"Ovarian Cycle"

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1. Control of Ovarian Cycle (Hormonal Axis)

Flowchart:

Hypothalamus (arcuate nucleus) → Releases GnRH → Acts on anterior pituitary → Releases FSH + LH → Act on ovaries → Ovarian hormone production (Estrogen, Progesterone)

Key Concept

- This is the Hypothalamic-Pituitary-Ovarian (HPO) axis
- Central regulator of female reproductive cycle

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2. Hormones in the Ovarian Cycle

Hormone	Source	Main Function
FSH	Anterior pituitary	Follicular growth
LH	Anterior pituitary	Ovulation + luteinization
Estrogen	Theca interna + granulosa cells	Endometrial proliferation
Progesterone	Corpus luteum	Endometrial maintenance

High-Yield Concept

- Two-cell, two-hormone theory:
  - Theca cells → androgens
  - Granulosa cells → convert → estrogen

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3. Phases of Ovarian Cycle

Phase	Main Hormone	Key Event
Follicular phase	Estrogen	Follicle development
Ovulation	LH surge	Oocyte release
Luteal phase	Progesterone	Endometrial preparation

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4. Action of FSH

Key Effects

- Stimulates recruitment of 15–20 primordial follicles
- Promotes follicular growth:
    - Primordial → Primary → Growing follicles

Important Clarification

- FSH does not directly initiate follicle development
- It acts in a permissive role (supports growth environment)

Flowchart

FSH → Recruitment of primordial follicles → Growth of follicles → Primary follicles → Estrogen production begins

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5. Action of Estrogen

A. Effects on Uterus

- Causes proliferation of endometrium → Called proliferative (follicular) phase

B. Effects on Cervix

- Thinning of cervical mucus → Facilitates sperm entry

C. Feedback Effects

Type	Effect
Negative feedback	↓ FSH secretion
Positive (feed-forward)	Triggers LH surge (at high levels)

High-Yield Concept

- Estrogen has dual feedback:
  - Low levels → negative feedback

- High sustained levels → positive feedback → LH surge

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6. LH Surge

Trigger

High estrogen levels

- Decreased FSH → LH surge

Effects of LH Surge

LH surge → Completion of Meiosis I → Formation of secondary oocyte → Initiation of Meiosis II → Ovulation → Formation of corpus luteum → Progesterone secretion

Important Clarification

- Meiosis II is NOT completed at ovulation
- It completes only after fertilization

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7. Ovulation (Integrated Mechanism)

Flowchart

Growing follicle → ↑ Estrogen → Positive feedback → LH surge → Meiosis I completes → Secondary oocyte forms (Metaphase II arrest) → Follicle ruptures → Ovulation

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8. Role of Progesterone (Luteal Phase)

Source

- Corpus luteum

Functions

- Prepares endometrium for implantation
- Maintains secretory phase

Flowchart

LH surge → Corpus luteum formation → Progesterone secretion → Endometrium enters secretory phase

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9. Integrated Hormonal Overview

GnRH → FSH + LH

- FSH
  → Follicular growth
  → Estrogen production

- Estrogen
  → Endometrial proliferation
  → ↓ FSH (negative feedback)
  → ↑ LH (positive feedback at high levels)

- LH surge
  → Meiosis I completion
  → Ovulation
  → Corpus luteum formation

- Progesterone
  → Secretory endometrium
  → Prepares for implantation

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10. Clinical Concepts

a. Anovulatory Cycles

- Failure of LH surge → No ovulation

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b. Hormonal Imbalance

- ↓ FSH → impaired follicle development
- ↓ LH → no ovulation

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c. Cervical Mucus Changes

- Thin (estrogen) → fertile phase
- Thick (progesterone) → infertile phase

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11. Exam Points

- GnRH → FSH + LH
- FSH → follicular growth
- Estrogen → proliferative phase
- LH surge → ovulation trigger
- Progesterone → secretory phase
- Secondary oocyte is ovulated (not ovum)
- Meiosis II completes only after fertilization
- Estrogen causes LH surge (positive feedback)

-> The End <-