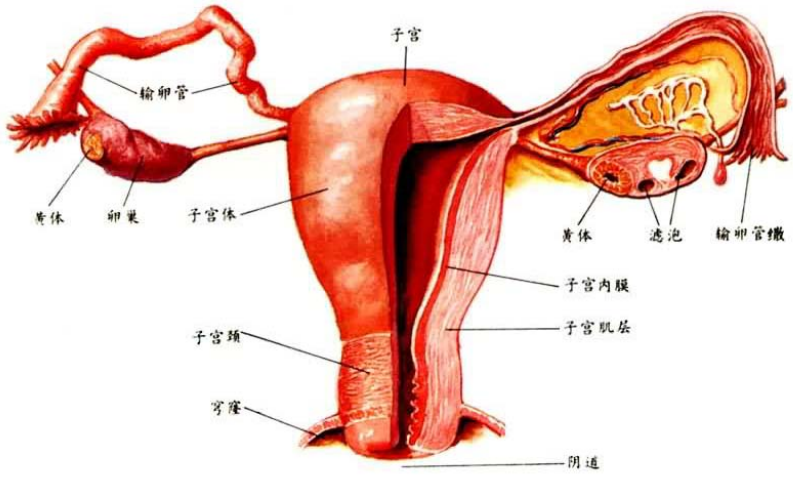


# Female reproductive system

# composition

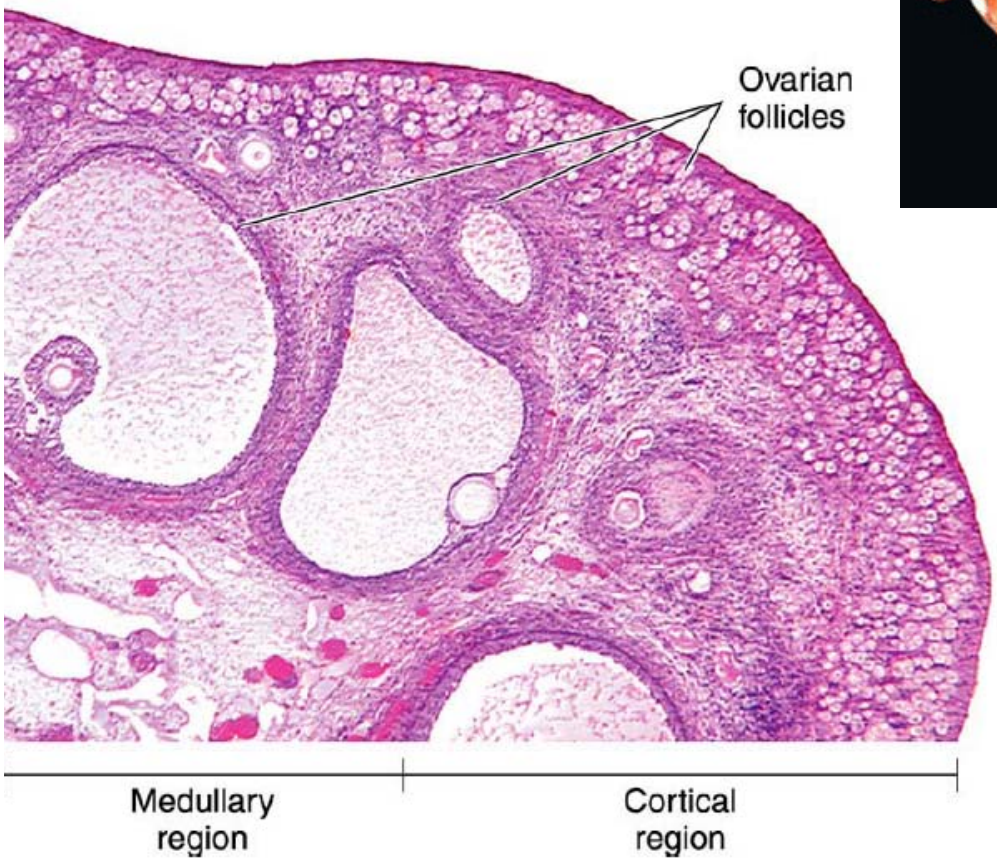



1. Ovary
2. Oviduct
3. Uterus
4. Vagina (阴道)
5. External genitalia (外生殖器)

# Ovary

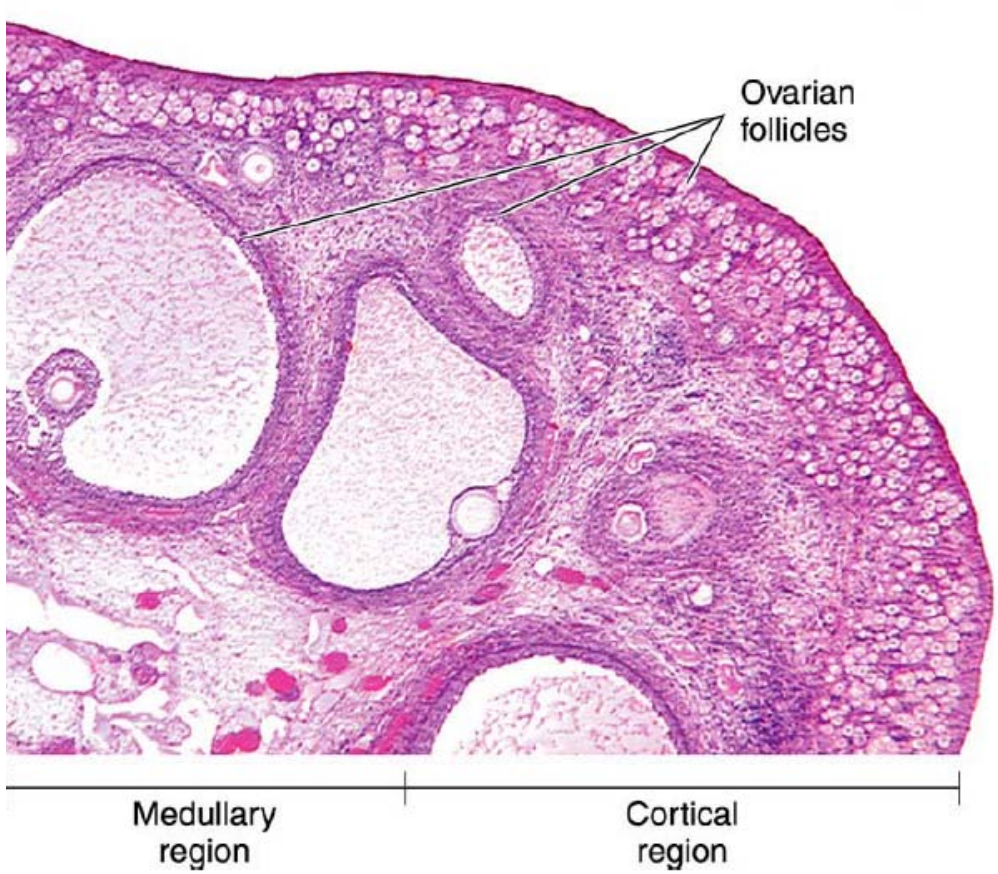
- General structure
- Ovarian follicles（卵泡）
- Ovulation（排卵）
- Corpus luteum（黄体）
- Atretic follicles (闭锁卵泡) and interstitial gland（间质腺）
- Hilus cell (间质腺)

# General structure of ovary



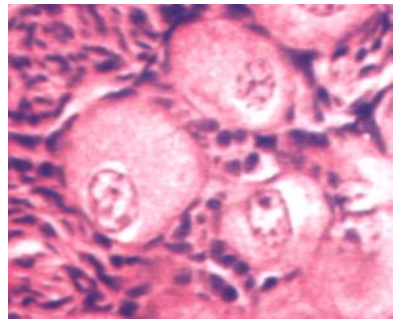

# Ovarian follicle

- Primordial follicle
- Growing follicle
  primary follicle
  secondary follicle
- Mature follicle
- Atretic follicle

