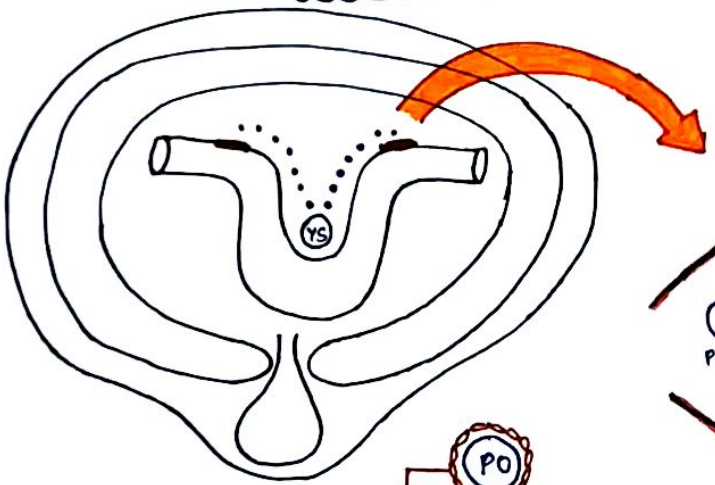
OOGENESIS AND FOLLICULAR DEVELOPMENT

DEVELOPING EGG (OOCYTE) → SERIES OF STEPS ≈ OOGENESIS → BEFORE BIRTH / AFTER BIRTH (PUBERTY)

→ MATURE EGG (OVUM) [WHICH IS CAPABLE OF BEING FERTILIZED]

