Nerves and Hormones control EVERYTHING in the body.

What are the 4 layers of tissue found throughout the female reproductive tract?

Outer most → inner most

Serosa → muscularis → submucosa → mucosa

muscularis: Circular SM, Longitudinal SM

What is formed from the peritoneum? What are the 3 parts of the new structure?

The broad ligament.

- mesovarium - supports the ovaries
- mesosalpinx - supports the oviducts
- mesometrium - supports the uterus

Describe the endocrine and exocrine functions of the ovary:

Endocrine: Sex cell (oocyte) production. Product to tissue (leaving an area)

Exocrine: Follicles produces E_2, CL production P_4. Hormone directly to blood.

Can you palpate the mare's ovary for ovarian structures such as the CL or follicles? If not, why not?

NO! The ovary is inverted compared to most other species.

Cortex: middle
Medulla: outer area
Ovulatory fossa: where ovulation occurs.

List and describe the structures on the ovary:

Preovulatory dominant follicle → corpus hemorrhagicum → corpus luteum → corpus albicans

what "breaks down" the BM? Collagenase

Basement membrane is degenerated & causes ovulation

corpus hemorrhagicum (bloody body)

~5 days

corpus luteum (yellow body)

corpus albicans (white body)

What are the two types of uteruses?

Bicornate: cows, sows, ewes

Simplex: humans, primates

Match the following terms with the definition:

C Perimetrium A Myometrium B Endometrium

A. Inner circle of smooth muscle outer longitudinal layer, peristaltic contractions
B. Mucosa and submucosa, point of placental attachment, uterine glands
C. Outer serous layer continuous with perineum, blocks adhesions

Follicular Phase: Period from regression of CL to ovulation. Under stimulation of E_2. 20 % of the cycle. Stages?

Estrus: day 21/0, "Standing heat". High E_2 = GnRH surge = LH surge = ovulation
Behavior: ↑ locomotion/vocalization, mounting

Proestrus: 2-5 days, day 17-20, CL death = ↓ in P_4 = final follicular development (3° follicles mature for ovulation)
↑ E_2 = ↑ LH/FSH
mucous, muscle motility, uterine gland growth ↑

Luteal Phase: Period from ovulation to CL regression. Under stimulation of P_4. 80 % of the cycle. Stages?

Metestrus: day 2-4, E_2 ↓ due to ovulation, P_4 ↑ (slowly) over time due to CH → CL (luteinization), ↑ uterine secretions, ↑ uterine secretions, ↓ muscle contractions.

* Most follicular dynamics occur here *

Diestrus: 10-14 days, day 5-17, longest stage of estrous cycle, CL reaches maximum size, ↑ P_4 levels prevent final follicle development = (-) feedback -ends when CL is destroyed-
→ IF no embryo = CL regression due to uterine $PGF2\alpha$

What is the primary ovarian structure during the follicular phase?

a. Uhh… honestly, IDK
b. A primary follicle
c. A graafian follicle
d. Growing follicles
e. None of the above

What is the dominant ovarian steroid hormone during the follicular phase?

a. Progesterone
b. Relaxin
c. Oxytocin
d. Estrogen

Which of the following is the primary ovarian structure during the luteal phase?

a. An antral follicle
b. Corpus Hemorrhagicum
c. Corpus Albicans
d. Corpus Luteum

Since we know the dominant ovarian structure during the luteal phase is the CL, what could the dominant ovarian steroid hormone be?

a. GnRH
b. Progesterone
c. Estrogen
d. Relaxin

Reasons for a female not to cycle:

- Pregnancy
- Nutrition
- Seasonal - mares/ewes
- pre-pubertial
- postpartum
- congenitial

What is a precursor of all steroid hormones?

Cholesterol

True / False: Granulosa cells have two specialized cells, cumulus oophorus and corona radiata cells.

TRUE

Oocyte maturation occurs in 4 stages, what are they?

Prenatal, nuclear arrest, cytoplasmic growth, resumption of meiosis

What is the site of fertilization?

Ampullary-isthmic junction

Explain the differences of cervical mucus under stimulation of E2 and P4:

Sialomucin: under E_2, thin & watery. conditions that favor sperm motility. "Priviledged pathway" "Sperm car"

Sulfomucin: under P_4, thick & viscos, sperm will be washed out. cervical seal of pregnancy. "sticky" | "honey" | "molasses"

Let's talk hormones!

Hormone:	Synthesis:	Site of Action
GnRH	hypothalamus	Anterior Pituitary
FSH	Anterior Pituitary	Granulosa cells
LH	Anterior Pituitary	Theca/Luteal cells
Estrogen	Granulosa Cells	Hypothalamus
Progesterone	Corpus Luteum	Hypothalamus
PGF2a	Uterus	Corpus Luteum
Testosterone	Theca Cells	A LOT

What are all the parts (including junctions) of the female reproductive tract?