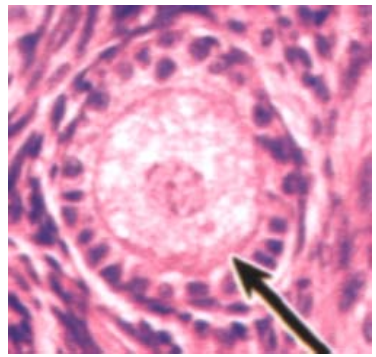


# Process of ovarian follicle development

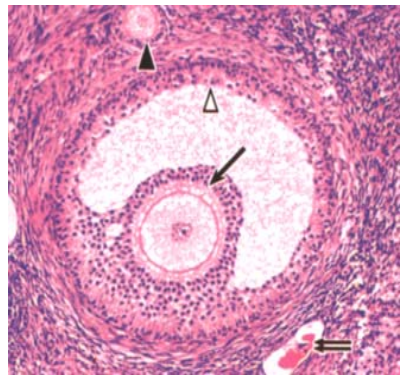
**Primordial follicle**



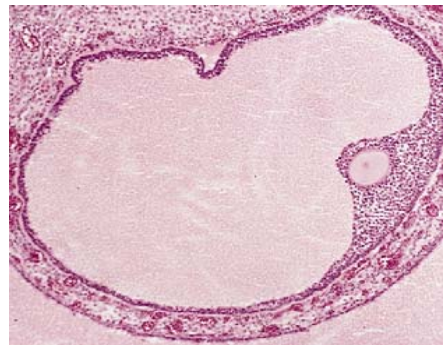
**Primary follicle**



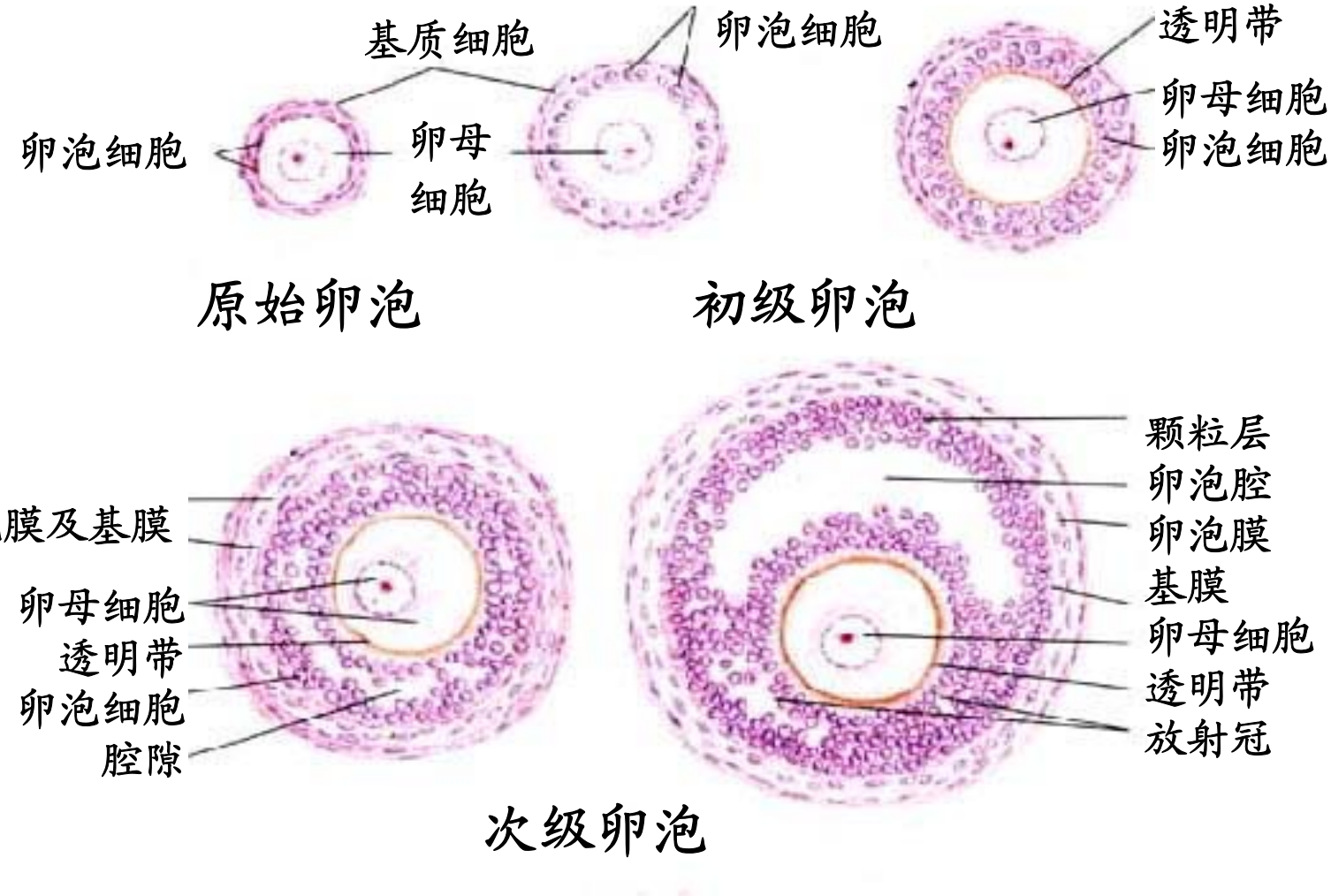
**Secondary follicle**



**Mature follicle**



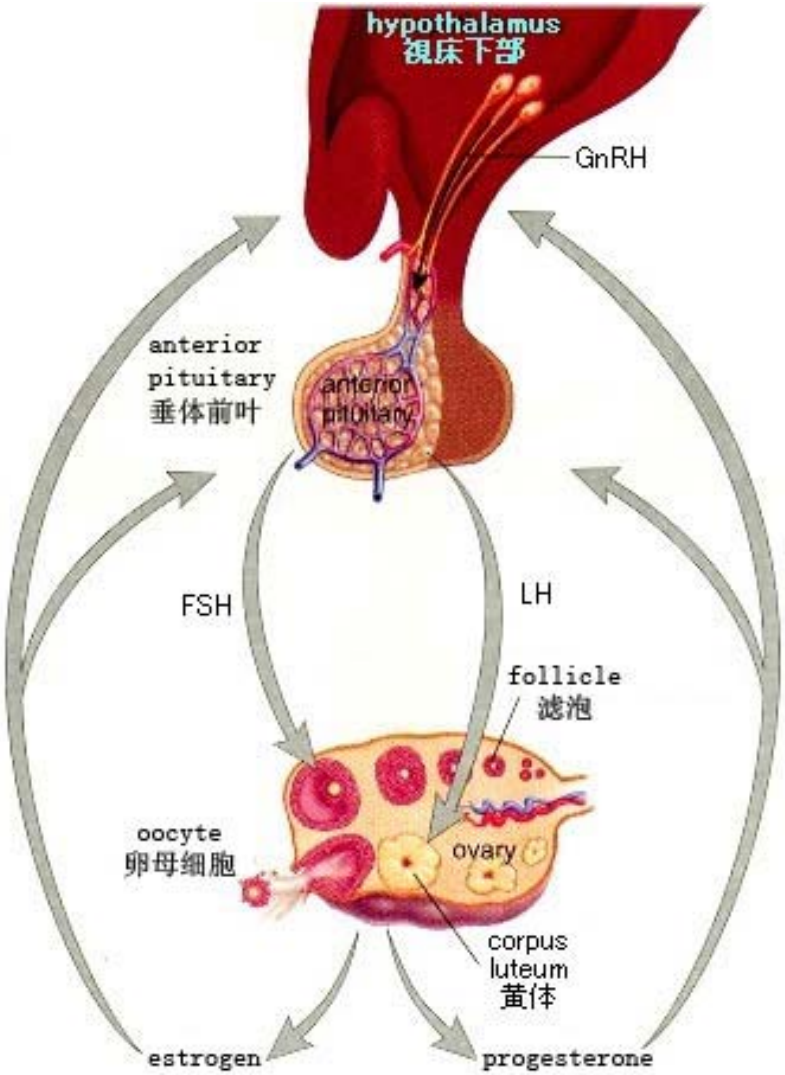
# Structure of ovarian follicle

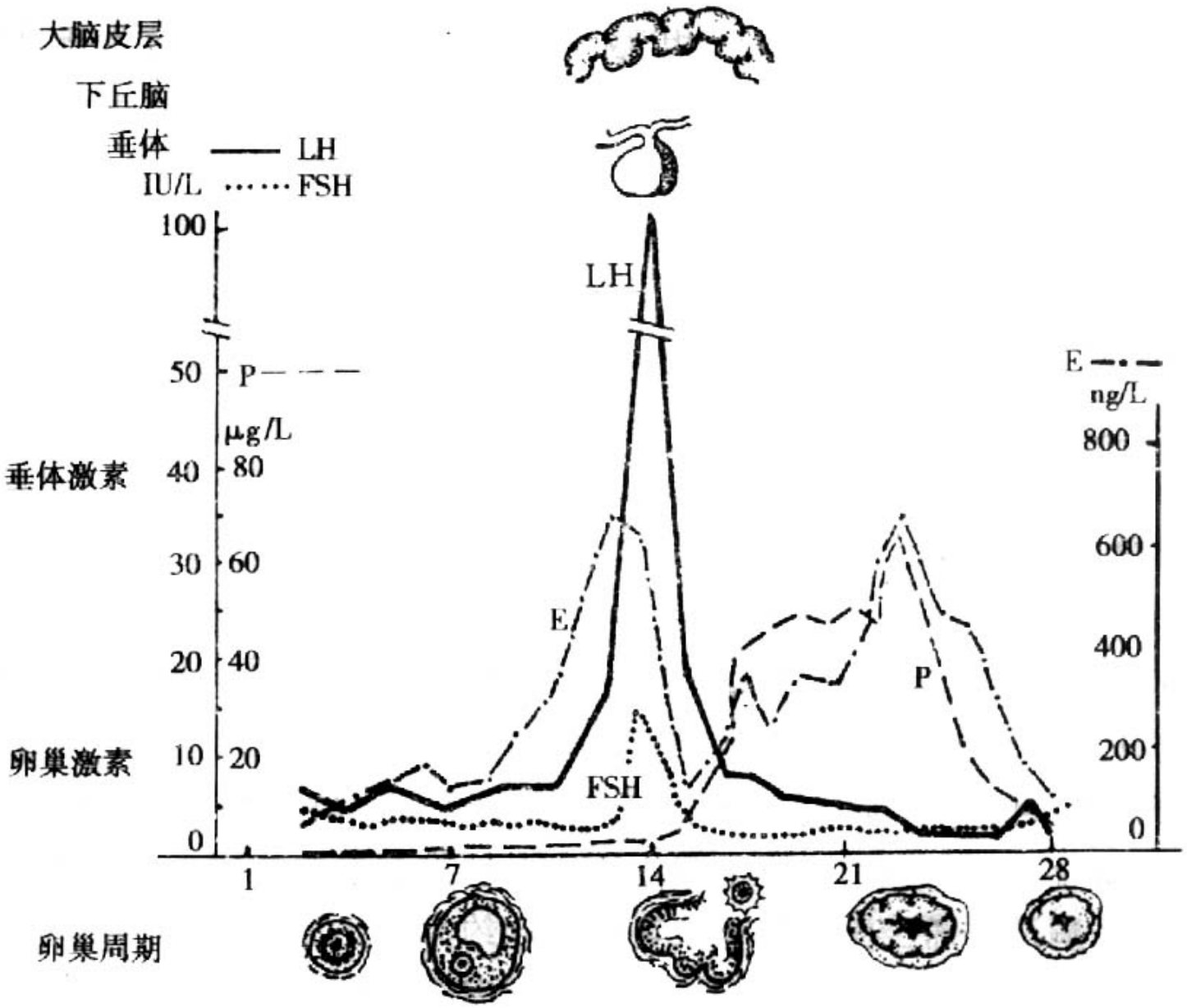


# Structure of ovarian follicle

**Ovarian follicle** = **follicular cells** + **oocyte**

**oocyte**
- **Primary oocyte** — in primondial follicle, growing follicle
- **Secondary oocyte** — in mature follicle

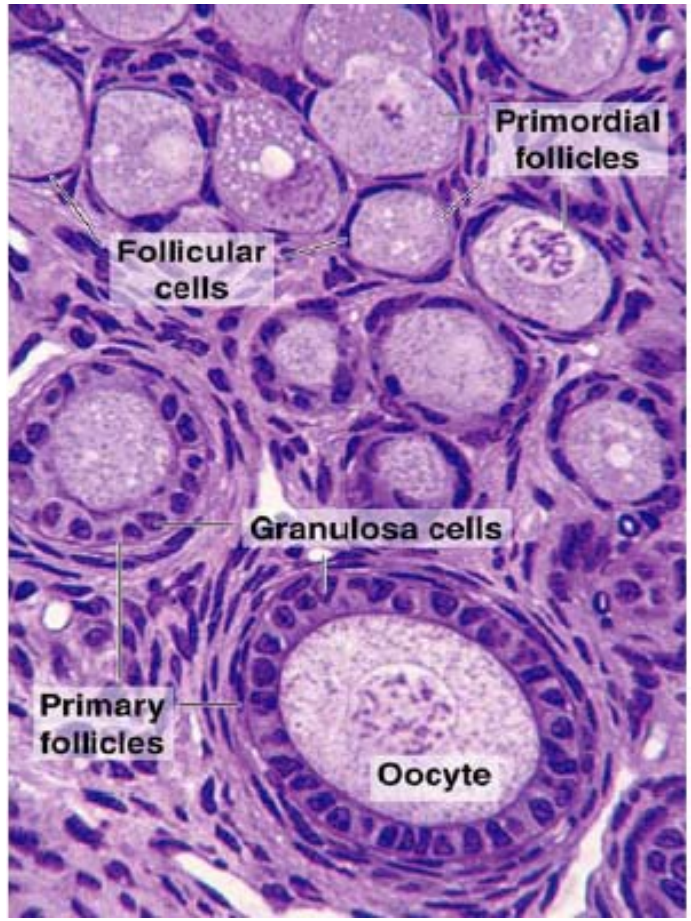

hypothalamus
視床下部
GnRH
anterior
pituitary
垂体前叶
anterior
pituitary
FSH
LH
follicle
滤泡
oocyte
卵母细胞
ovary
corpus
luteum
黃体
estrogen
progesterone




下丘脑-垂体-卵巢轴在月经周期中的变化

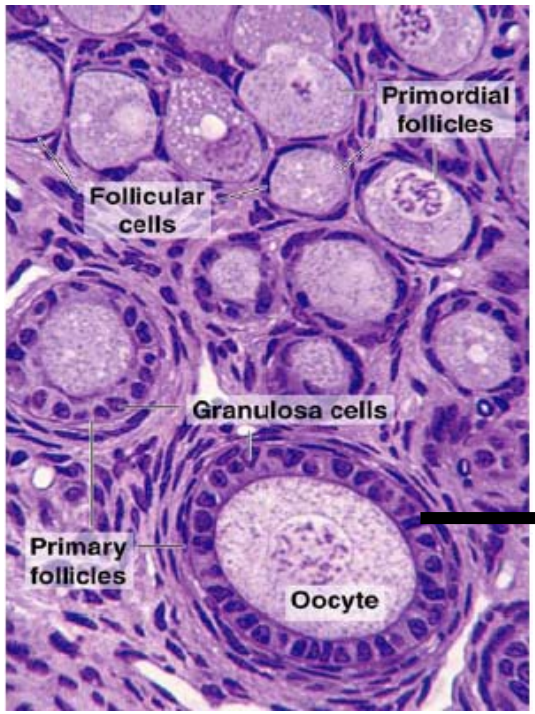
# Primordial follicle

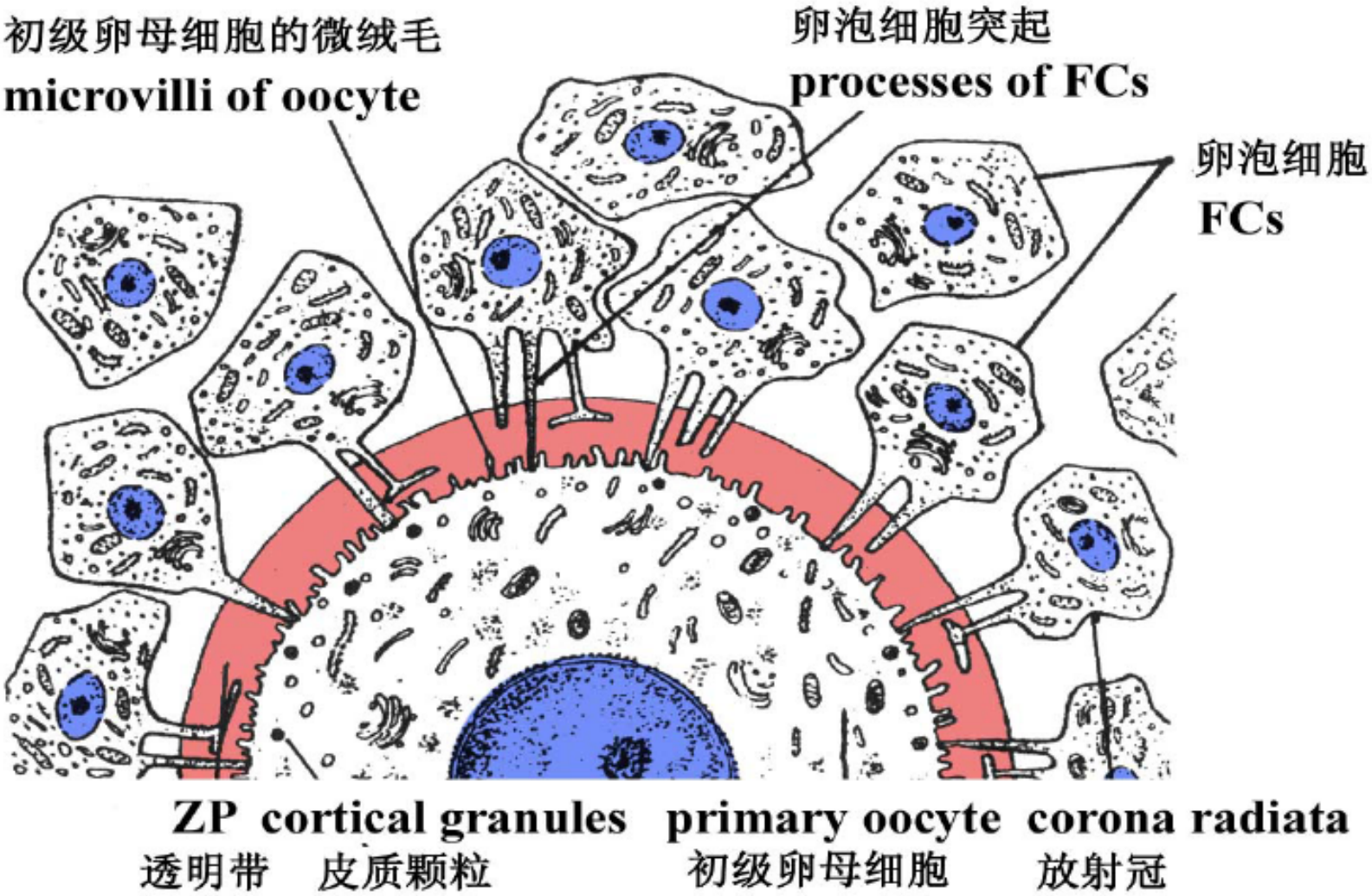
- Primary oocyte (初级卵母细胞)
- Follicular cells (卵泡细胞): primary oocyte enveloped by single layer of flattened follicular cells



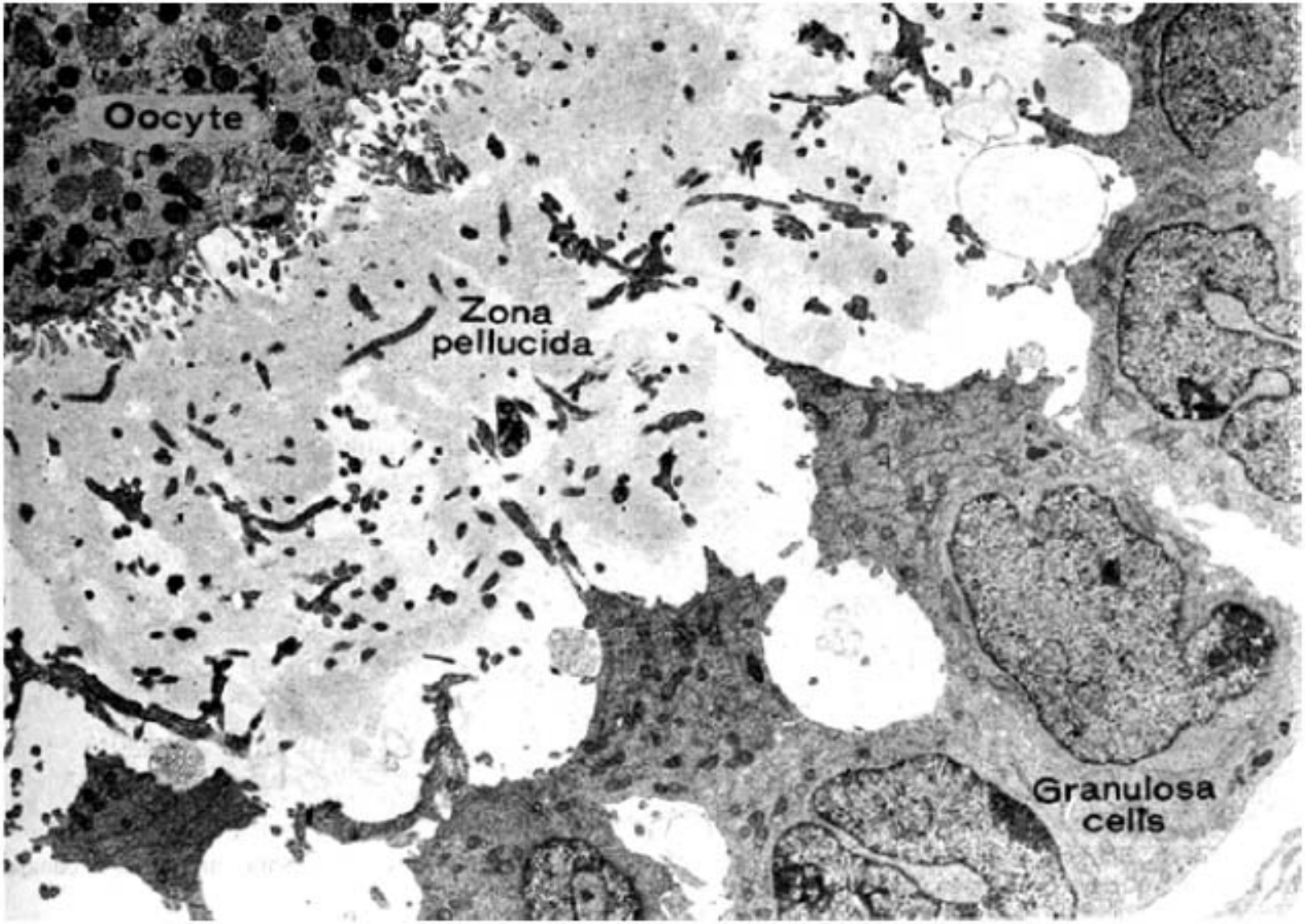
# Primary follicle

- **Follicle cell: single layer → multiple layers**
- **Primary oocyte: enlarge, cell organ,** 皮质颗粒
- **Zona pellucida: formed; ZP3 receptor**



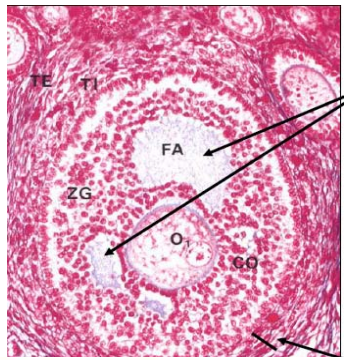

**Zona Pellucida, a thick tough refractile membrane**

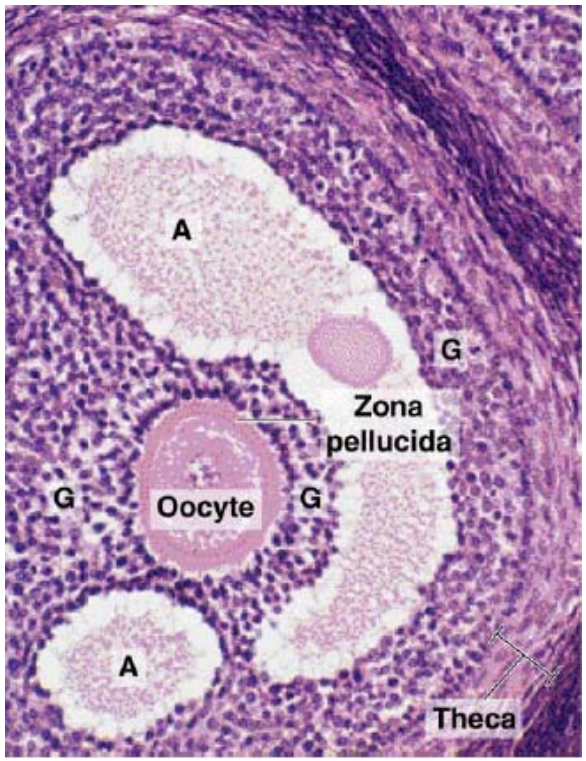


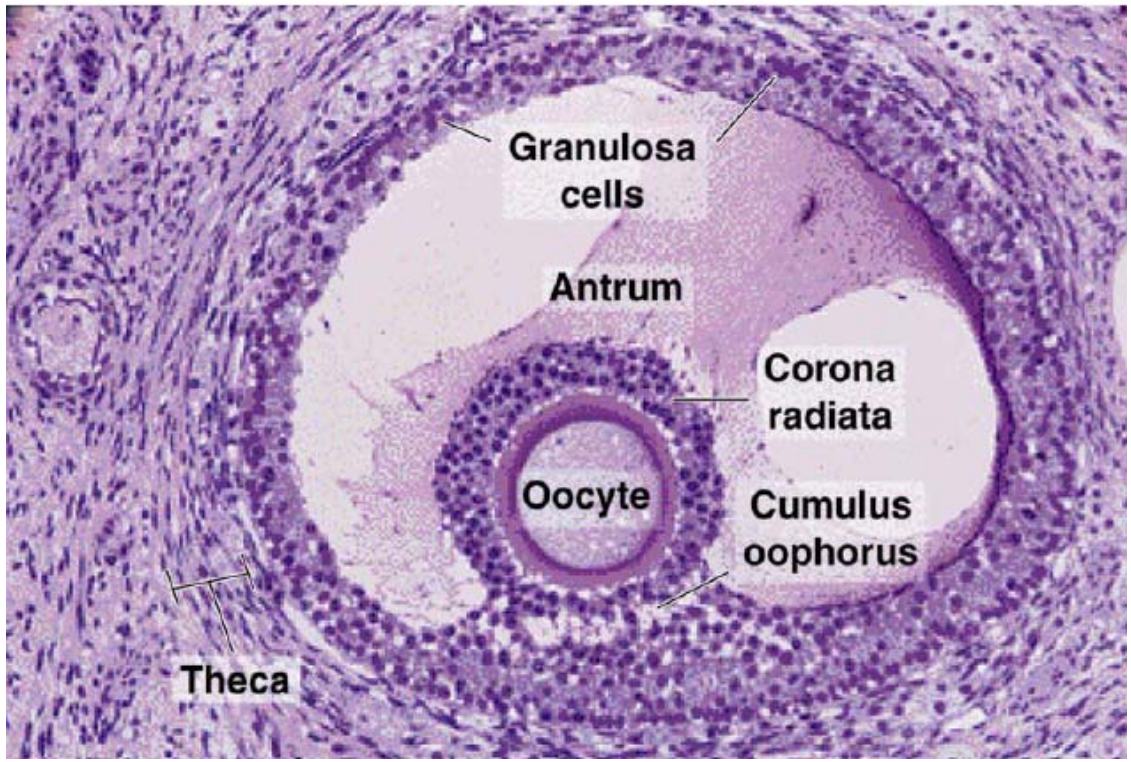

TEM of ZP. Microvilli or cytoplasmic processes insert into ZP. ZP has ZP1, ZP2 and ZP3 (sperm receptor) glycoproteins.

