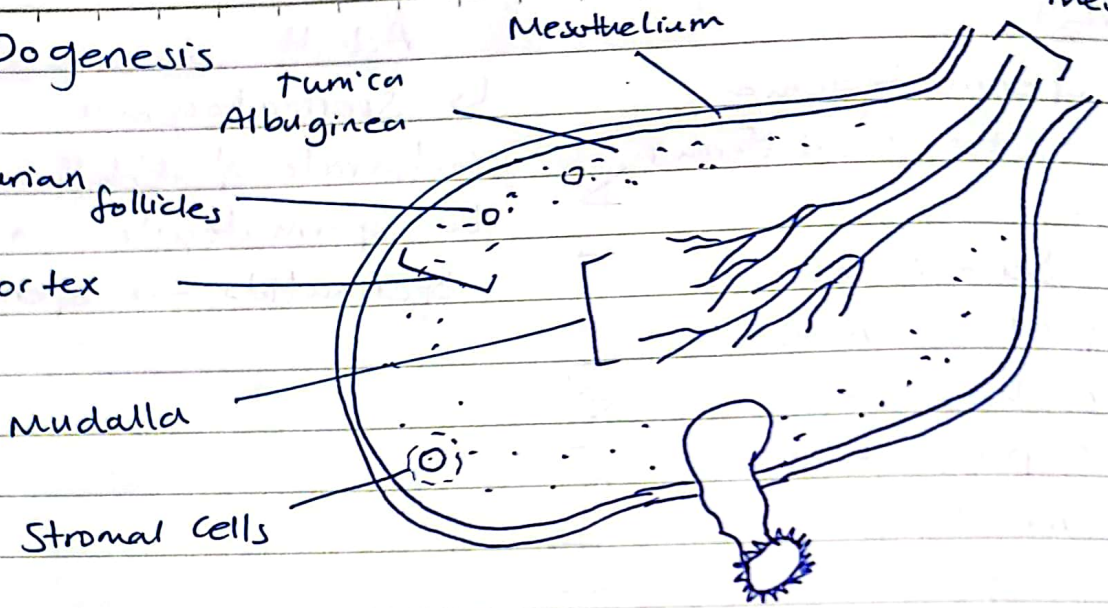
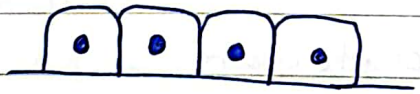
Oogenesis



1) The first layer that surrounds the ovary from the outside is known Germinal epithelium
- Endodermal cell from the yolk sac will migrate during the 1st trimester of pregnancy toward the genital ridge & start to proliferate

AKA mesothelium

prepubital
↳ simple cubodial epithelial



pubertal
↳ simple squamous epithelial

2) Tunica Albuginea locates directly under the germinal epithelian
→ collagenous connective tissue

3) Cortex locates under the Tunica Albuginea
→ contain the ovarian follicles & ovarian bodies
→ contain stromal cells
↳ support
↳ form theca layers — externa
interna - secrete estrogen

4) Medulla locates in the core of the ovary
→ contain loose connective tissue & lymphatic vesseles

Ovarian follicles - layer or layers of somatic cells (2n)
AKA follicular or granulosa cells
↳ incubate & support the oocyte

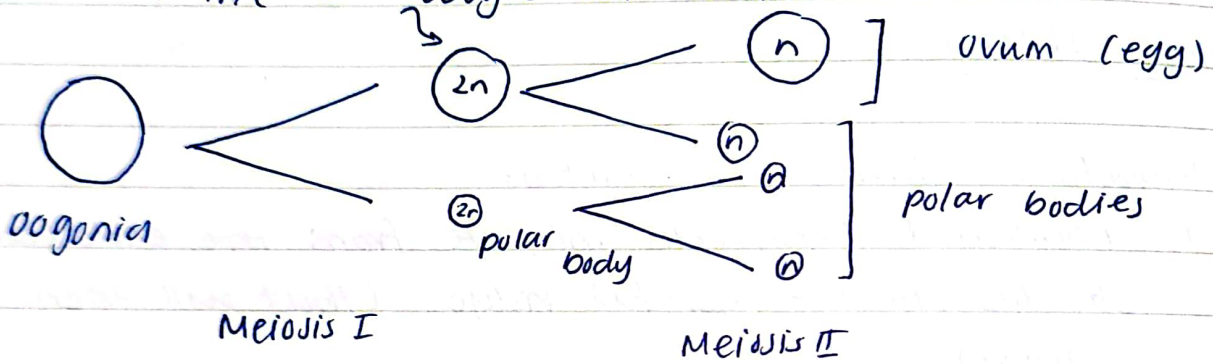
Oogenesis stages

1) proliferation - increase by mitosis
↳ Primordial germ cells migrate from the endoderm of the yolk sac to the genital ridge (that will then make the ovary)
→ In the 1st trimester of Uterine life
• They reach ~7 million oogonia in both ovaries

2) Growth - selection of the oogonia
↳ some will enlarge
↳ some will die
→ reduce in number to ~3 million
→ by the 7 month of Uterine life

3) Maturation - meiosis
↳ enter the 1st meiotic cell division
→ blocked at prophase I, until puberty

- At Puberty, during ovulation
  → when the ovum is being released, the oogonia completes Meiosis I & become secondary oocyte picked by the fimbrae of the infundibulum
- If fertilization of the 2nd oocyte occur by the sperm penetration
  → the 2nd oocyte will continue Meiosis II

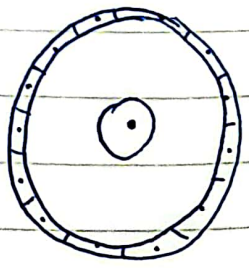


- Females in their reproductive life release between 420 to 450 eggs
  → ~ 35 years of ovulation