Ovary → infundibulum → ampulla → ampullary-isthmic junction → isthmus → utero-tubal junction → uterine horn → uterine body → internal cervical OS → cervix → external cervical OS → fornix vagina (*sows do NOT* have this) → vagina → vestibules → vulva

What is so special about LARGE luteal cells?

- originally granulosa cells. Have no LH receptors. Have PGF2α receptors. undergo hypertrophy ("big trophy" (↑ in size)), produce P_4, relaxin, oxytocin
  - ↳ Signals for PGF2α from uterus.

What is so special about SMALL luteal cells?

- originally theca cells. Have LH receptors. undergo hyperplasia. ("players" (↑ in #s))
  - Produce P_4.
    - ↳ majority.

What are the 3 effects of the environment on the female?

Temperature: heat + cold shock

Photoperiod: Short (ewes) | long (mares) day breeders

Moisture: Seasonal changes affect feed availability

What are the 5 events of folliculogenesis?

1. Initiation | progression of pre-antral follicles: gonadatrophin independent.
   - Bulk of follicles life is spent here

2. Recruitment of small antral follicles: enter gonadatrophin DEPENDENT stage.
   - FSH ↑ = prompts antral follicle growth
   - ↑ E_2
   - ↑ FSH + ↓ LH + ↓ E_2

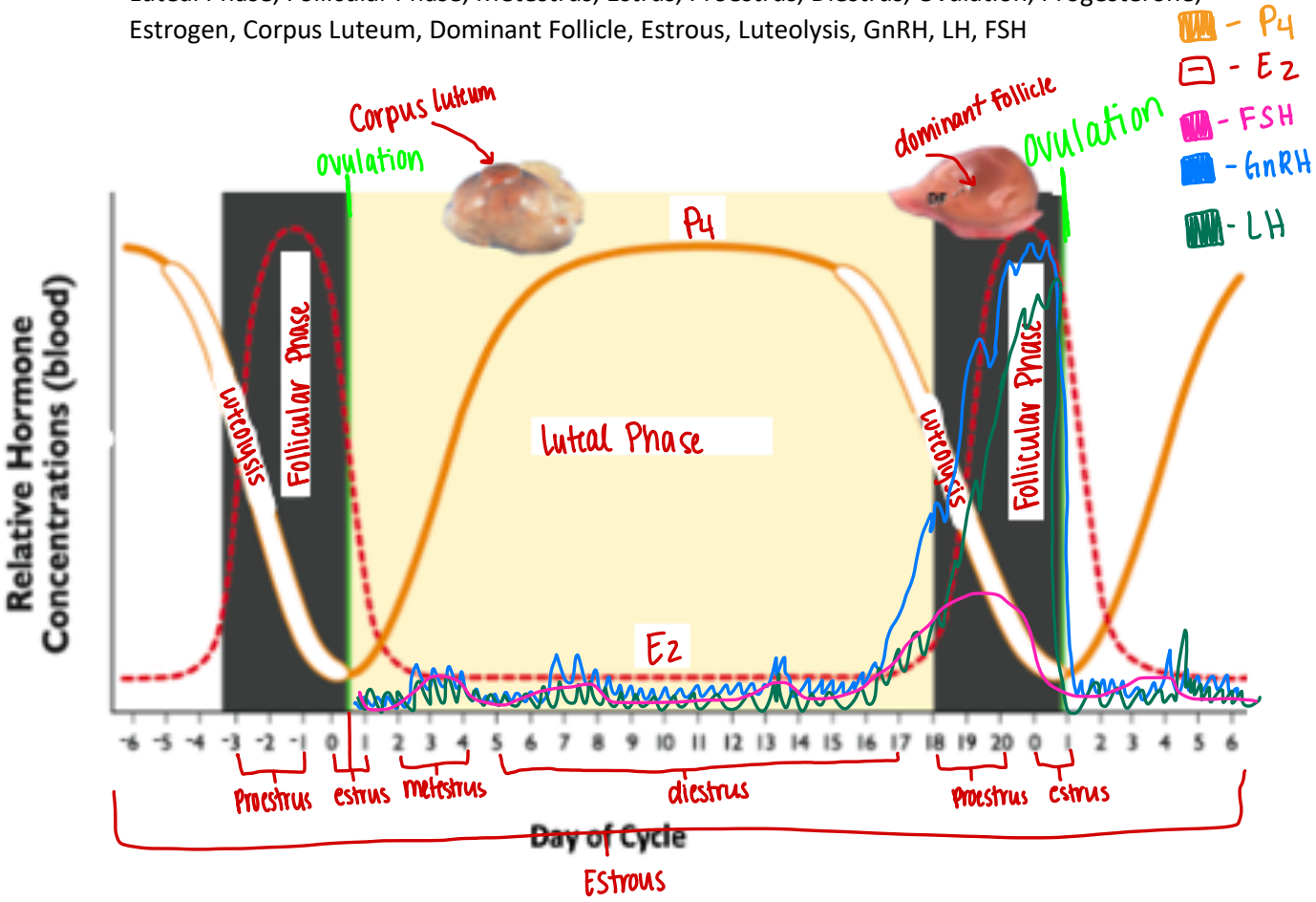
3. Selection of growing cohort of recruited antral follicles:
   - 1st to get LH receptors "win" (FSH ↓ due to inhibin ↑)
   - ↓ FSH, moderate LH, ↓ inhibin