# Secondary follicle

- Follicular antrum (卵泡腔): formed, have follicular fluid in it
- Granulosa layer: are follicular cells
- Structure of cumulus oophorus:



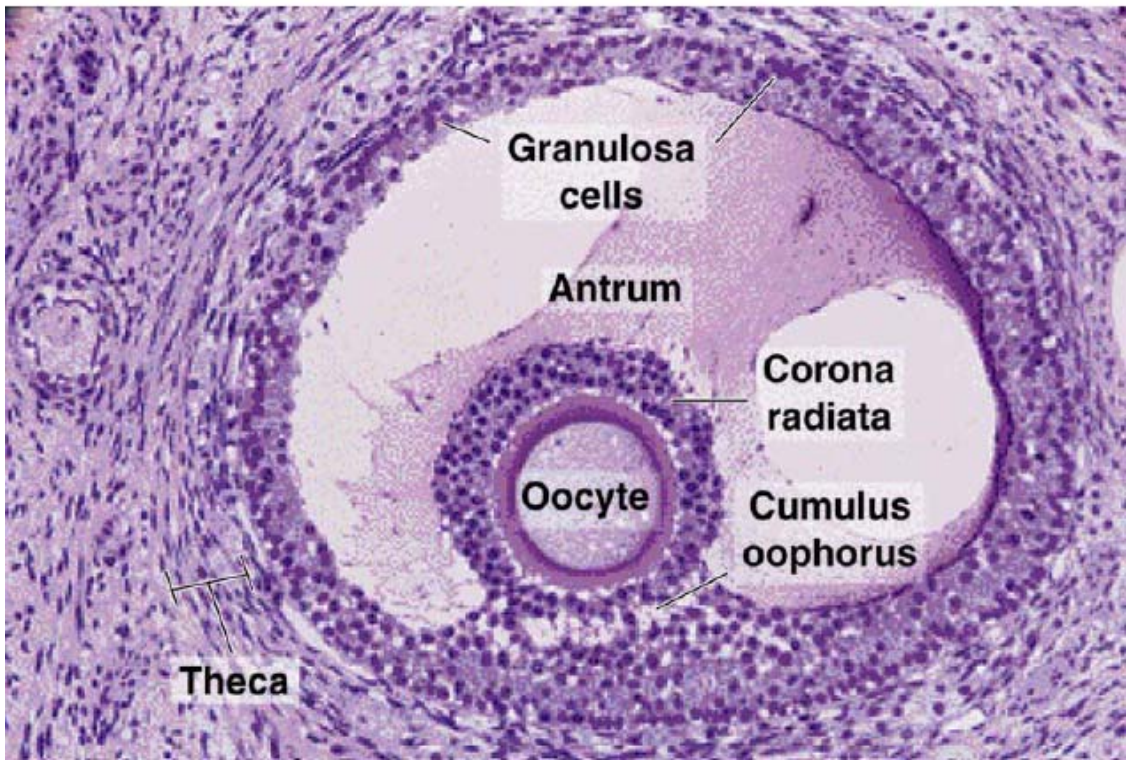



# Secondary follicle

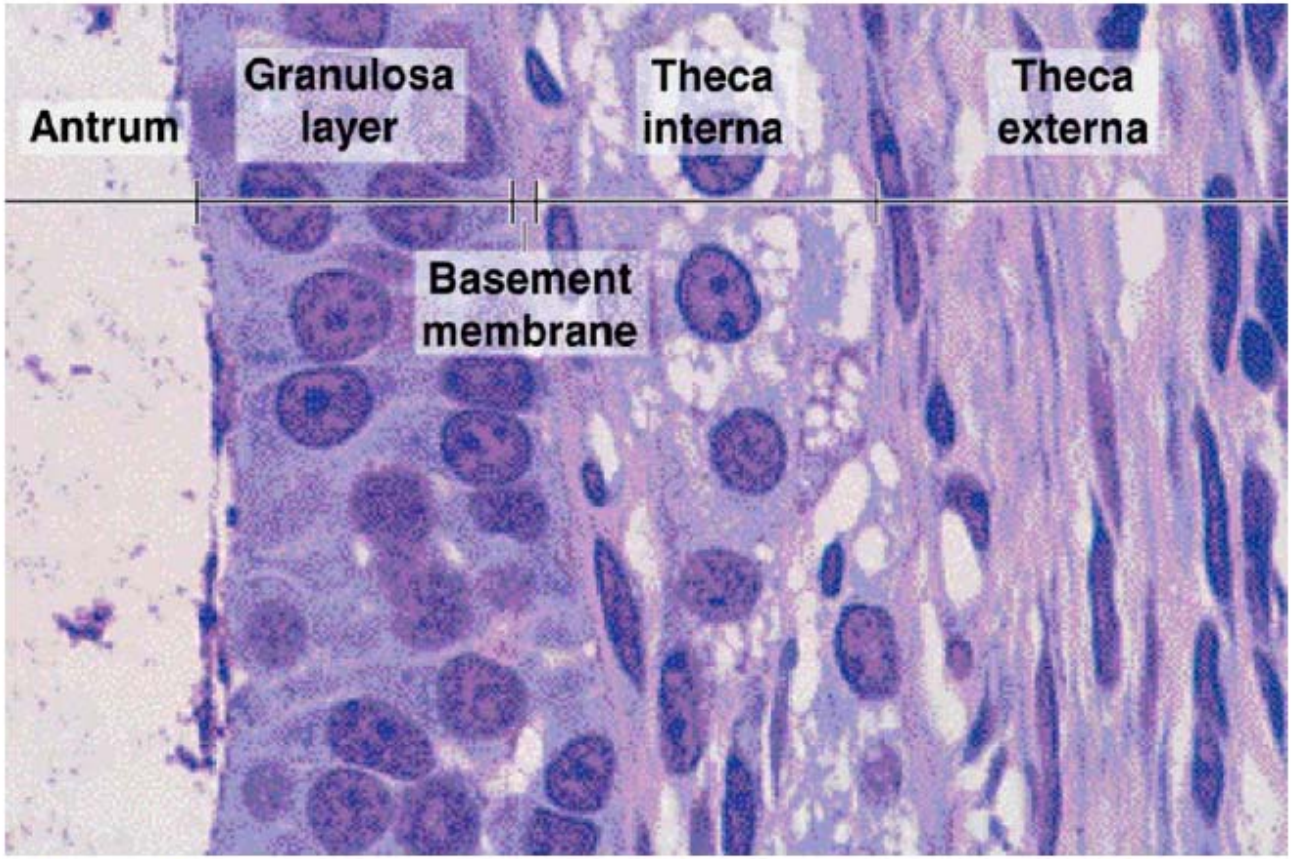
- Follicular theca:

  theca interna: theca cell and blood vessel

  theca externa: more fiber, a little blood vessel.

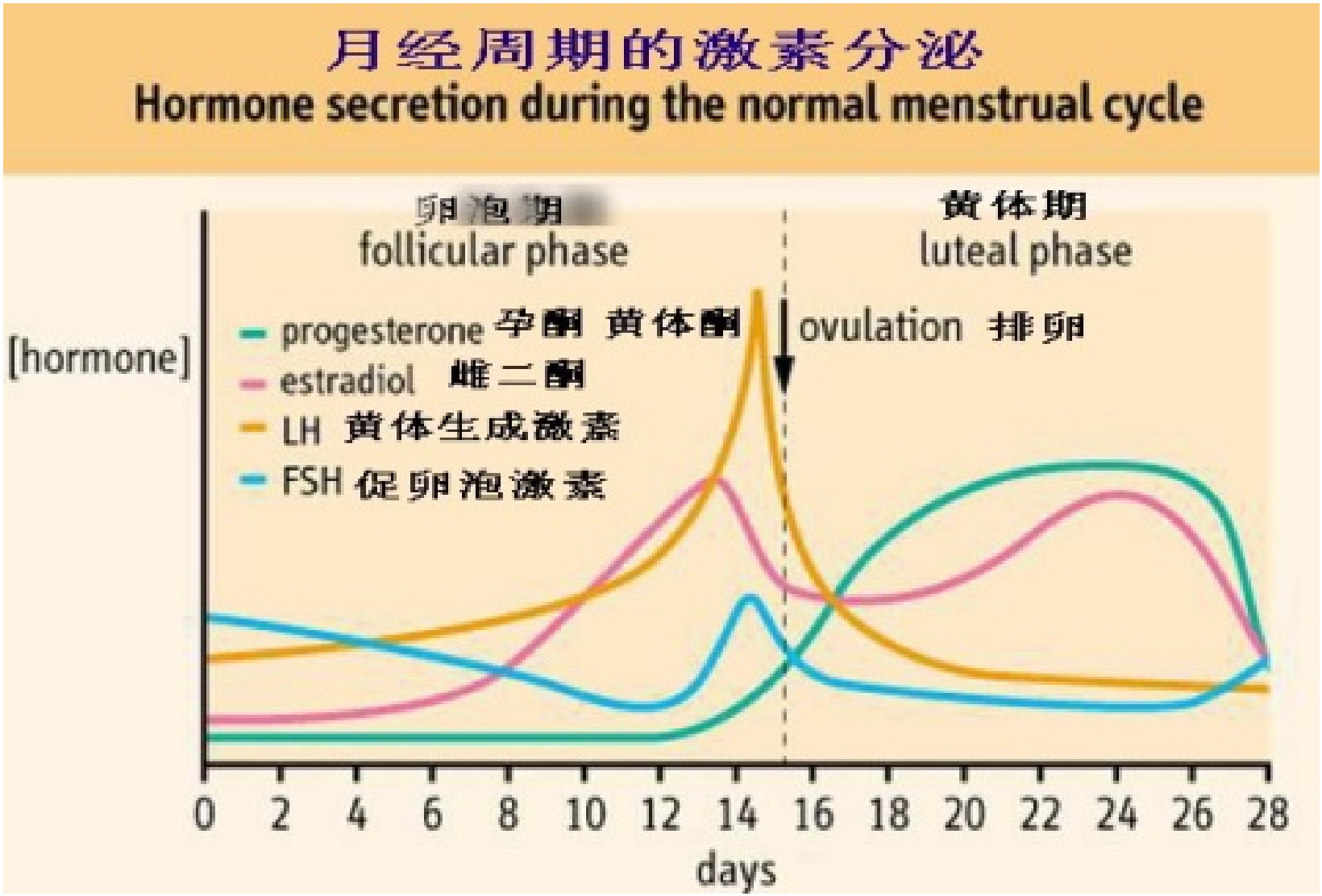


# Follicle theca



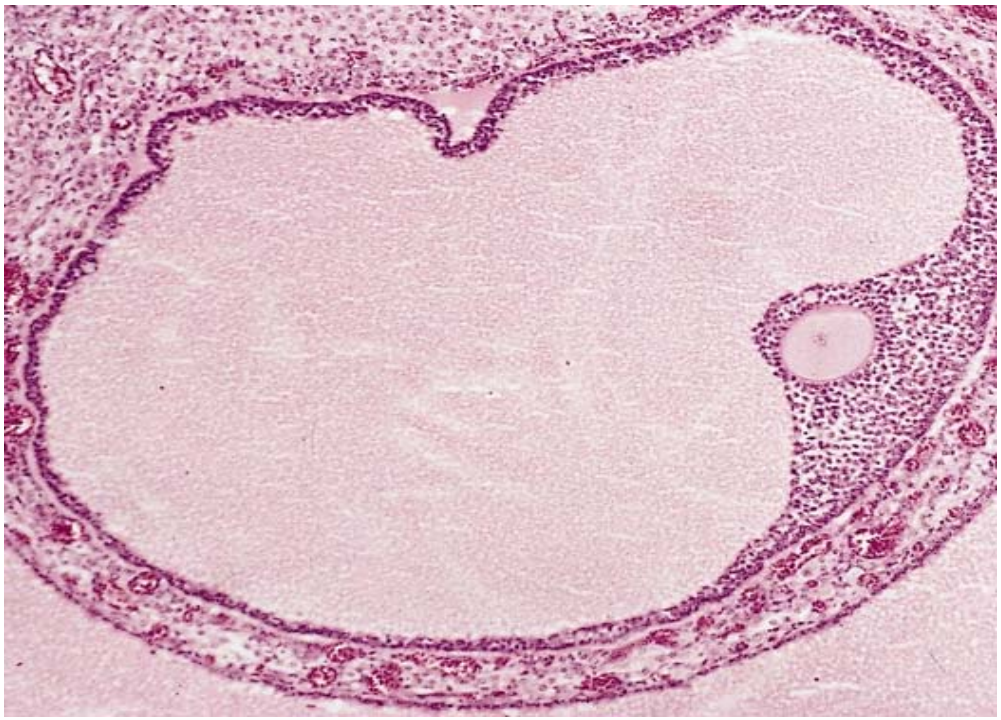

**Part of a secondary follicle. HE stain. Low power. The theca has two layers: theca interna (steroid-secreting cells that producing estrogen) and theca externa (fibroblasts).**

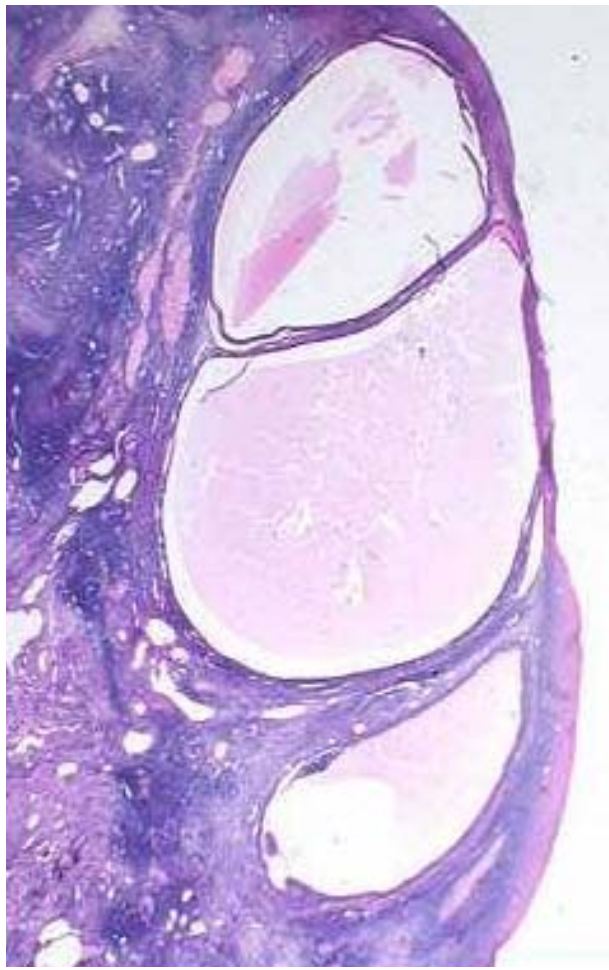
- Estrin (雌激素): formed the granulosa cell and theca cell



