

The Follicular Phase

What are the major events of the follicular phase?

- Luteolysis
- Reduction in progesterone
- GnRH released at higher amplitudes and frequencies
- FSH and LH at higher concentrations
- Promotes follicular development
- Production of estrogen
- Preovulatory surge of LH

How is folliculogenesis different between species?

Cattle & Sheep: dominant ovulatory follicles develop in sequential waves during both the follicular and luteal phases of the cycle

Swine & Primates: dominant ovulatory follicles only develop during the follicular phase of the cycle

What are the 5 events of folliculogenesis?

Primordial-

1. Initiation and progression of pre-antral follicles
 - a. Development of primordial follicles

All tertiary follicles-

2. Recruitment of small antral follicles
3. Selection of growing cohort of recruited antral follicles
4. Dominance of 1 or more follicles
5. Follicular atresia occurring continuously throughout folliculogenesis

What's the difference between pre-antral follicle growth and antral follicle growth?

Pre-Antral Follicle Growth:

- Continuous process
- Gonadotropin independent
- Growth factors produced by the granulosa cells and oocyte have a proactive role in development
- Bulk of follicle's life is spent in the pre-antral stage

Antral Follicle Growth:

- Gonadotropin dependent
- Antral follicles develop in response to tonic levels of FSH and LH released from the Anterior Pituitary

What are the follicular dynamics of antral follicles?

- Recruitment
 - o FSH is increased prompting antral follicle growth
 - o Gonadotropin dependent
- Selection
 - o 1st to acquire LH receptors, increased dependency on LH
 - Inhibin reduces FSH at AP level
 - o Changes in hormonal profile
 - o Monotocous species (non-litter bearing) have a single follicle selected
 - o Polytocous species have many follicles selected
- Dominance
 - o Produce increasing estrogen and inhibin
 - o Increase blood flow
 - Increase LH received
 - o Granulosa cells acquire LH receptor and shifts from E2 production to P4 production right before ovulation
- Atresia
 - o All follicles that are unable to survive each dynamic undergo atresia
 - Most recruited follicles (recruitment)
 - Follicles that weren't selected (selection)
 - Subordinate follicles (dominance)

What is the 2-cell/2-gonadotropin model?

- LH & FSH are released from the anterior pituitary and travel through the blood to the ovarian follicle
- **This is necessary for ovulation**

THECA INTERNA

1. LH binds to receptor on theca interna cell
2. CAMP activates PKA
3. Cholesterol -> testosterone

GRANULOSA

1. FSH binds to receptor on granulosa cell (needed for testosterone to enter)

2. CAMP activates PKA which then activates Aromatase
3. Testosterone crosses basement membrane
4. Aromatase converts Testosterone -> estrogen