4. Dominance of 1 | more follicles:
   - ↑ E_2, granulosa cells acquire LH receptors
   - Before deviation - all follicles can be the dominant follicle
   - After deviation - largest follicle is dominant follicle

5. Artesia: occurs continuously throughout follicular oogenesis
   - Waves = artesia of furthest grown follicle

Label the chart with the following:

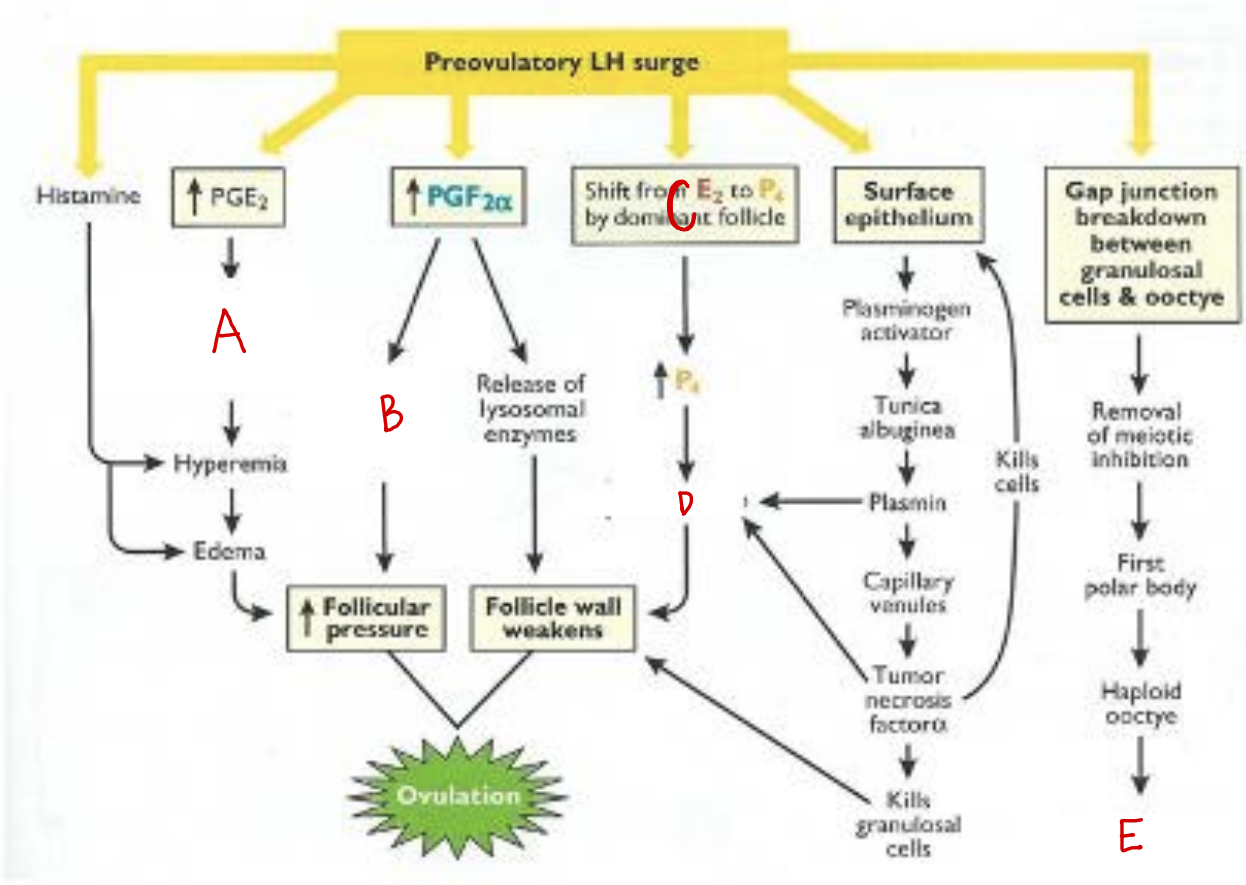
Luteal Phase, Follicular Phase, Metestrus, Estrus, Proestrus, Diestrus, Ovulation, Progesterone, Estrogen, Corpus Luteum, Dominant Follicle, Estrous, Luteolysis, GnRH, LH, FSH