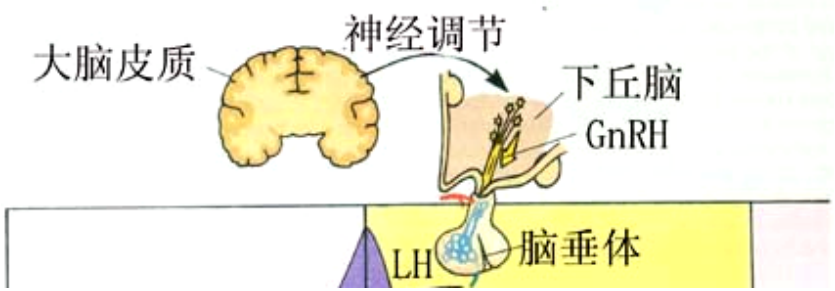
# Mature follicle

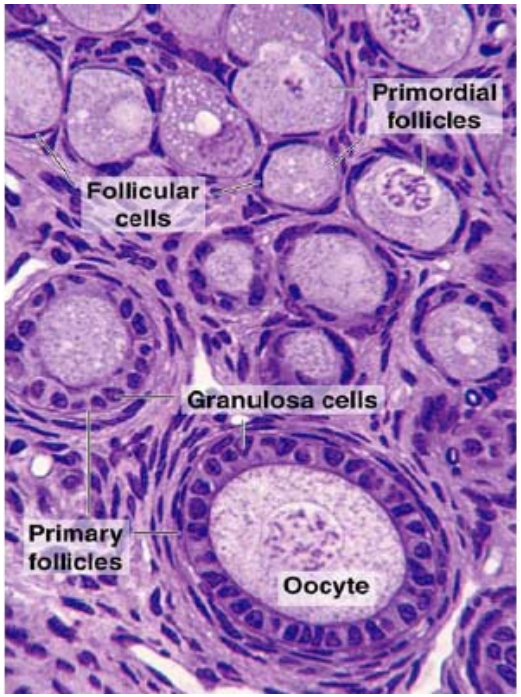
- Follicular antrum: enlarge
- Granulosa layer: thin
- Oocyte: secondary oocyte

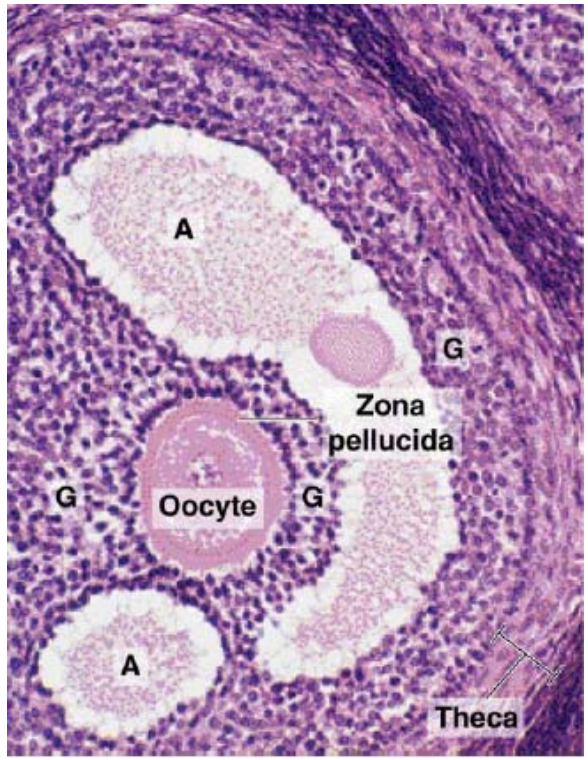




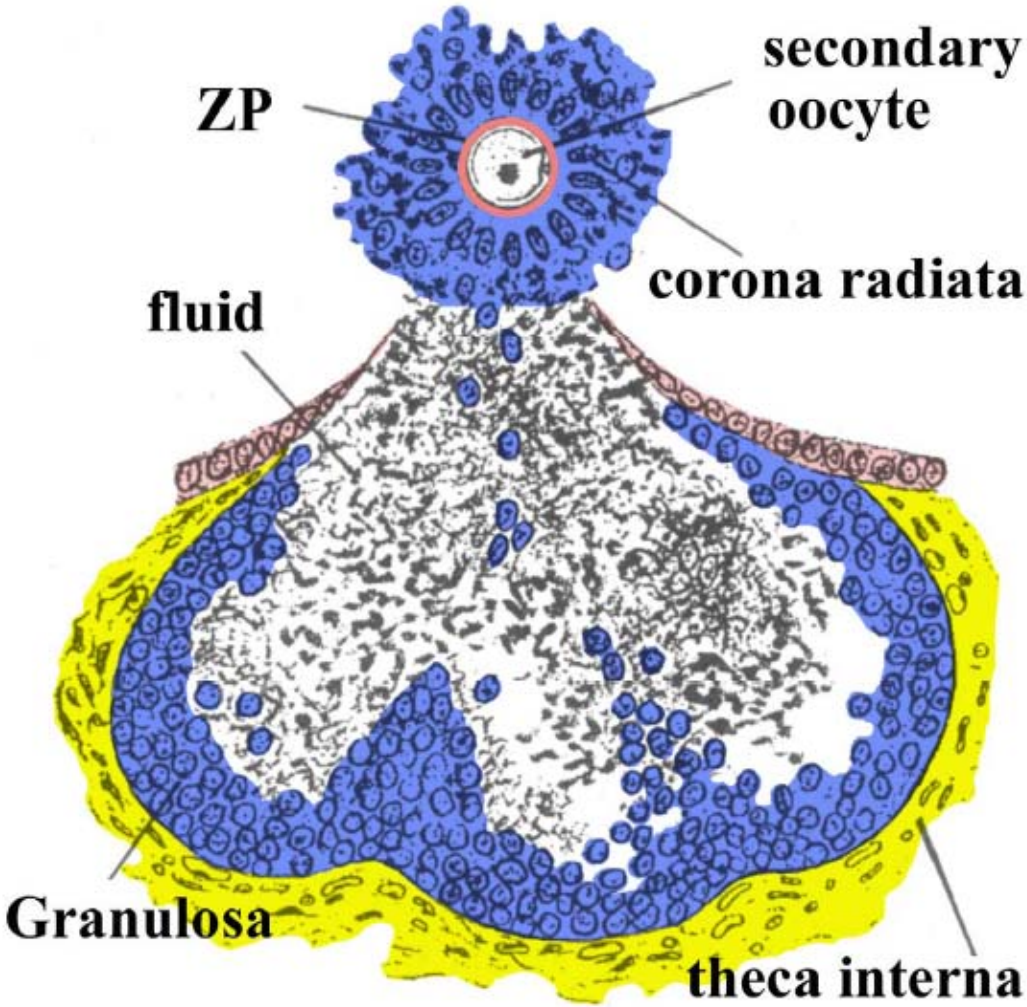
# Compared the ovarian follicles



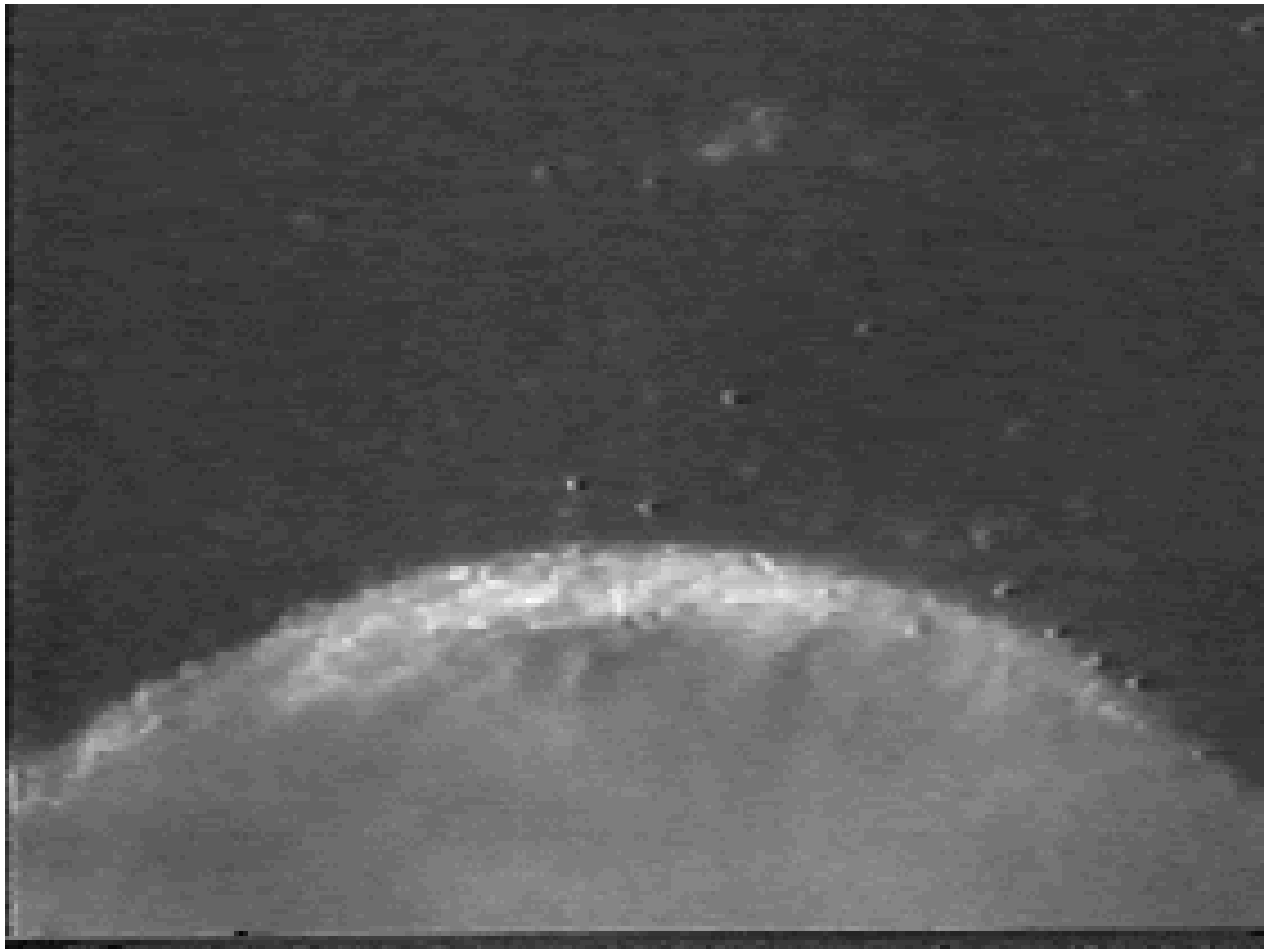




# ovulation

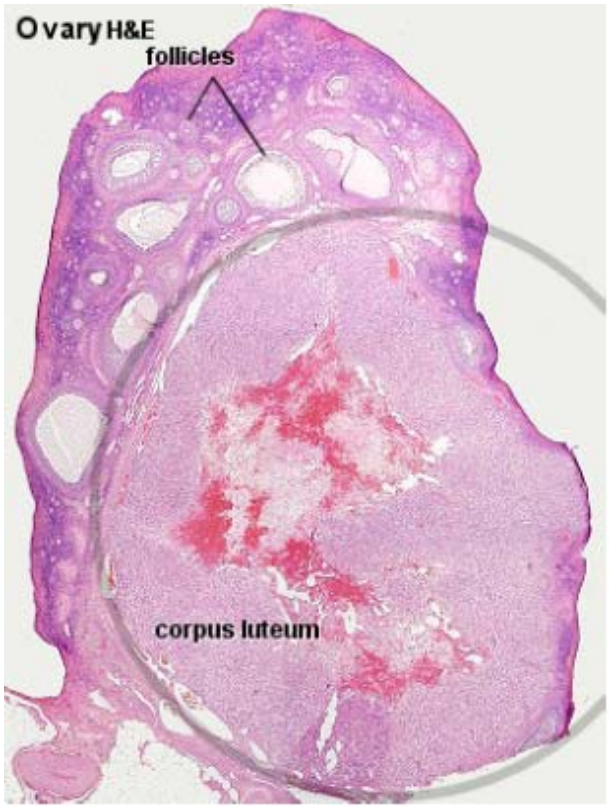

ZP
secondary oocyte
corona radiata
fluid
Granulosa
theca interna

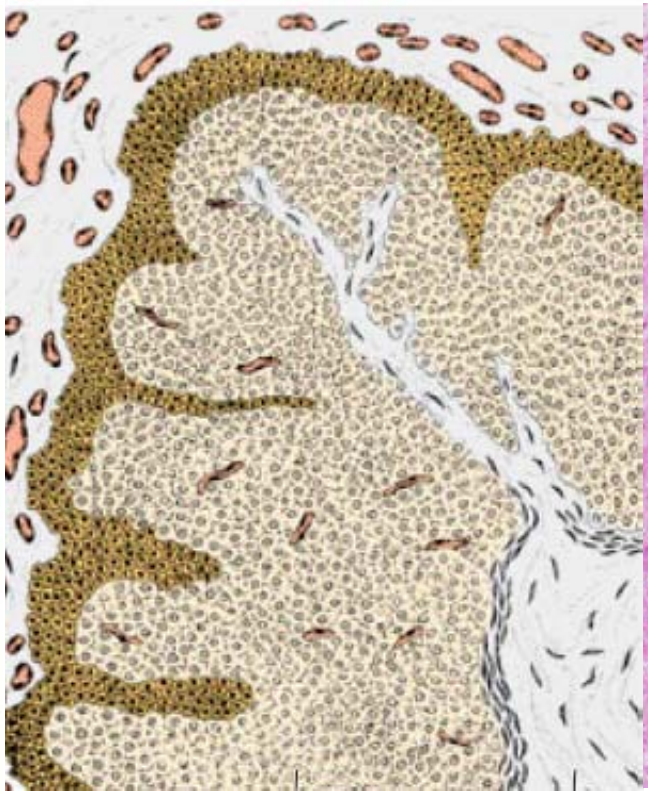
# ovulation

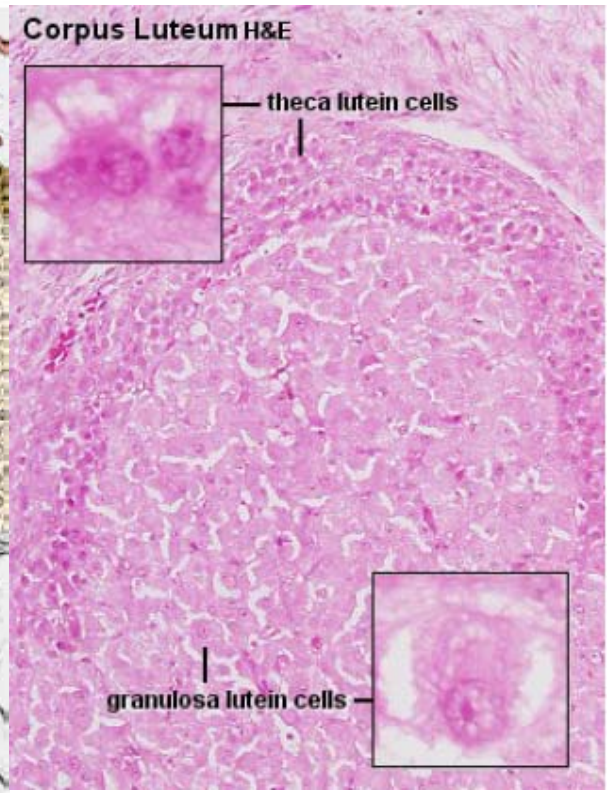


# Corpus luteum(黄体)

- Granulosa lutein cell: progesterone(孕酮)
- Theca lutein cell: estrin(雌激素)