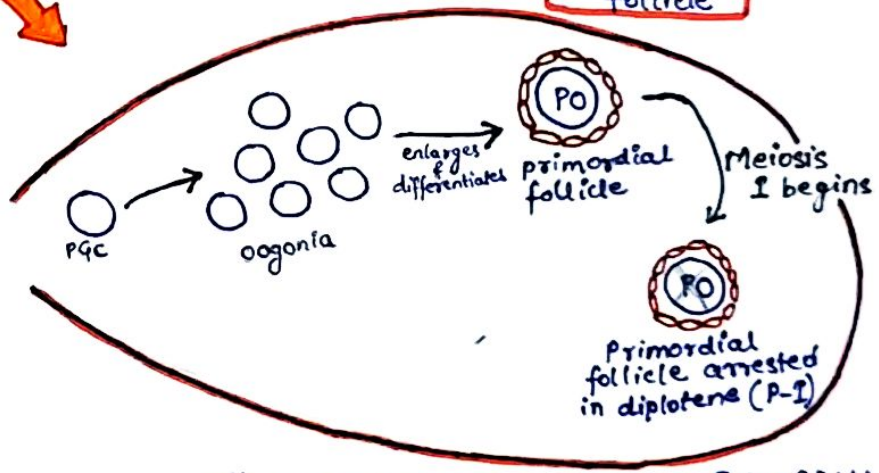
DEVELOPMENT BEFORE BIRTH



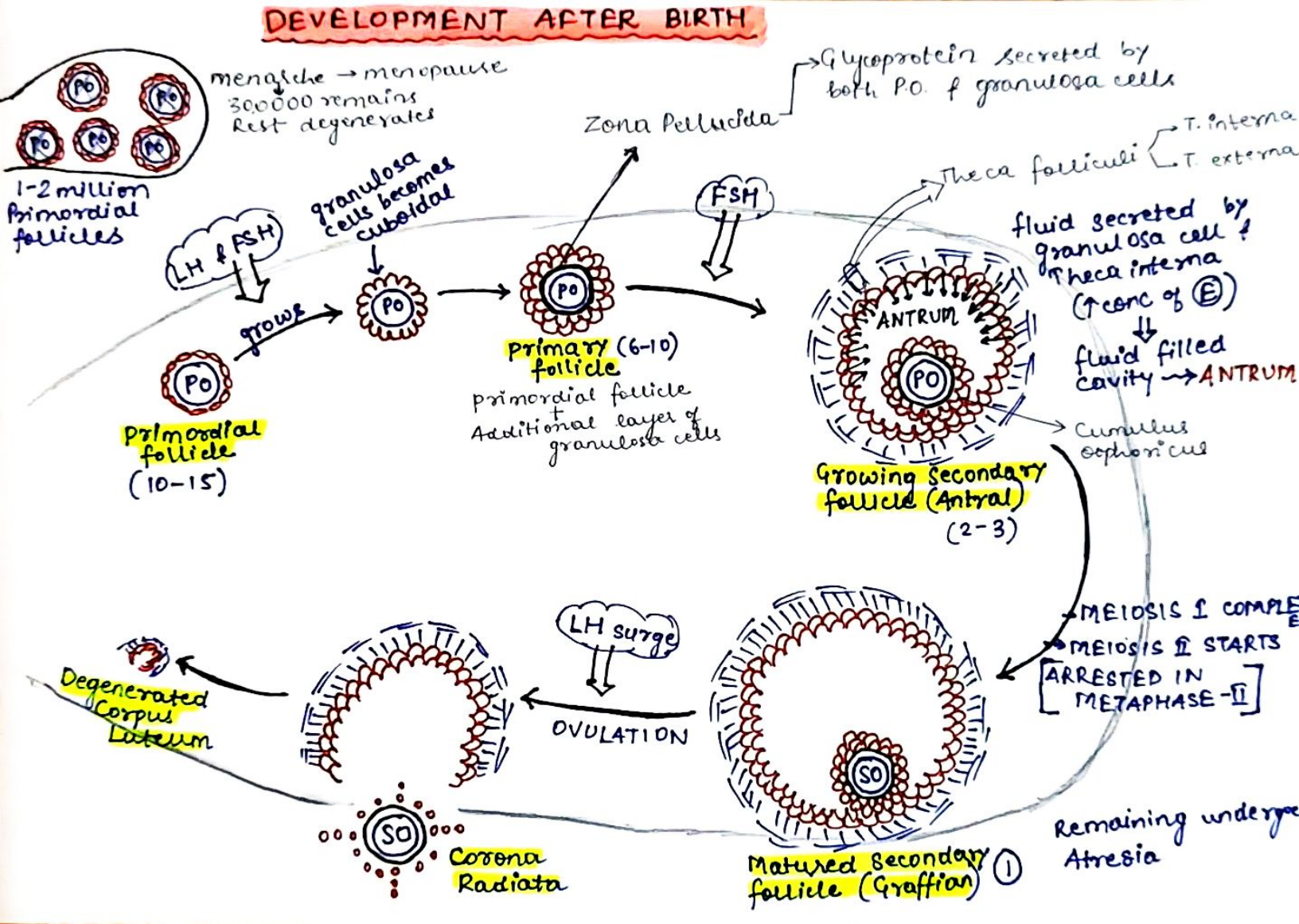
- → Provides Nourishment to Ovum
- → Secretes OMIF (Oocyte Maturation Inhibiting Factor)