Primordial follicle - dispered in the cortex
↳ present before birth
→ immature, arrested at prophase I
↳ remain unchanged until puberty

- At Puberty, FSH & LH stimulate the primordial follicles to nature & grow from
  primary follicle → secondary follicle → mature follicle (tertiary)

Structure of Primordial follicle
1) large sized oocyte
2) large sized nucleus < round, pale
3) clear nucleolus - eccentric
4) Abundant cytoplasm - pale

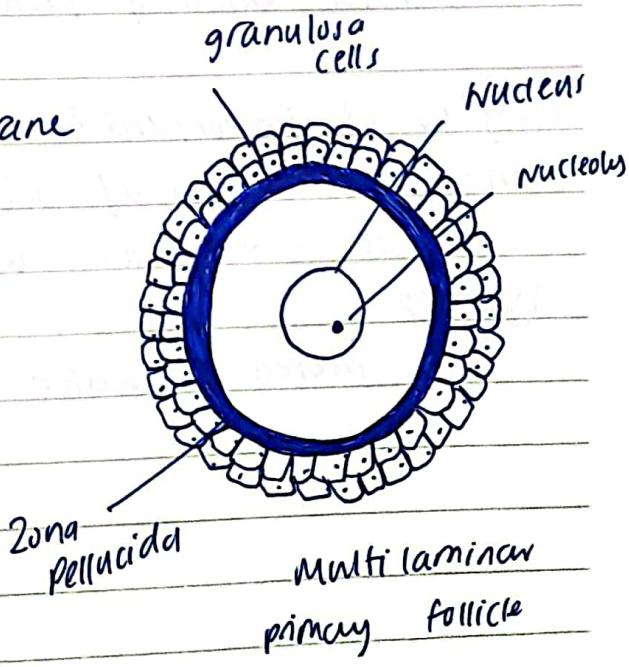


* found in clusters *

* Each month around 20 - 30 primordial follicles try to mature but only one will succeed to reach maturity. WHY??
The stromal cells will create a theca layer surrounding the primordial follicle. Theca externa & Theca interna.
Although one ovum will mature, the other 20 - 30 primordial follicles will be the source of estrogen production from the theca interna. They will be arrested & transform to Atritic follicle

Primary follicle
↳ under the effect of FSH the primordial follicle will grow to primary follicle
→ the epithelium layer surrounding it changes in shape
1) Simple squamous
2) Simple cubodial] unilaminar primary (early)
3) simple columnar]
4) Stratified cubodial] multilaminar primary (late)
↳ small ↳ large

* In Primary follicle, the Zona Pellucida appears surrounding the primary oocyte
→ diameter ~ 40 μm
Zona Pellucida - glycoprotein membrane
↳ 4 glycoprotein ZP1, ZP2, ZP3, ZP4
↳ non-cellular membrane
↳ surrounds all mammalian eggs & pre-implantation embryos
↳ secreted by granulosa cells



Multilaminar primary follicle

Secondary follicles

↳ cavities are present

→ follicular fluid is secreted from the granulosa cells

↳ follicular fluid will enter between the granulosa cells forming cavities → separated from GC by basement membrane

↳ formation of the theca layer by the stromal cells

Theca interna
↳ have blood capillaries
↳ produce estradiol
→ precursor of estrogen

Theca externa
↳ fibrous connective tissue
↳ blood capillaries

estradiol → estrogen

HOW? by the granulosa cells, the granulosa cells have an enzyme called aromatase that converts estradiol to estrogen

What is the follicular fluid?

1) hormones
2) growth factors
3) GAGs - glucose amino glycans
4) steroid binding proteins

Why is it important?

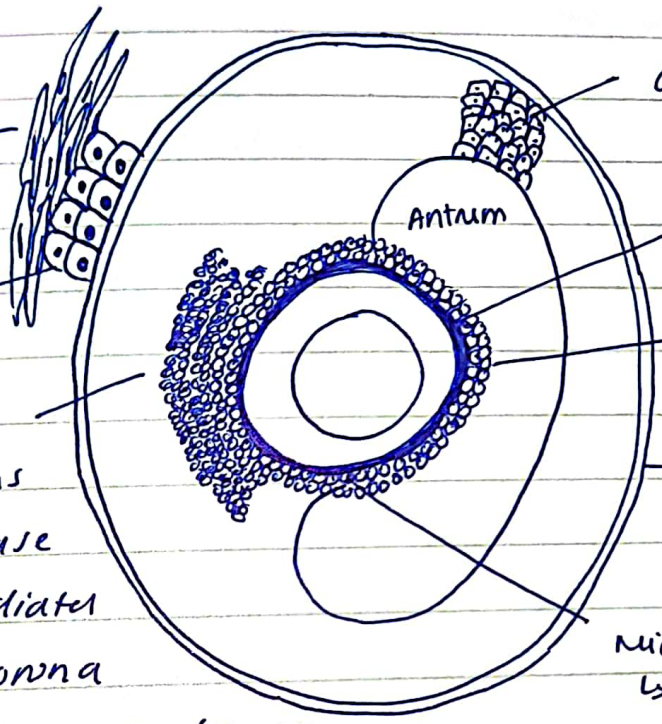
The concentration of solute is high, thus increasing osmosis → draw water in

WHY??

increased water pressure to release the ovum

Mature Graafian follicle

↳ one large cavity AKA Antrum Cavity



↳ act as base to corona radiata

↳ connect corona radiata to the granulosa cells

↳ must be lyzed

→ from the lyses enzyme from the follicular fluid