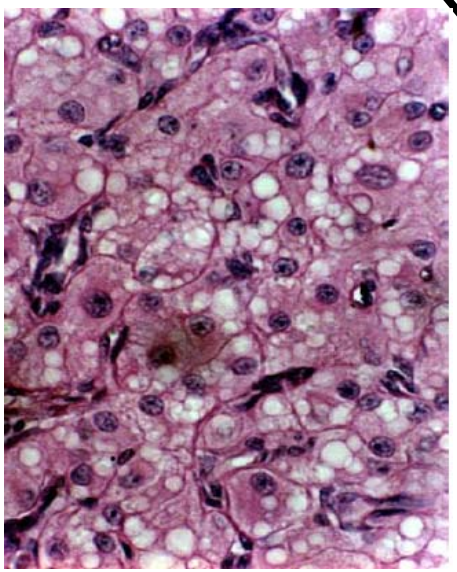
# Derivation of Corpus luteum

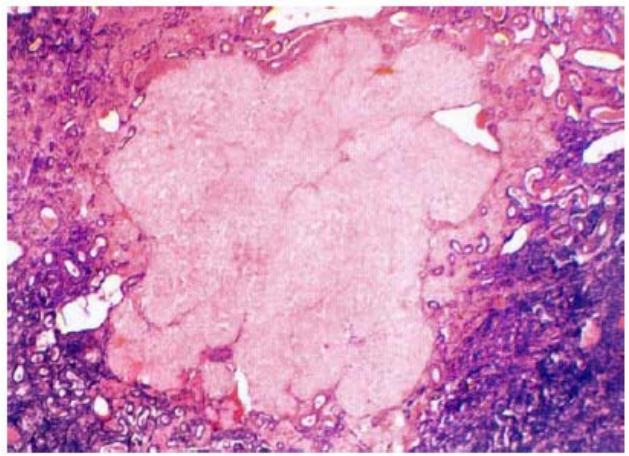
**Corpus luteum**

**Corpus leteum of menstruation**
月经黄体

**Corpus luteum of pregnancy**
妊娠黄体

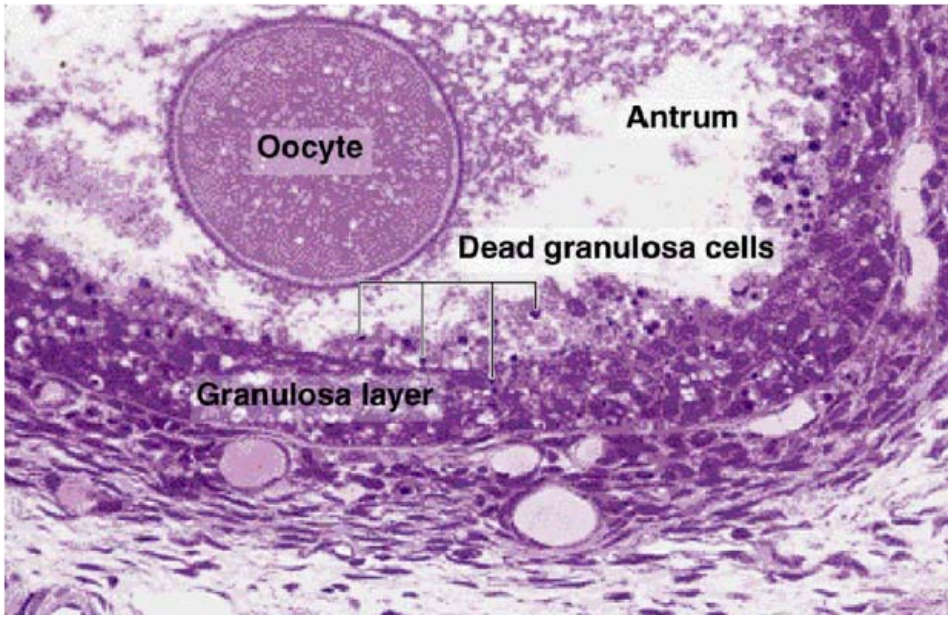
**Corpus albicans**
白体

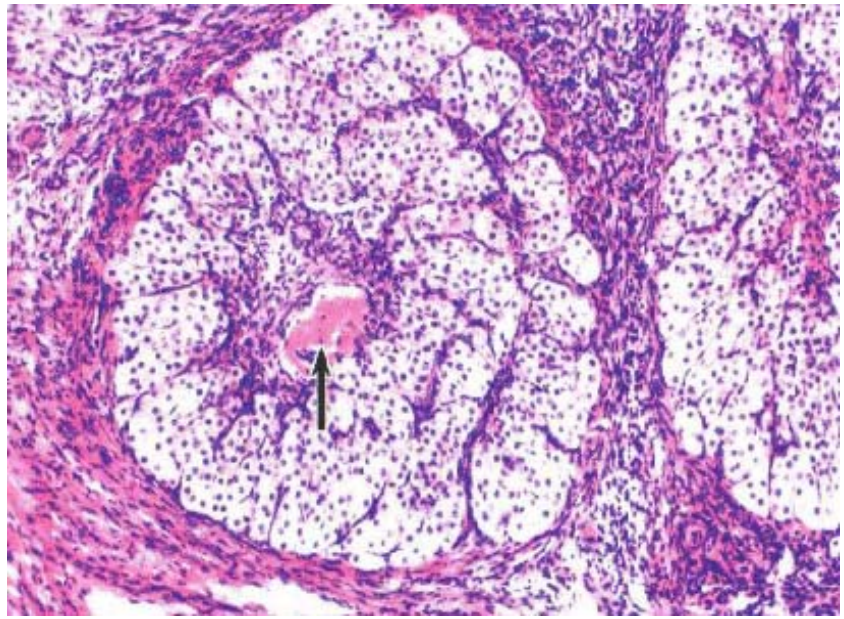


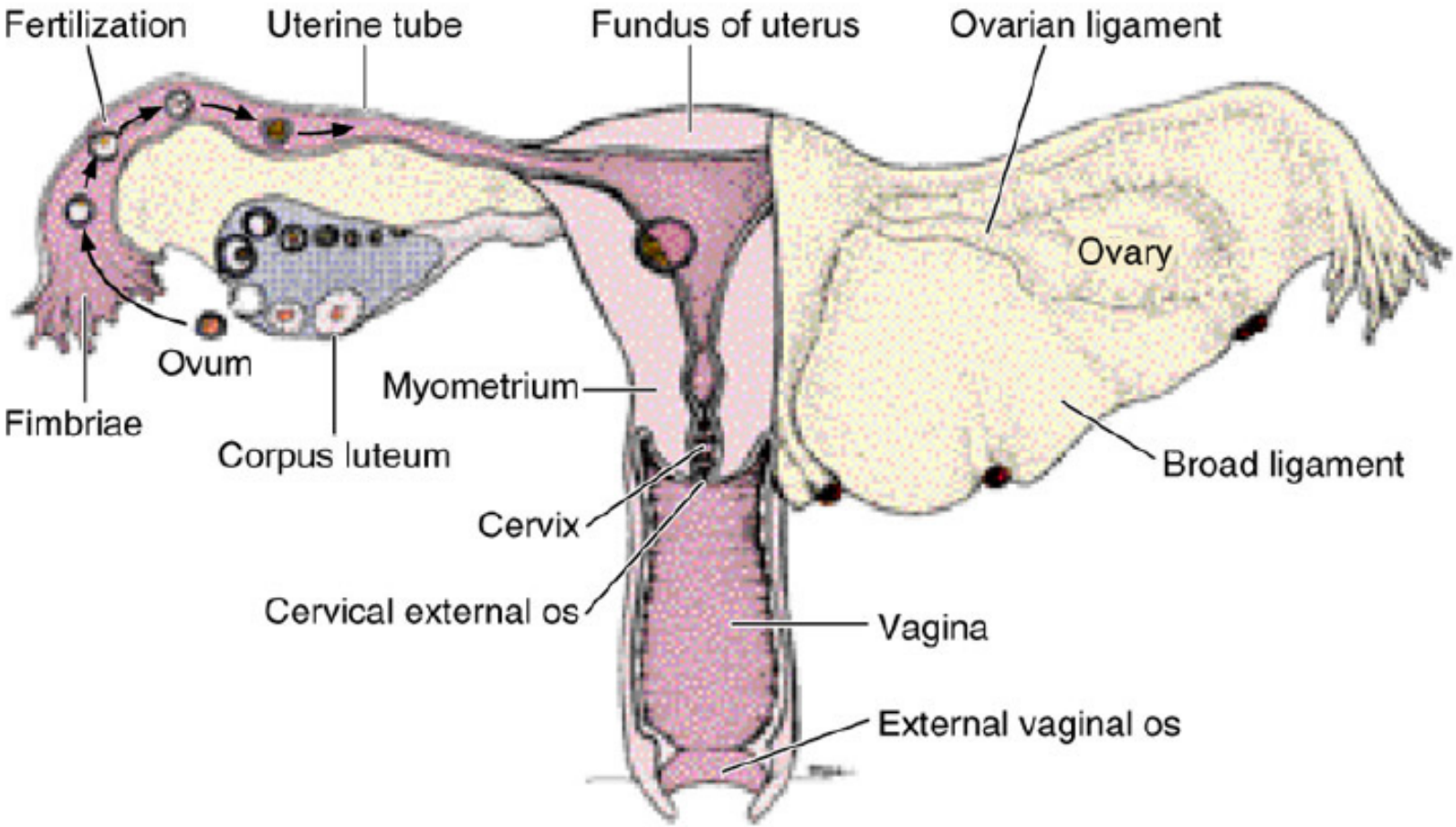


# Atretic follicle

- Primordial follicle, primary follicle:
- Secondary follicle:

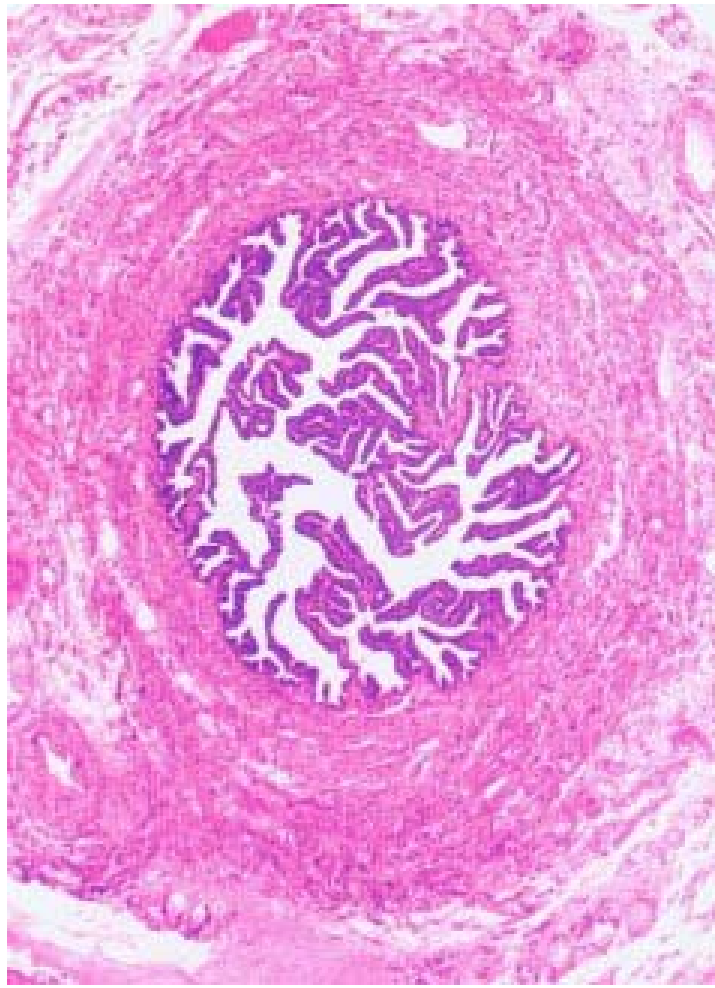


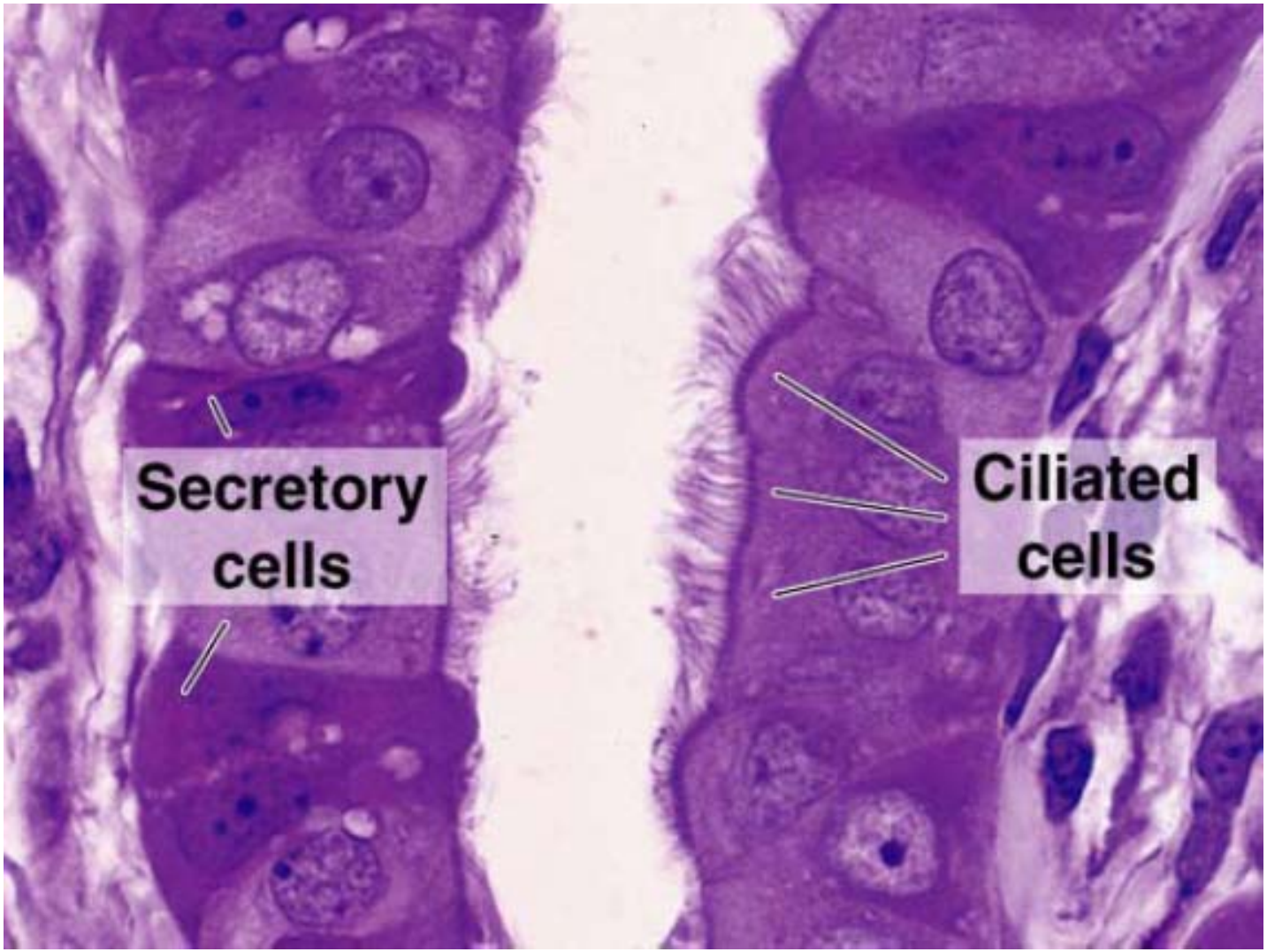

Fertilization
Uterine tube
Fundus of uterus
Ovarian ligament
Ovary
Ovum
Fimbriae
Corpus luteum
Myometrium
Broad ligament
Cervix
Cervical external os
Vagina
External vaginal os

# Oviduct (输卵管)

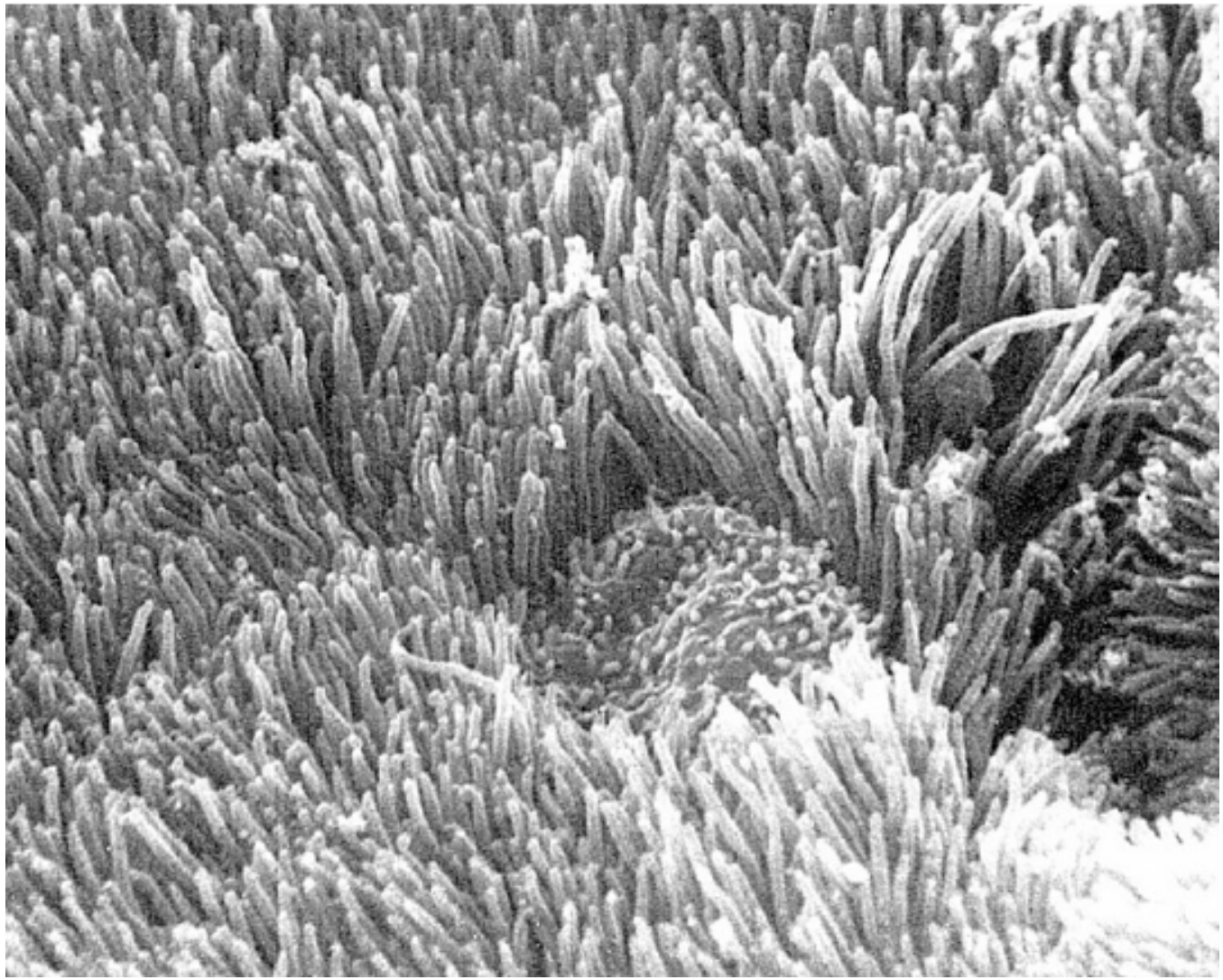
- Mucosa
  mucosal fold
  simple columnar epithelium
    ciliated columnar cells
    mucus-secreting cells
  lamina propria
- Muscularis
- Serosa