Match the following to the correct area of the chart:

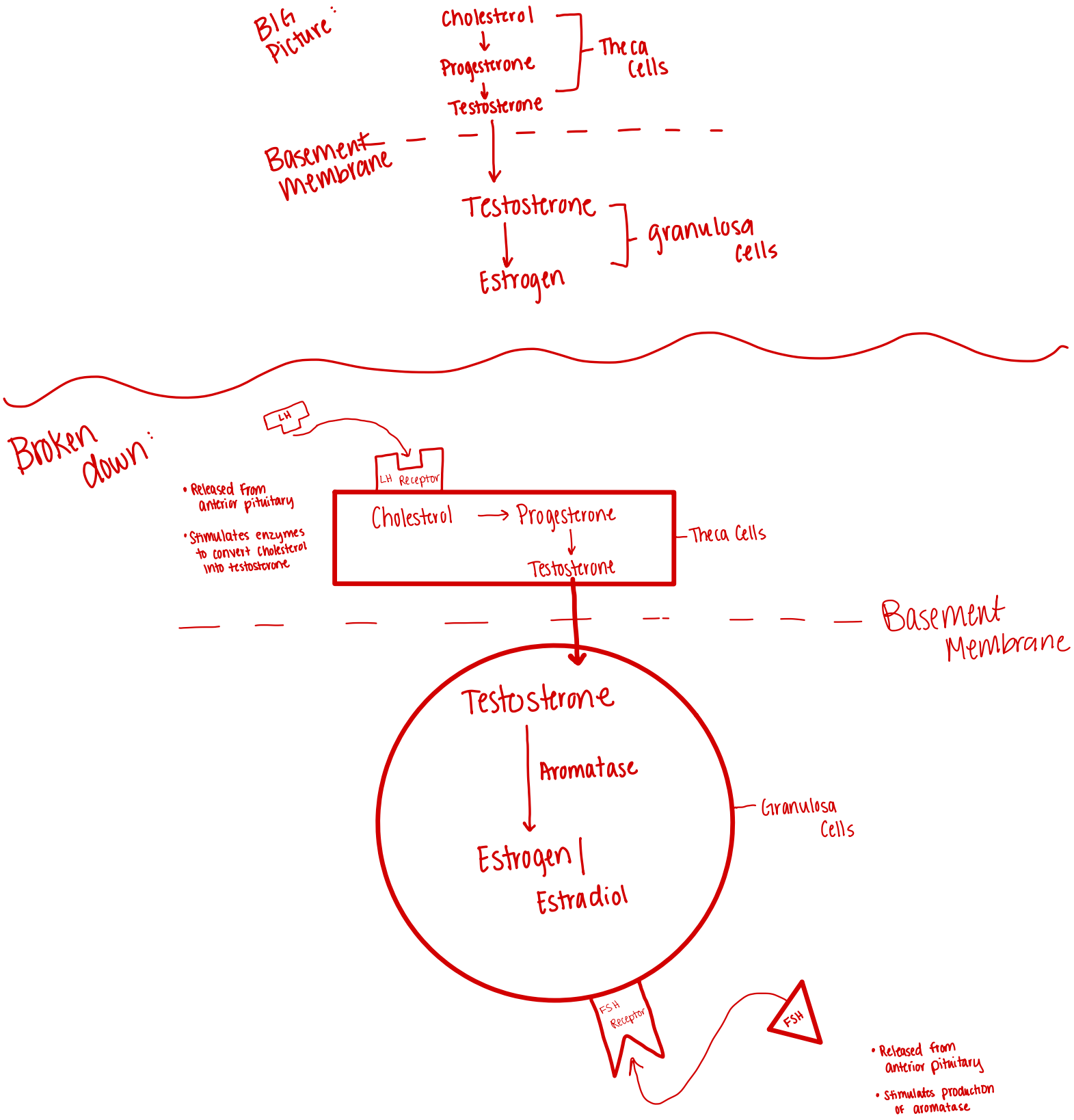
a. Increased blood flow to ovary and dominant follicle
b. Increased contraction of ovarian smooth muscle
c. Shift from E2 to P4 by dominant follicle
d. Increased collagenase
e. Fertilization

★ Please Note:
C was not whited out but it says it on Chart.



Here is one of your big point questions!

Draw and explain the 2-cell/2-gondatrophin theory:



Good Luck and there is still a session on Thursday going over last minute questions and IMPORTANT vocabulary! Let me know if you have questions!