KEY Follicular Phase

1. What stages make up the Follicular Phase?
   Proestrus, Estrus

2. What are the major events of the Follicular Phase?
   Luteolysis (CL death)
   ⬇
   Reduction in Progesterone
   ⬇
   GnRH released at higher amplitudes + frequencies
   ⬇
   FSH and LH released at higher concentrations
   ⬇
   Promotes follicular development
   ⬇
   Preovulatory surge of LH

3. What is occurring in the Tonic center?
   - 2 nuclei release GnRH in a tonic pattern
   - Episodic pulse patterns
   - Drives early follicle growth

4. What is occurring in the Surge center?
   - 3 nuclei release GnRH in a surge pattern
   - Secretes basal levels of GnRH
     - Increase concentration of estrogen and decrease levels of progesterone signals surge center

5. What is Folliculogenesis?
   Growth and development of Ovarian Follicles

6. What are the 5 events of Folliculogenesis?
   - Initiation and Progression of Pre-Antral Follicles
     - Development of primordial follicles
   - Recruitment of small follicles
   - Selection of growing cohort of recruited antral follicles
   - Dominance of 1 or more follicles
   - Follicular atresia occurring continuously throughout folliculargenesis

7. How do Pre-Antral Follicles grow and mature?
    - Continuous process (growth occurs in waves)
    - Gonadotropin dependent
    - Growth factors produced by the granulosa cells and oocyte have a pro-active role in the development

8. How do Antral Follicles grow and mature?
    - Antral follicles develop in response to tonic levels of (FSH) and (LH) released from the Anterior Pituitary
    - Follicular dynamics of antral follicles consist of:
        - Recruitment
        - Selection
        - Dominance
        - Atresia

9. What prevents the ovulation of a developing antral follicle?
   When a CL is present, progesterone will prevent ovulation

10. What is Recruitment?
    - FSH is increased ➡ prompts antral growth
        - Entry into gonadotropin dependent pool
            - Surge of FSH stimulation
        - Secrete estrogen
    - Most of recruited follicles undergo atresia

11. What is Selection?
    - Follicles that are 1st to acquire LH receptors ➡ increased dependence on LH
    - Changes in hormonal profile (P4 ➡ E2)
    - Non-litter bearing species have a single follicle selected
    - Litter bearing species have many follicles selected
    - Follicles that aren't selected undergo atresia

12. What is Dominance?
    - Produce increasing estrogen and inhibin
    - Increase blood flow (increased LH received)
    - Granulosa cells acquire LH receptor ➡ shifts from estrogen production to progesterone right before ovulation
    - Subordinate follicles undergo atresia

13. What is the 2-Cell/2-Gonadotropin Model?
    - In the Theca Interna cell, which has LH receptors, LH will bind to its receptor, causing Cyclic AMP to activate pKA (protein kinases), which will convert cholesterol (the precursor to all steroids) into Testosterone
      ⬇
    - Testosterone will enter the Granulosa Cell where it will turn into Estrogen with the help of pKA that's activated by Cyclic AMP from the FSH receptor
      ⬇
    - Estrogen will travel through blood and get carried to the brain and repro. tract

14. What happens when the LH surge reaches the dominant follicle?
    - Resumption of meiosis in the oocyte
    - Separation and expansion of cumulus cells (corona radiata)
    - Follicle rupture
    - Expulsion of the cumulus oocyte complex (COC)

15. What does the LH surge break down?

Breaks down gap junctions between granulosa cell and oocyte, removing meiotic inhibition (Meiosis resumes)

16. What events triggered by the LH surge lead to ovulation?
    - Swelling
        - Hyperemia = increased blood flow
    - Destruction of follicular tissue
        - Hyperemia ➡ Histamine and PGE2 increase blood flow
        - Dominant follicle ➡ angiogenic factors in follicular fluid
        - Progesterone production prior to ovulation
            - Increases production of collagenase
        - Prostaglandin (PGF2a and PGFE2)
        - Proteases made ➡ used to get oocyte out