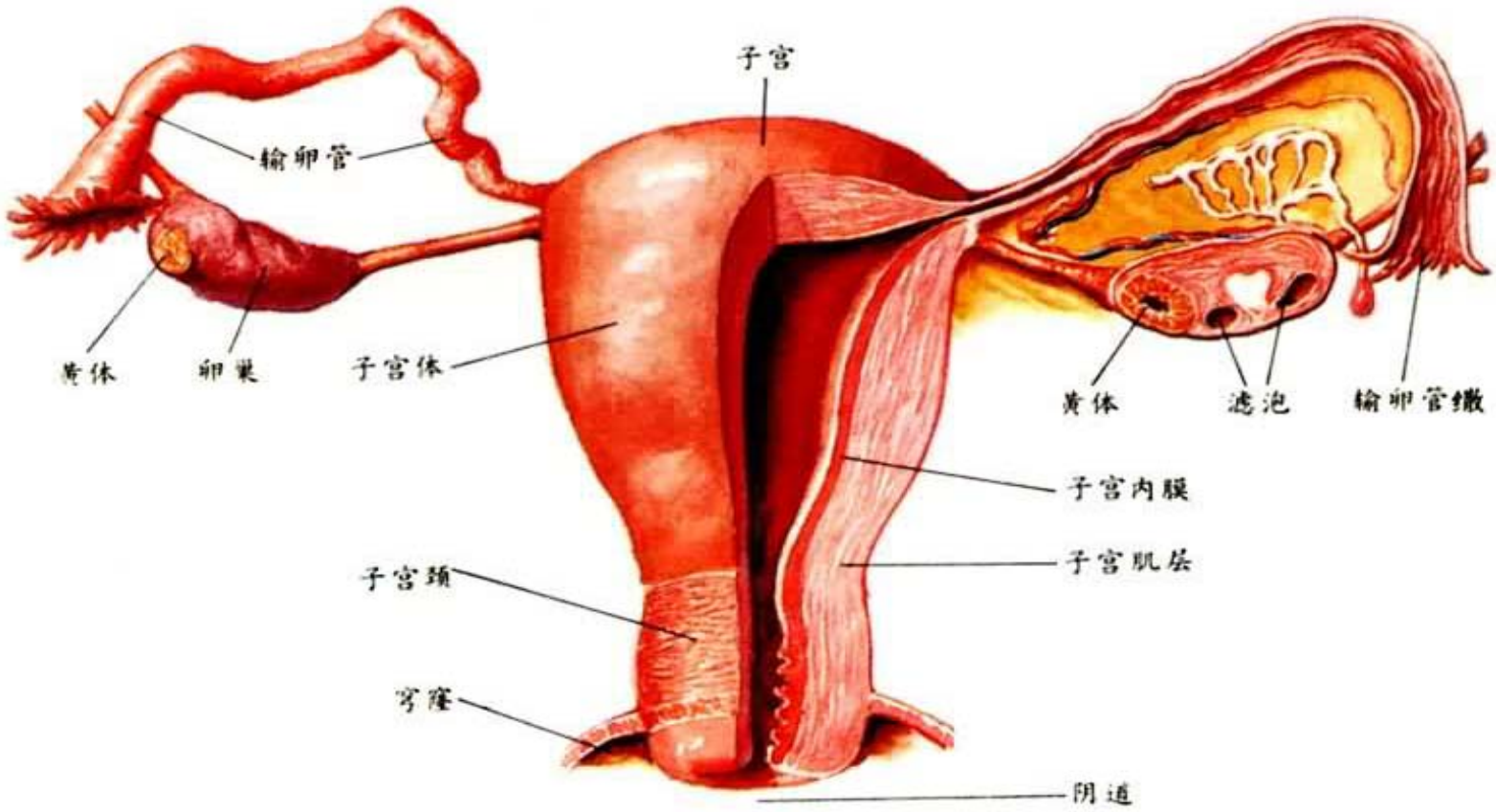
# Epithelium of oviduct



# Epithelium’s Surface of oviduct



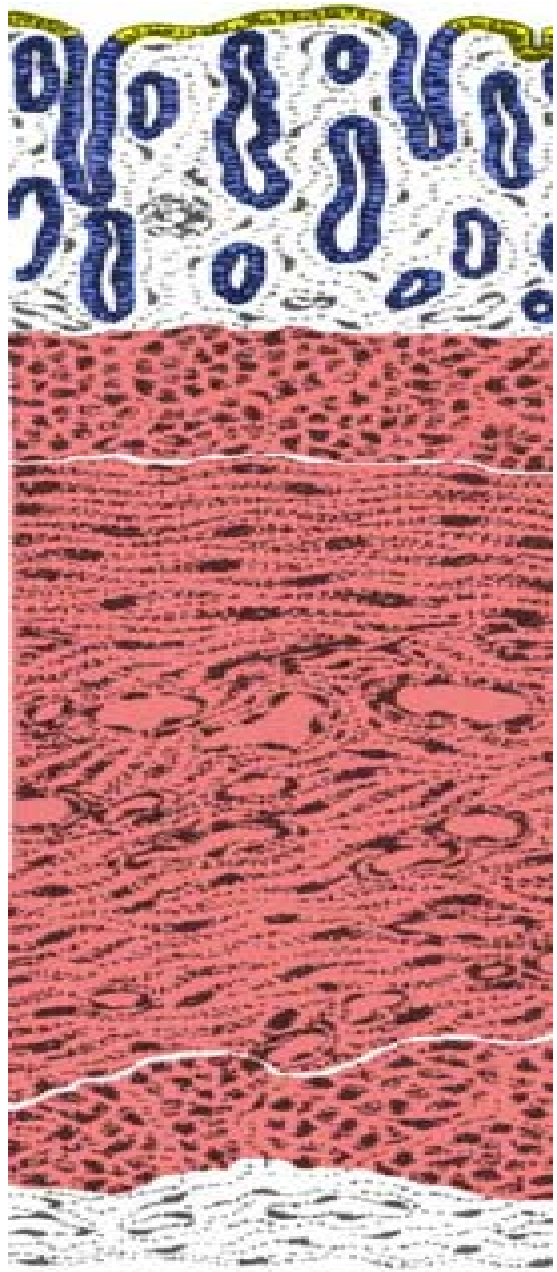
# uterus




粘膜
肌层
外膜

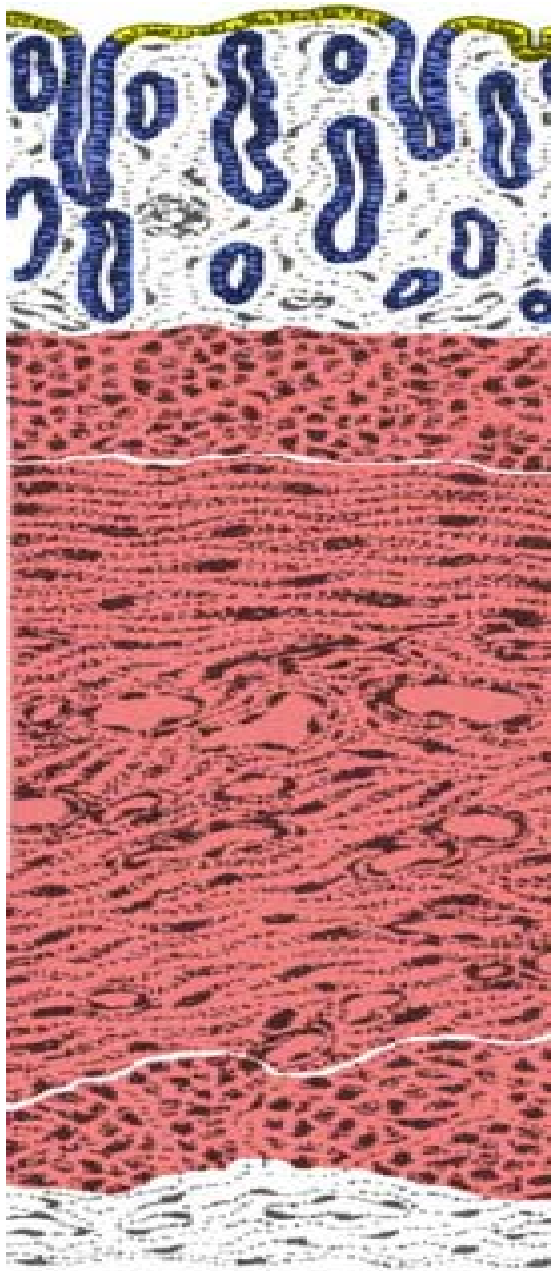
# uterus

- Endometrium
  simple columnar epithelium
  lamina propria
- Myometrium
- Perimetrium
  Methothelium +
  connective tissue



# myometrium

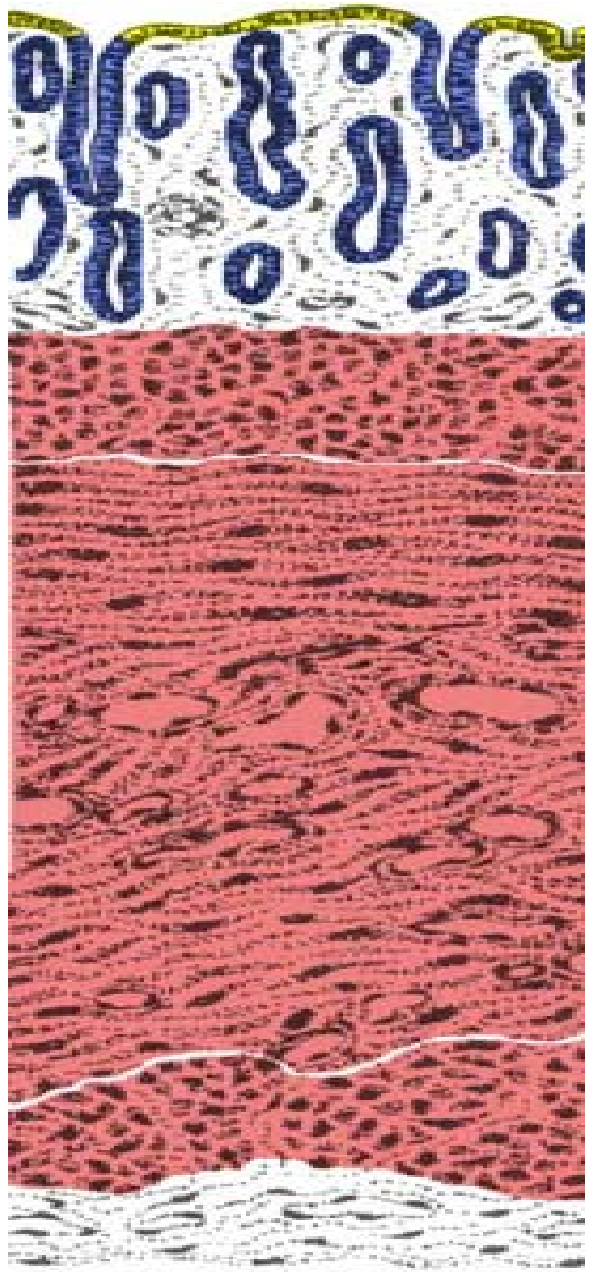
- Smooth muscle



# endometrium

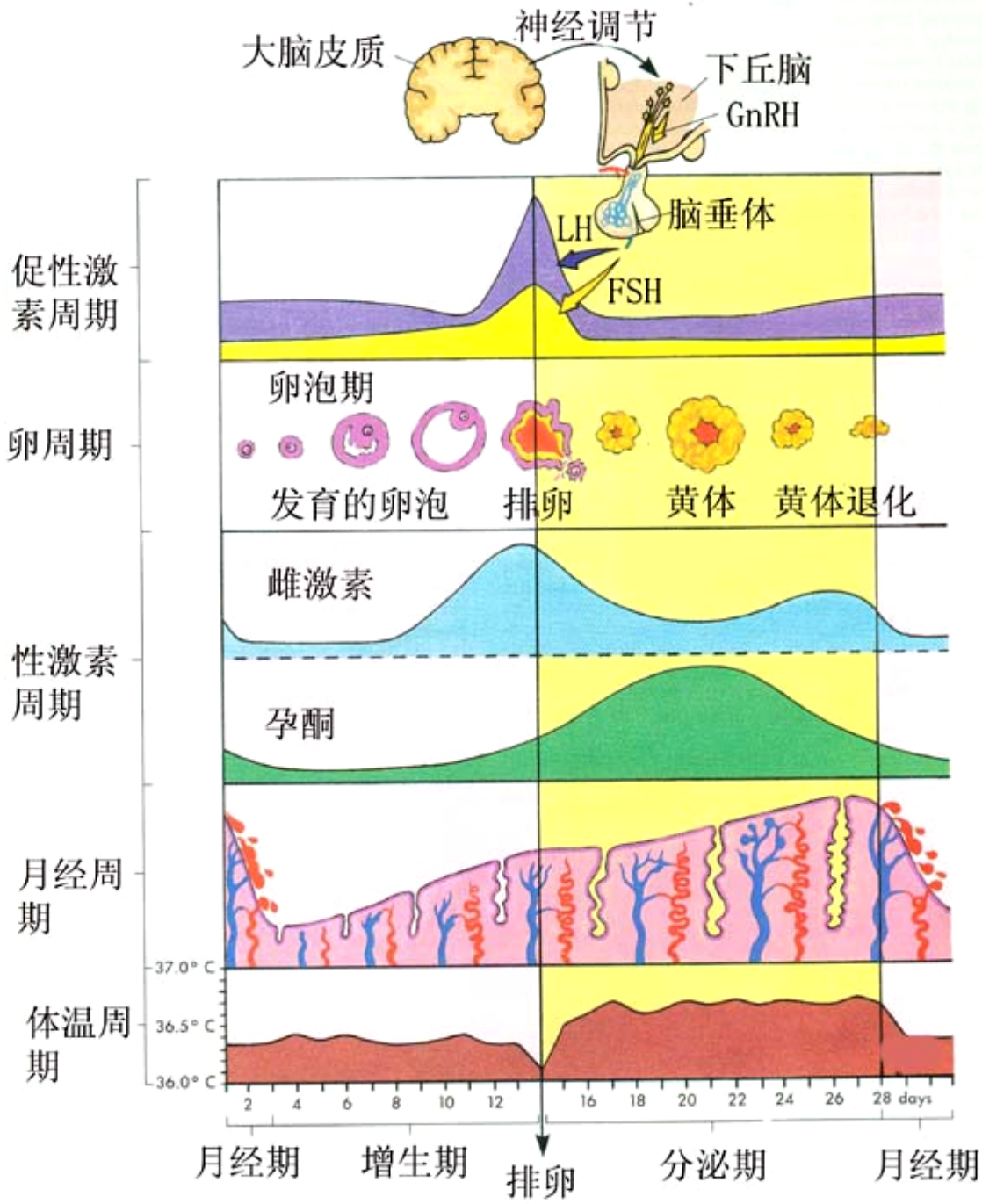
- Simple columnar epithelium
  - ciliated columnar cells
  - mucus-secreting cells
- Lamina propria
  - stroma cell(基细胞)
  - uterine gland
  - spiral artery