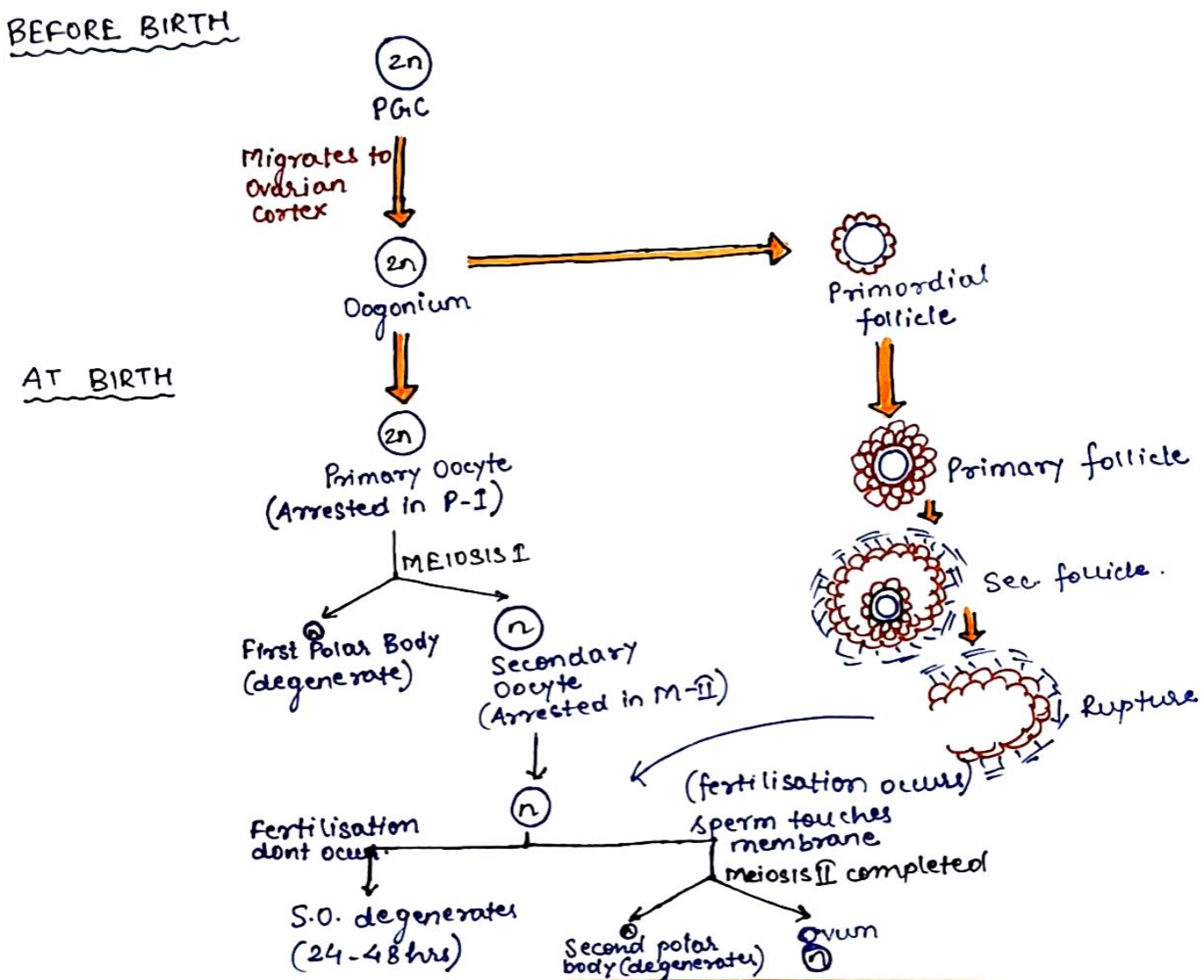
Flat epithelial cells + P.O. → primordial follicle

Granulosa cells



5th MONTH ⇒ 1-2 MILLION PRIMORDIAL FOLLICLE [ARRESTED IN DIPLOTENE]


DEVELOPMENT AFTER BIRTH
menarche → menopause
300000 remains
Rest degenerates
1-2 million primordial follicles
Zona Pellucida
Glycoprotein secreted by both P.O. & granulosa cells
Theca folliculi
T. interna
T. externa
LH & FSH
granulosa cells becomes cuboidal
grows
FSH
fluid secreted by granulosa cell & Theca interna (↑conc of E)
fluid filled cavity → ANTRUM
ANTRUM
Primordial follicle (10-15)
primary follicle (6-10)
primordial follicle + Additional layer of granulosa cells
Cumulus oophoricus
Growing Secondary follicle (Antral) (2-3)
MEIOSIS I COMPLETE
MEIOSIS II STARTS
[ARRESTED IN METAPHASE-II]
LH surge
OVULATION
Degenerated Corpus Luteum
Corona Radiata
Matured Secondary follicle (Graffian) (1)
Remaining undergo Atresia


BEFORE BIRTH
2n
PGC
Migrates to Ovarian cortex
2n
Oogonium
Primordial follicle
AT BIRTH
2n
Primary Oocyte (Arrested in P-I)
Primary follicle
MEIOSIS I
Sec. follicle.
First Polar Body (degenerate)
n
Secondary Oocyte (Arrested in M-II)
Rupture
(fertilisation occurs)
n
Fertilisation dont occur
Sperm touches membrane
Meiosis II completed
S.O. degenerates (24-48 hrs)
Second polar body (degenerates)
Ovum
n