functional and basal layer



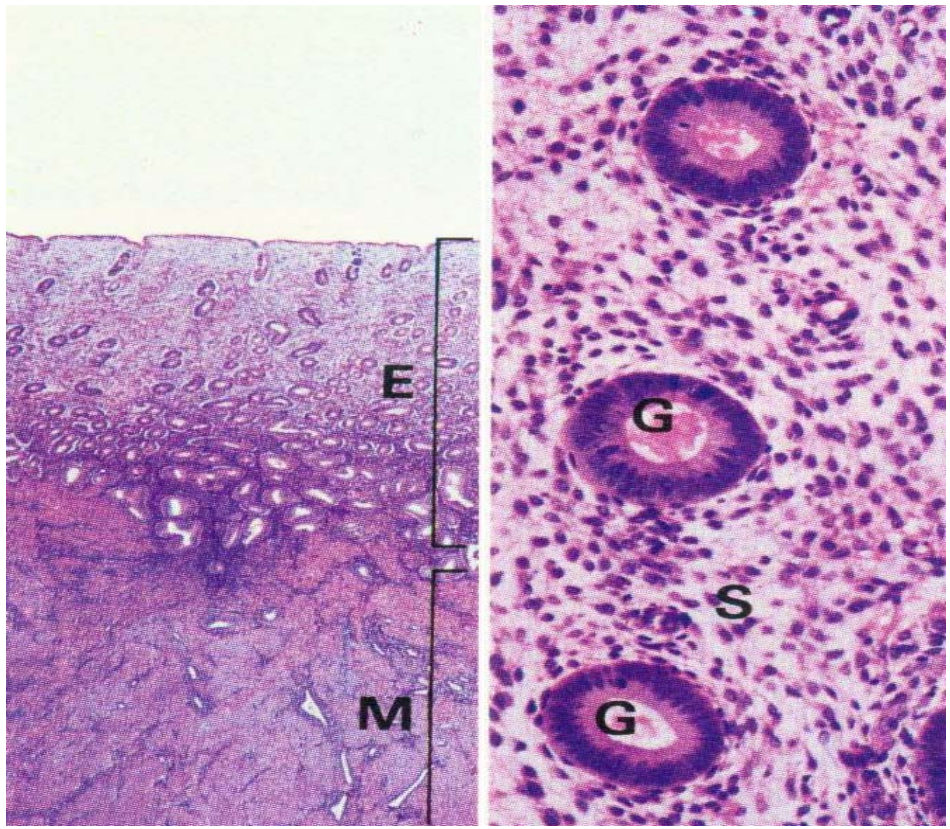
# Menstrual cycle

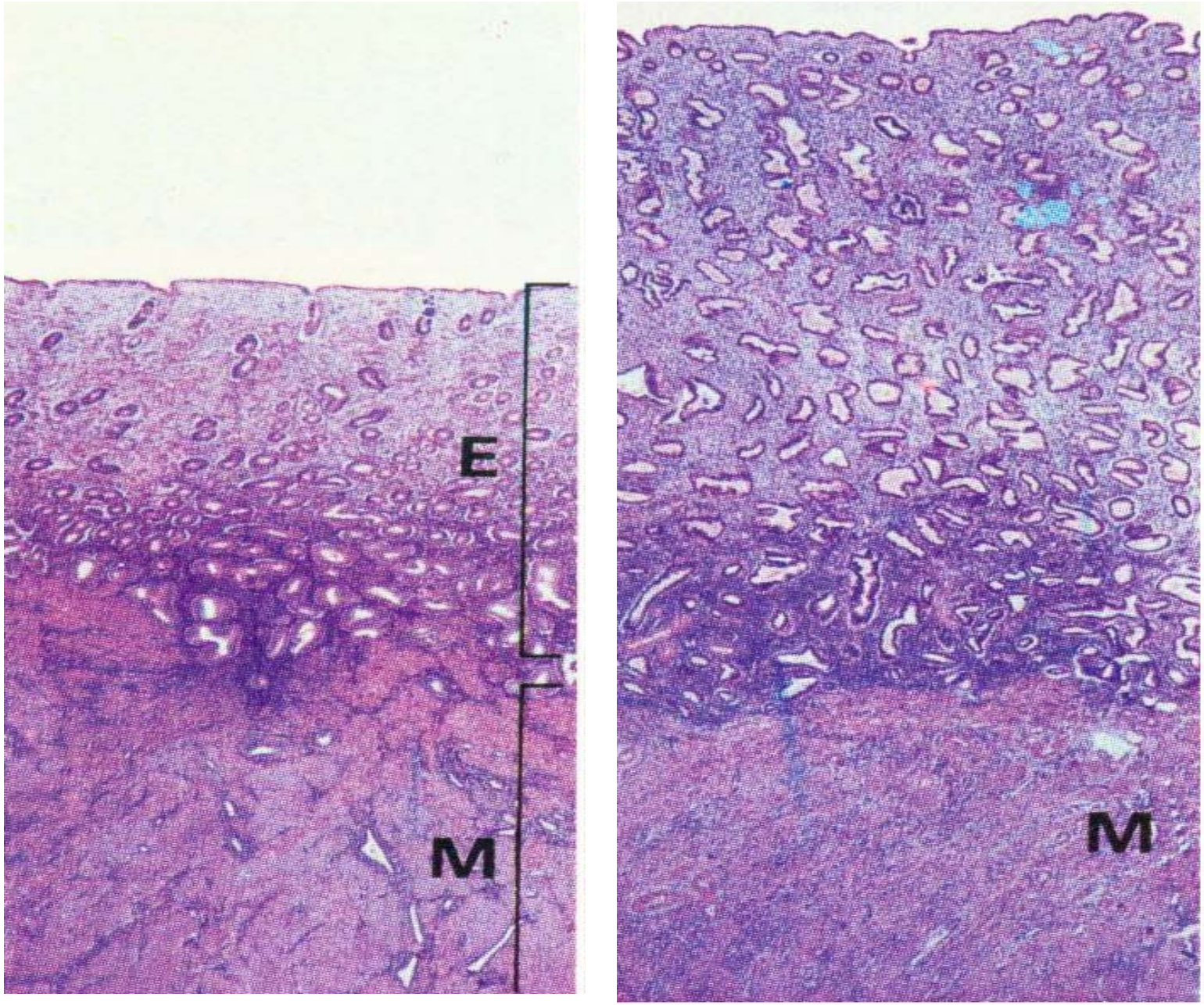
- Menstrual cycle (月经周期)
- Controlled by estrogen and progesterone
- Phase of cycle
  proliferative phase (增生期)
  secretory phase (分泌期)
  menstrual phase (月经期)


大脑皮质
神经调节
下丘脑
GnRH
脑垂体
LH
FSH
促性激素周期
卵周期
卵泡期
发育的卵泡
排卵
黄体
黄体退化
性激素周期
雌激素
孕酮
月经周期
体温周期
37.0° C
36.5° C
36.0° C
2
4
6
8
10
12
16
18
20
22
24
26
28 days
月经期
增生期
排卵
分泌期
月经期

# Proliferative phase

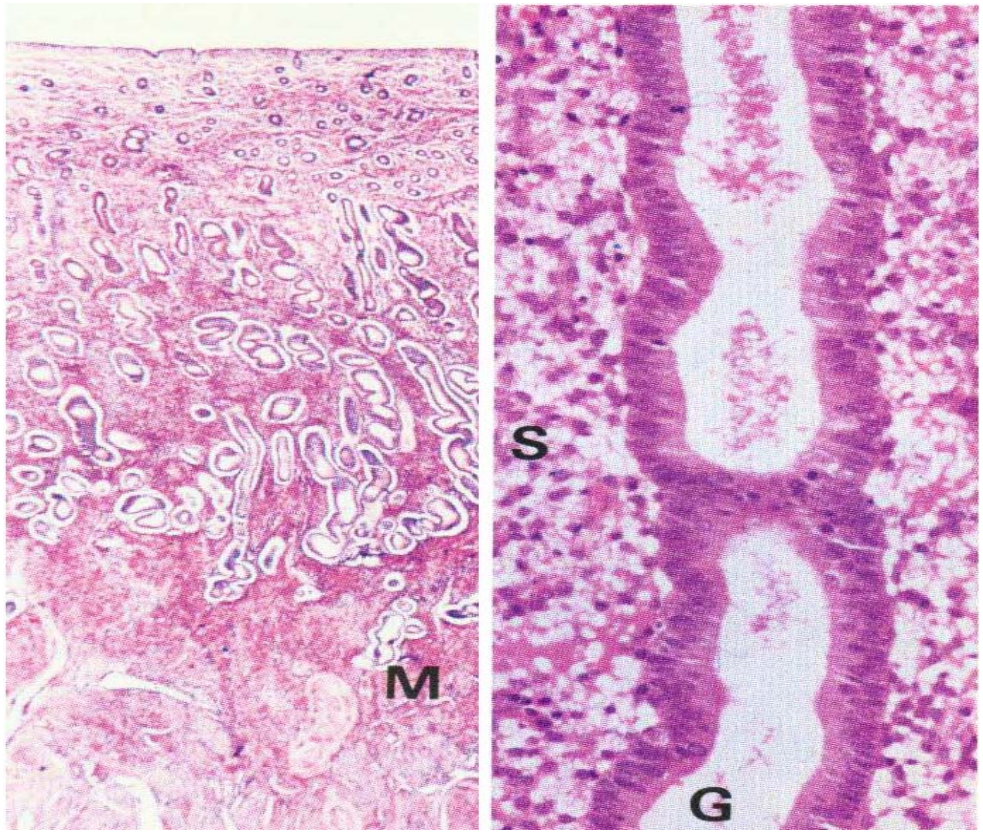
- Estrogen increses
- Endometrium regenerates from basale
- Uterine gland and spiral artery lengthen

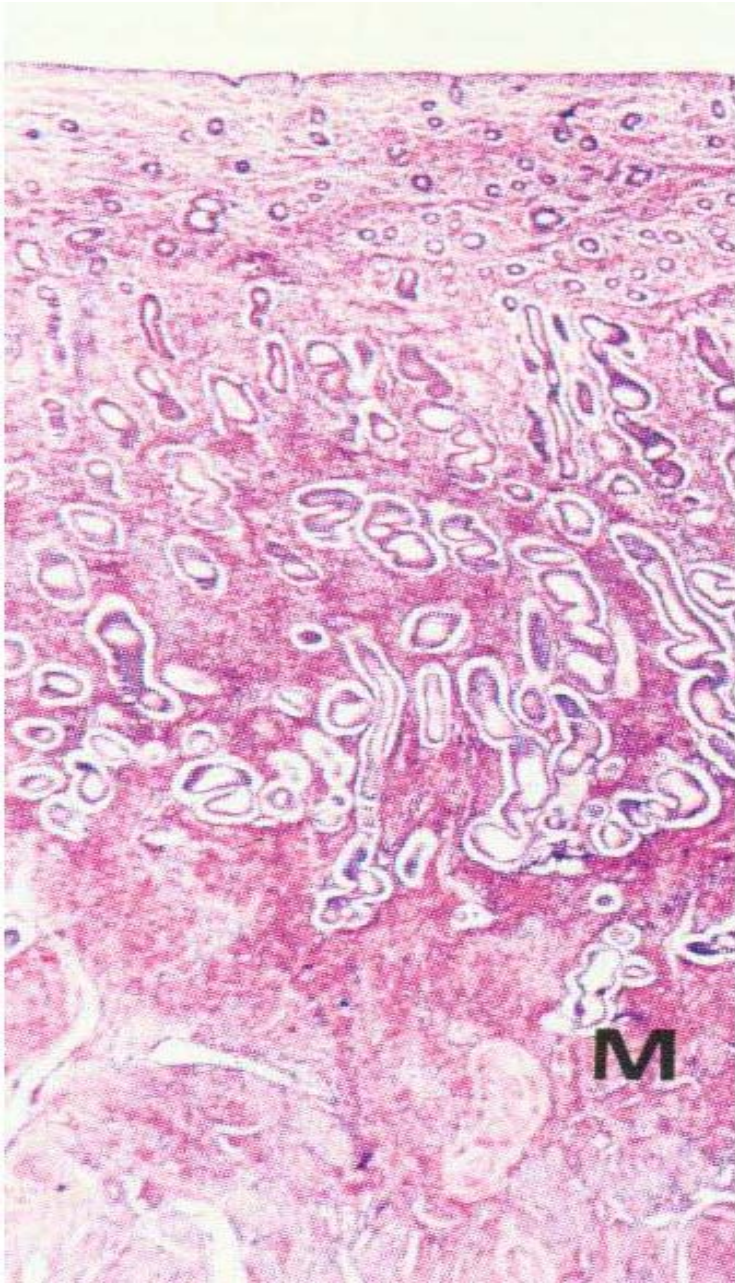


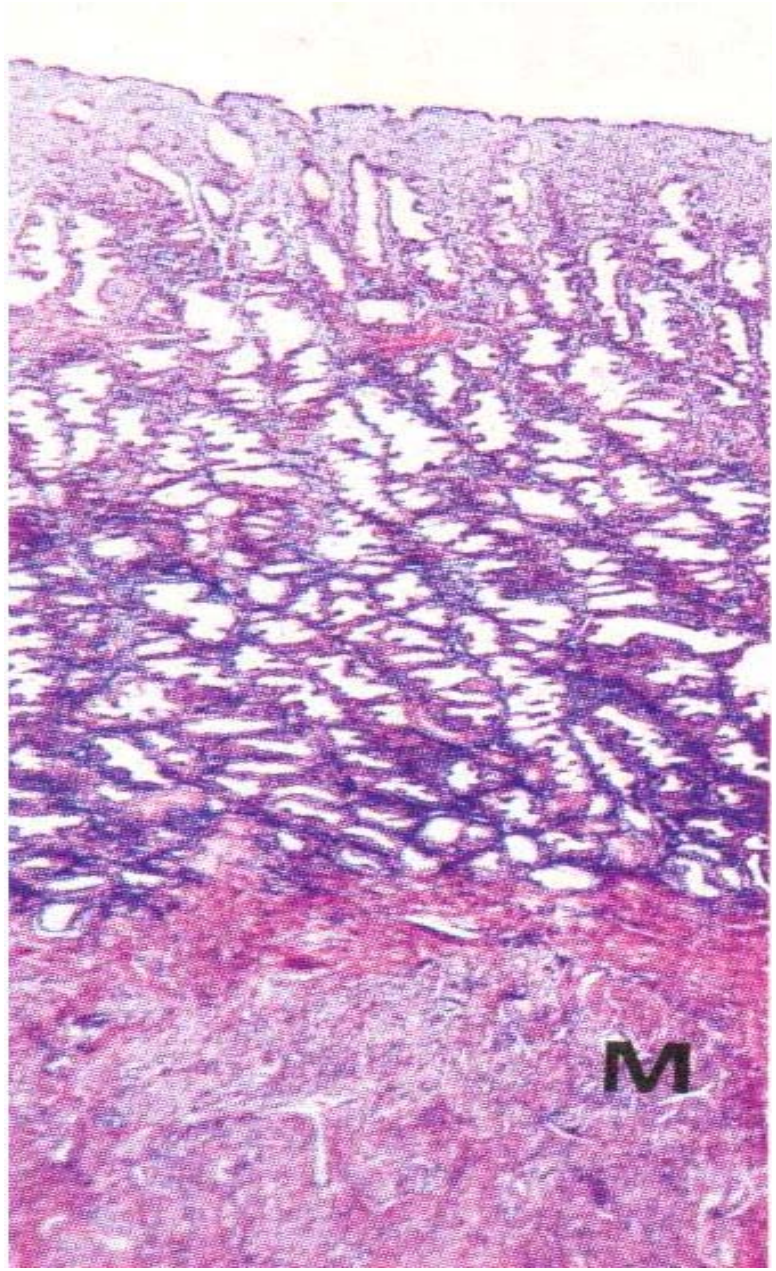

E
M
M

# Secretory phase

- Progesterone from corpus luteum increases
- Uterine gland grows and coils
- Coiled arteries elongate

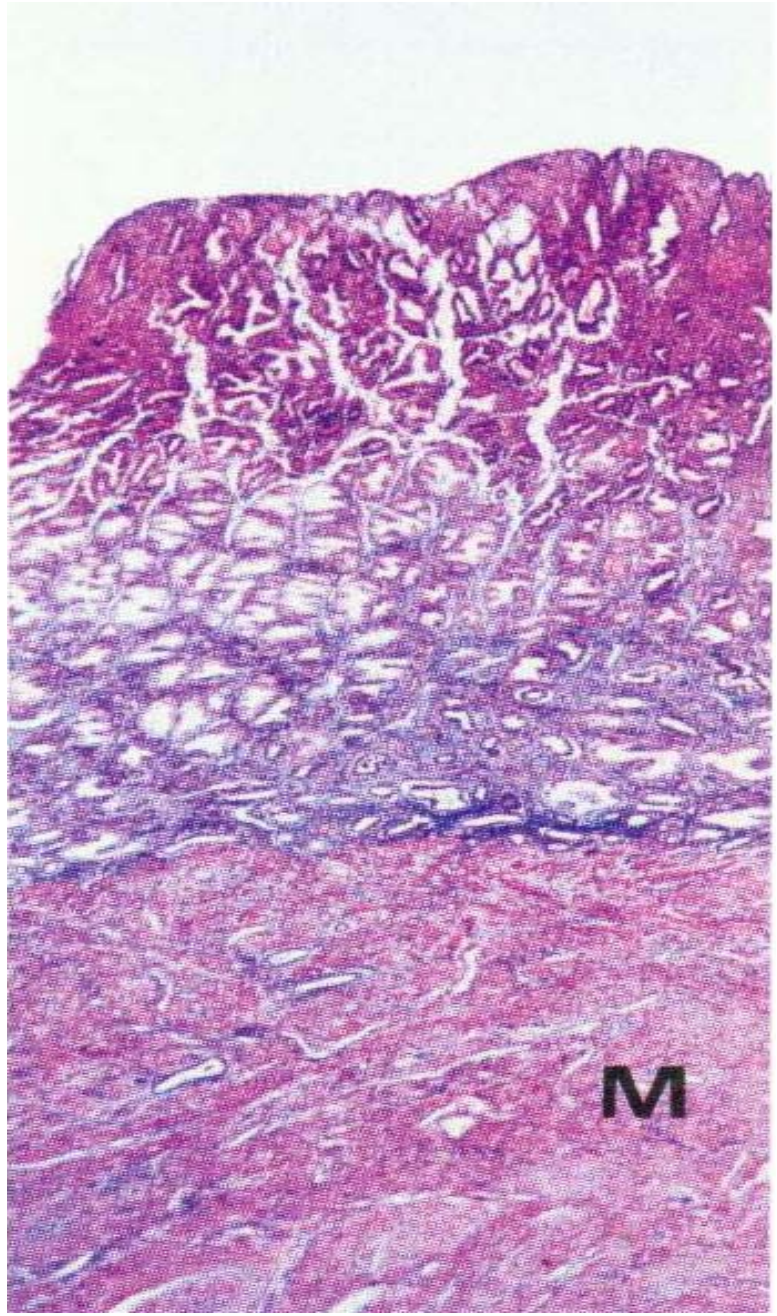


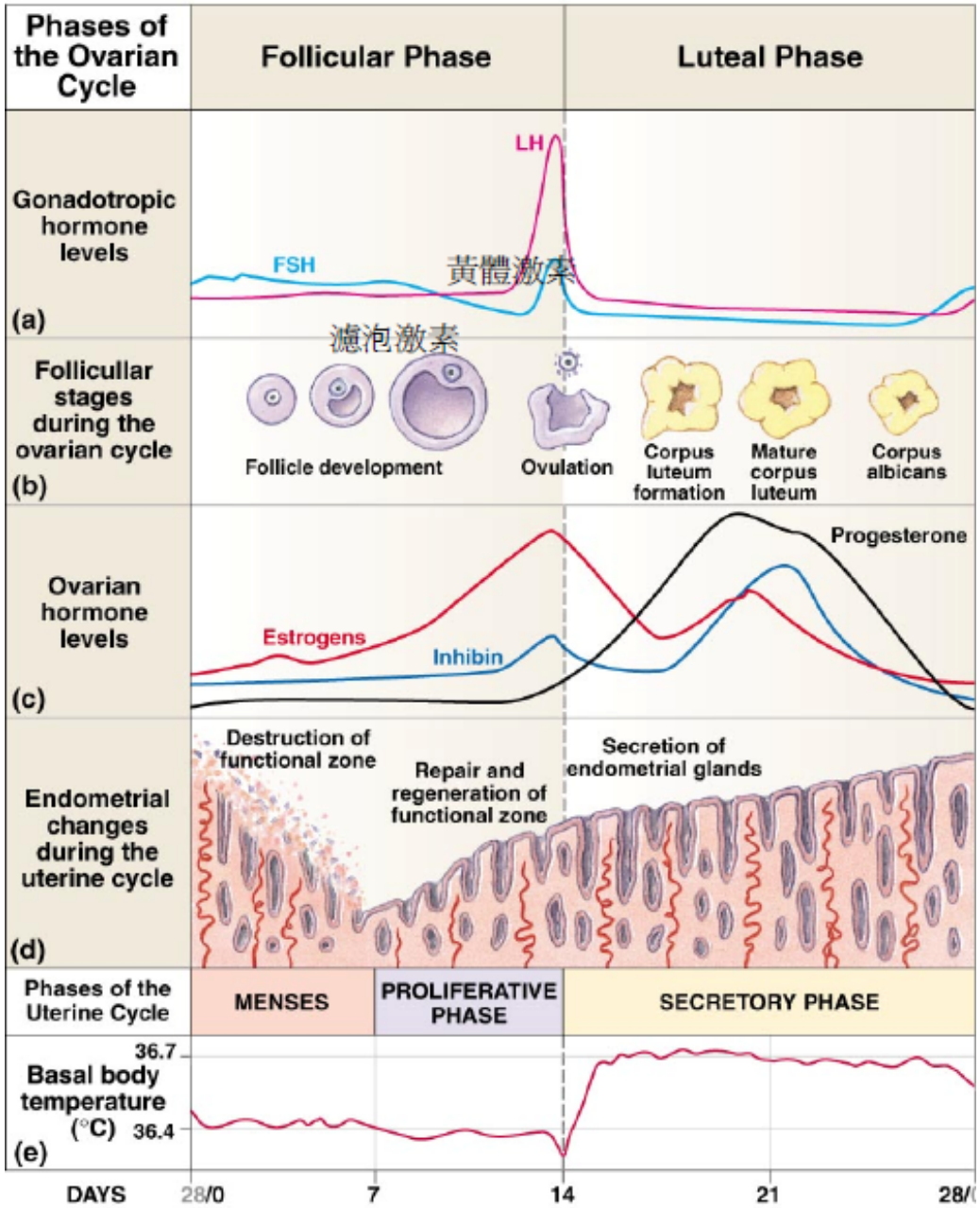

M


M

# Menstrual phase

- Decline of ovarian progesterone and estrogen
- Ischemia (坏死) and degeneration of functional layer

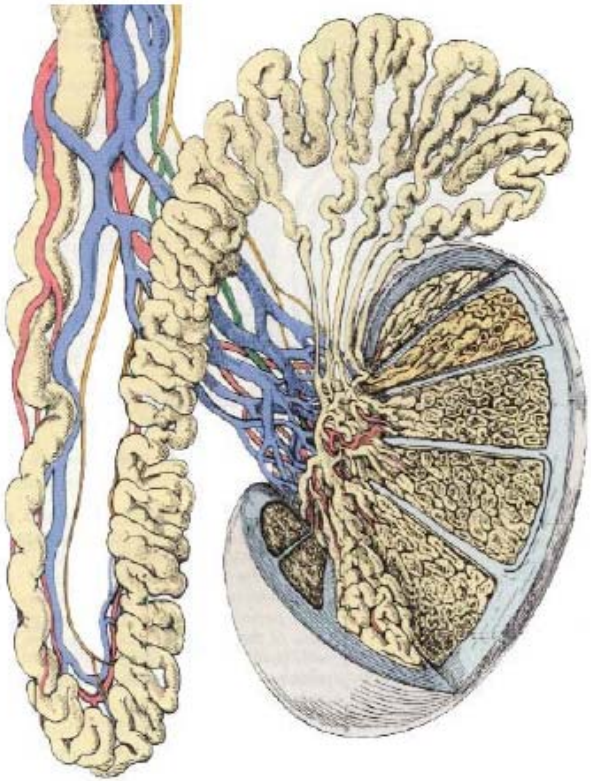


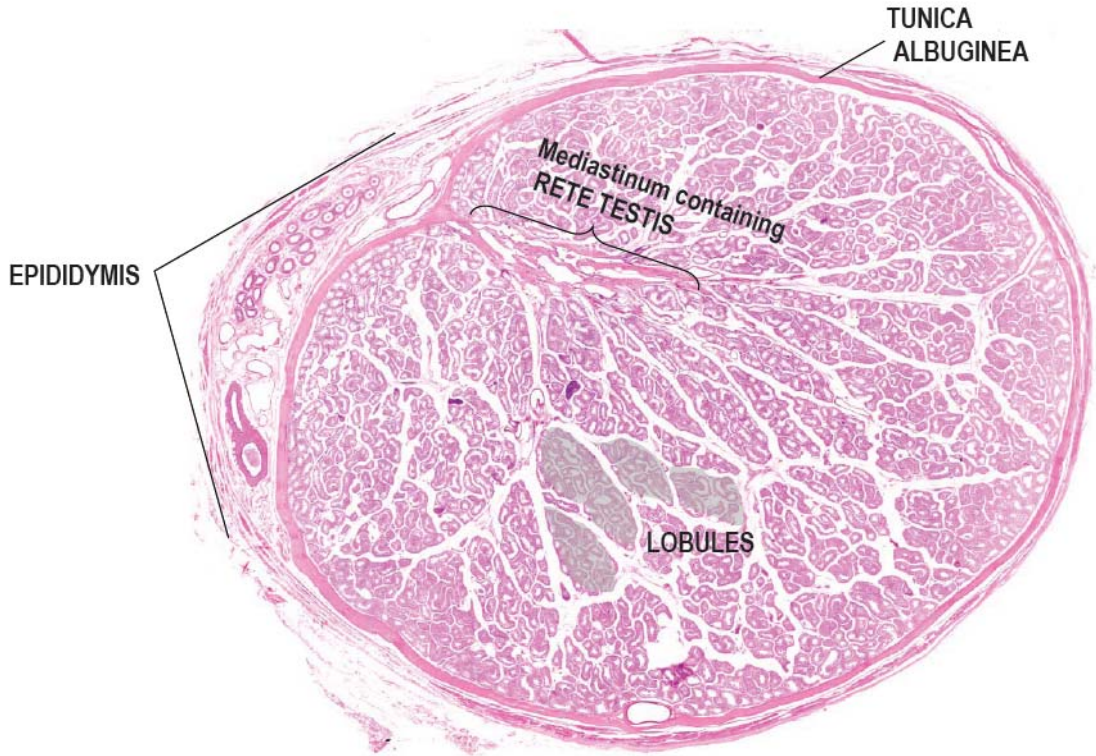

Phases of the Ovarian Cycle
Follicular Phase
Luteal Phase
Gonadotropic hormone levels
(a)
LH
FSH
黃體激素
濾泡激素
Follicullar stages during the ovarian cycle
(b)
Follicle development
Ovulation
Corpus luteum formation
Mature corpus luteum
Corpus albicans
Ovarian hormone levels
(c)
Progesterone
Estrogens
Inhibin
Endometrial changes during the uterine cycle
(d)
Destruction of functional zone
Repair and regeneration of functional zone
Secretion of endometrial glands
Phases of the Uterine Cycle
MENSES
PROLIFERATIVE PHASE
SECRETORY PHASE
Basal body temperature (°C)
(e)
36.7
36.4
DAYS
28/0
7
14
21
28/

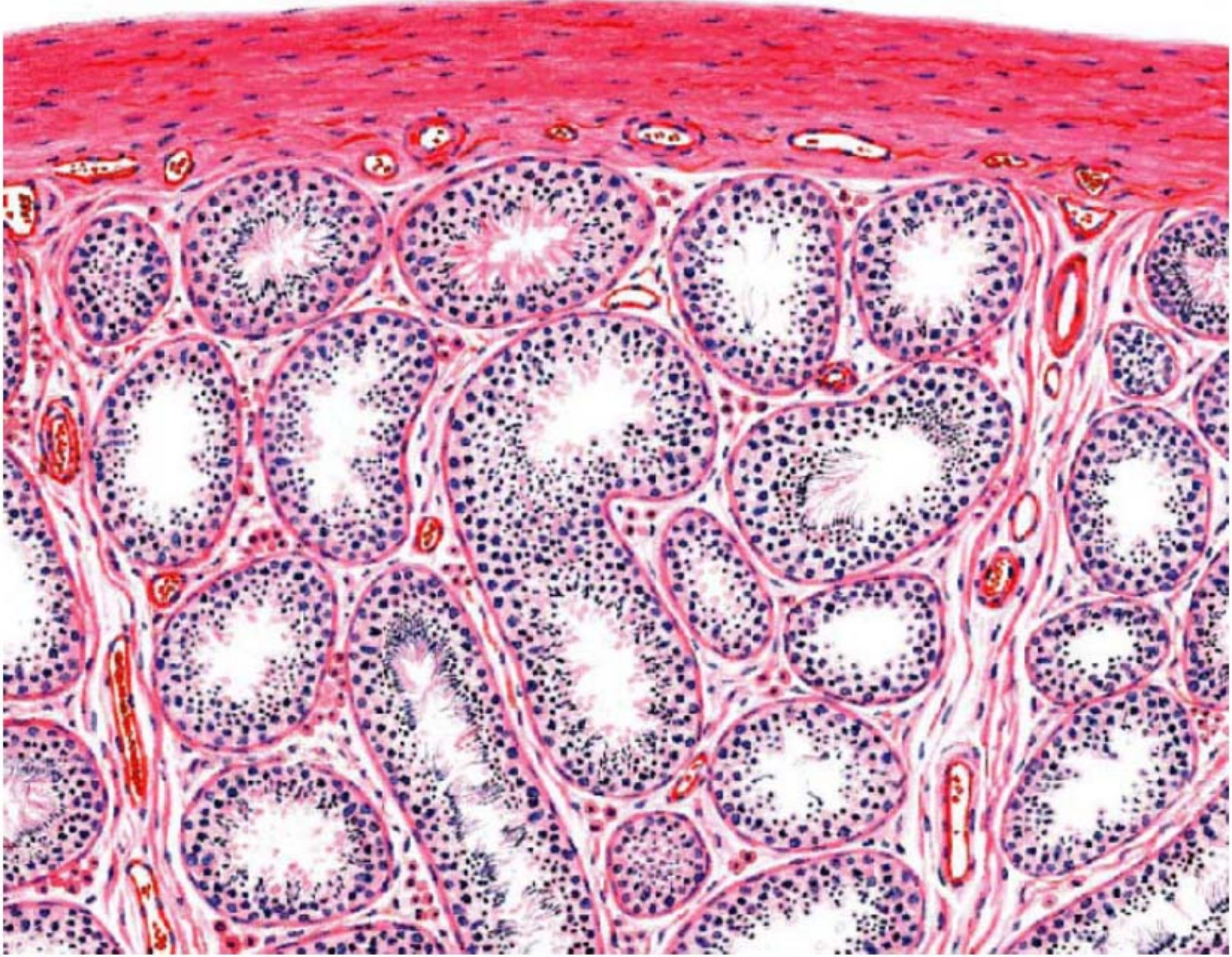
# 小　结

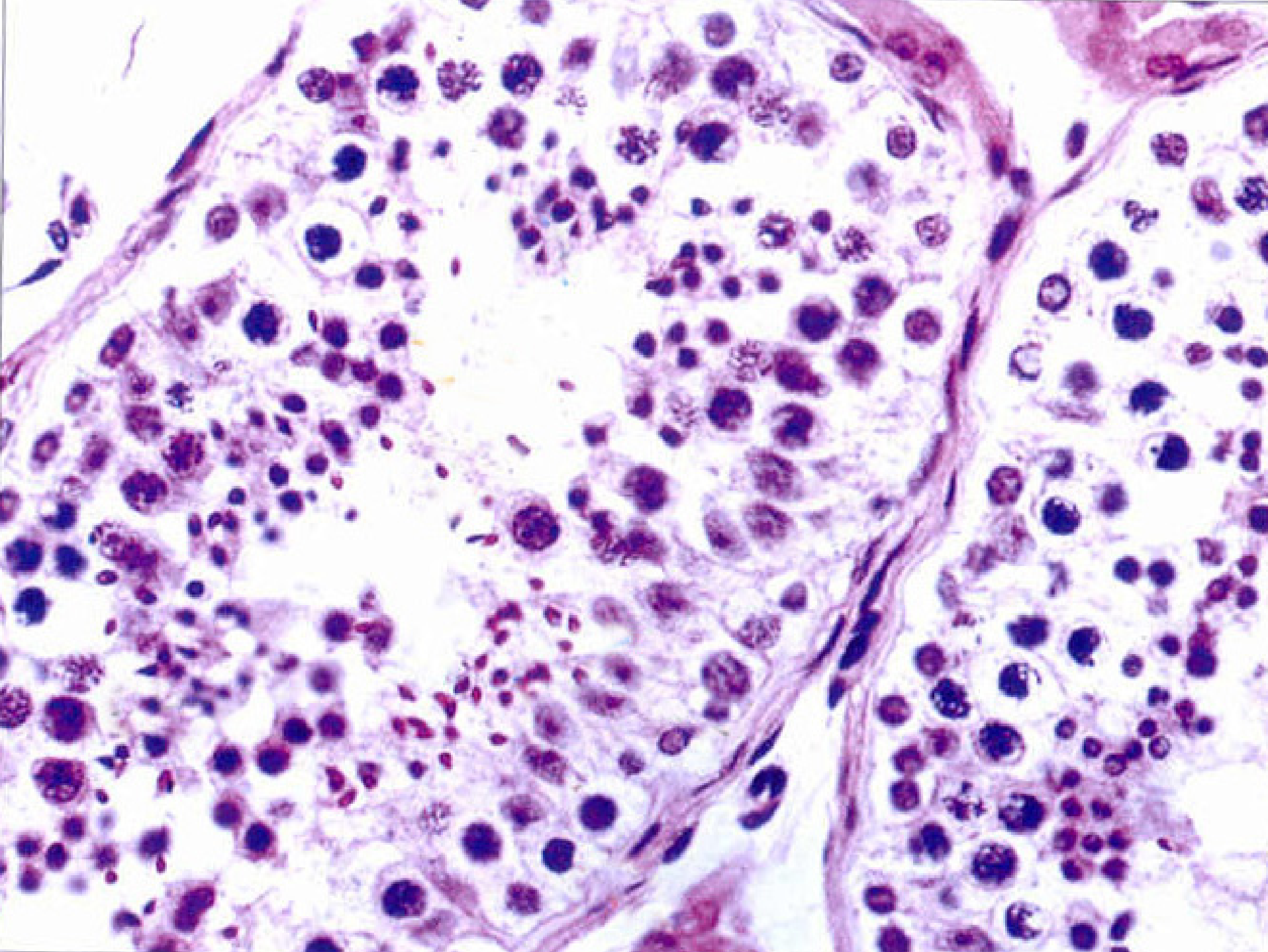
- 掌握卵泡的种类、结构和发育规律
- 掌握排卵的定义
- 掌握黄体的结构、分类和功能
- 熟悉子宫的一般结构
- 熟悉月经周期的形成原因和结构变化
- 了解输卵管的一般结构

# 男性生殖系统的总结




TUNICA
ALBUGINEA
Mediastinum containing
RETE TESTIS
EPIDIDYMIS
LOBULES





# Seminiferous tubule

- **Spermatogenic epithelium**
  **Spermatogenic cell**
  **(1)spermatogonium**
  **(2)primary spermatocyte**
  **(3)secondary spermatocyte**
  **(4)spermatid**
  **(5)spermatozoon**
  **Sustentacular cell**
- **Basement membrane**
- **Myoid cell**

# Interstitial tissue

- **Testicular interstitial cell (Leydig cell)**
- **Secrete androgen**