Primordial follicle —(LH & FSH ⇓)→ Primary follicle —(FSH ⇓)→ Secondary follicle (Antral stage) —(3 factors)→ Secondary follicle (Graffian stage)

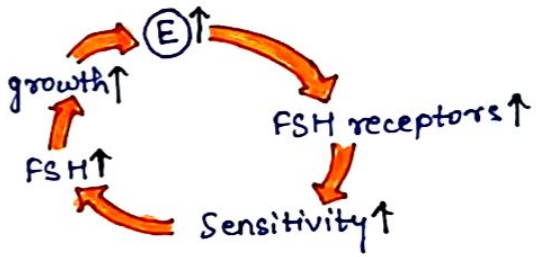
Secondary follicle (Graffian stage) ⇐ LH surge → Ovulation

Ovulation → LH ⇒ Corpus luteum
Ovulation → Sec. oocyte

3 factors :-

① Granulosa cell + Theca Interna → (E) ⇓ (+)

Granulosa cells to form ↑ no. of FSH receptors
⇓
Granulosa cells becomes more sensitive to FSH
⇓
Positive feedback for FSH release



② (FSH)↑ + (E)↑
⇓
LH Receptor↑
⇓
Sensitivity for LH↑
⇓
LH↑ ⇒ -secretion↑

③ (E)↑ + (LH)↑
⇓
- proliferation of cells↑
- secretion↑

FSH (2-3a)

LH peak

16hrs - 24hrs Before ovulation

Mechanism of ovulation

Ovulation (Rupture)

↑↑LH converts granulosa and theca cells to (P) secreting cells

(E)↓ (P)↑

LH surge

(P)↑

Proteolytic enzymes (Collagenase)

Weakened follicular wall

Degeneration of stigma

Follicular hyperemia & PG secretion

Plasma transudation into follicle

follicle swelling

Follicle rupture

Evagination of ovum

Mechanism of Ovulation

LH surge

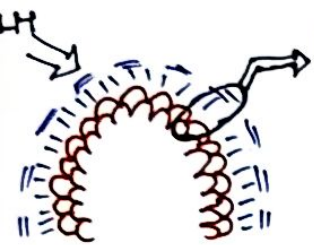
(P)↑

Small area in centre of follicular capsule K/a stigma protudes like a nipple

Fluid oozes out from stigma

stigma ruptures widely

Release of sec. oocyte alongwith antral fluid.



Remaining cells of Granulosa + Theca Interna → Lutein cells

LH ⇓ Luteinization

- yellowish colour
- filled with lipid inclusion
- ↑ diameter

⇓

Total mass of cell together K/a Corpus Luteum

- Granulosa cells develops ↑SER

⇓

secretion of (P) & (E) both increases

⇓

(P) > (E)

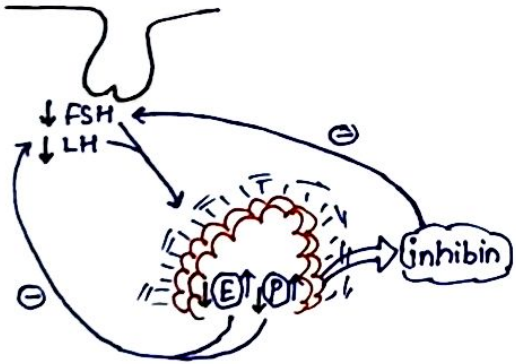
→ •Proliferation •Enlargement •Secretion.

12 days
- Proliferation
- Enlargement
- Secretion
- Degeneration

12 days

- Theca cells releases Androstenedione, Testosterone → (Aromatase, in granulosa cells) → Estrogen

Involution / Degeneration of corpus luteum



(E)↑ (P)↑

⇓

-ve f/b to FSH & LH

⇓

prolif, growth, secretion of corpus luteum ↓

⇓

(E)↓ (P)↓

⇒

E ✕
P ✕
Inhibin ✕

→ Negative f/b ✕

⇓

LH & FSH ↑

⇓

New follicles grow.