# SIKLUS ENDOMETRIUM

**Kuliah 7**

**Rahmatina B. Herman**
**Bagian Fisiologi**
**Fakultas Kedokteran Universitas Andalas**

# Cycles of Female Reproductive Function

- Menarche – Puberty

↓

↓

↓ - Endometrial cycle

↓ - 28 days (20 – 45 days)

↓

- Menopause

# Puberty and Menarche

- **Puberty:**
  - The onset of adult sexual life
  - Caused by a gradual increase in gonadotropin, beginning in ± 8$^{th}$ yr of life
  - Usually culminating in the onset of menstruation ages ± 13 years (11 – 16 years)
  - Anovulatory cycles

- **Menarche:**
  - the onset of menstruation

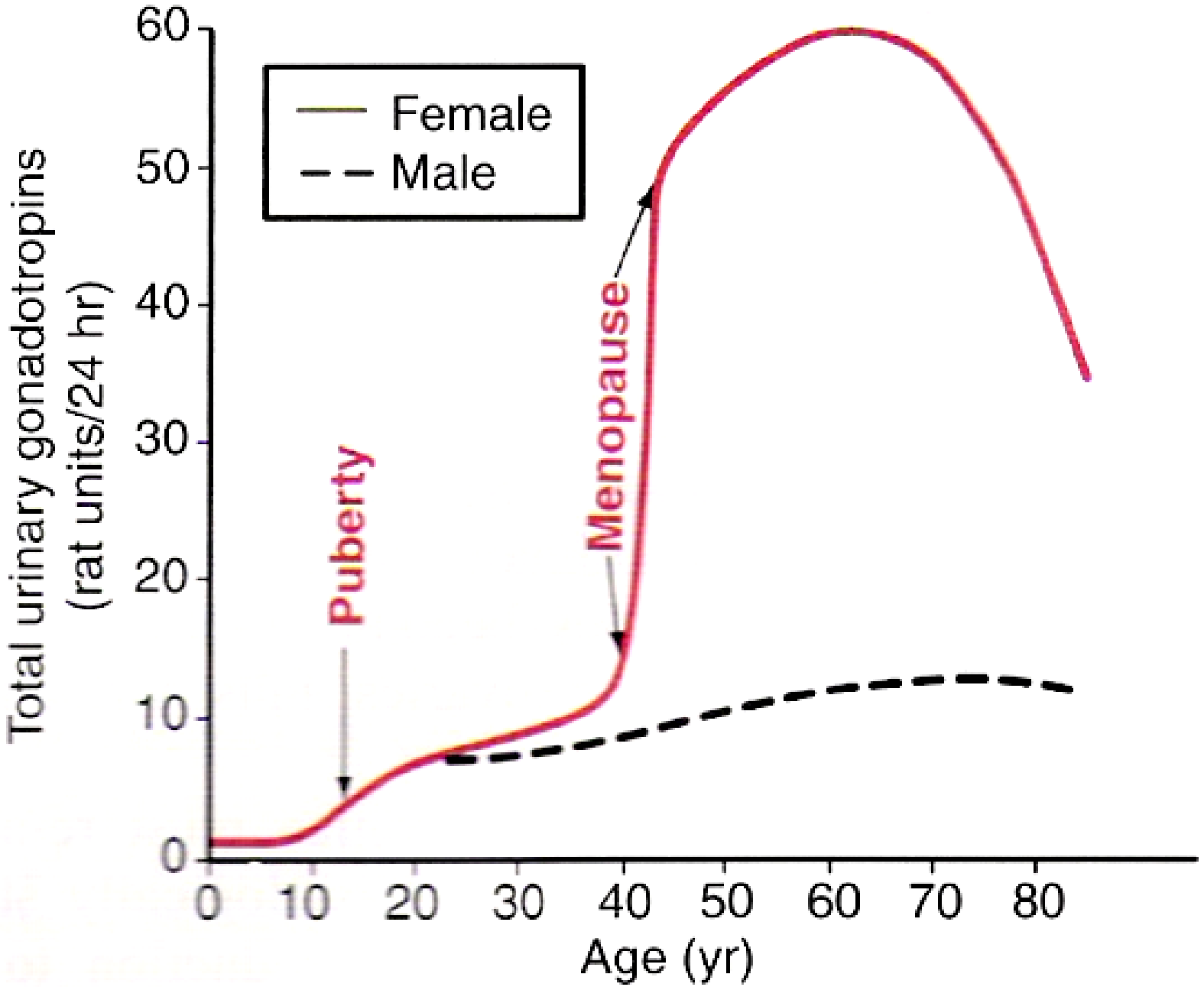
# Climacterium & Menopause

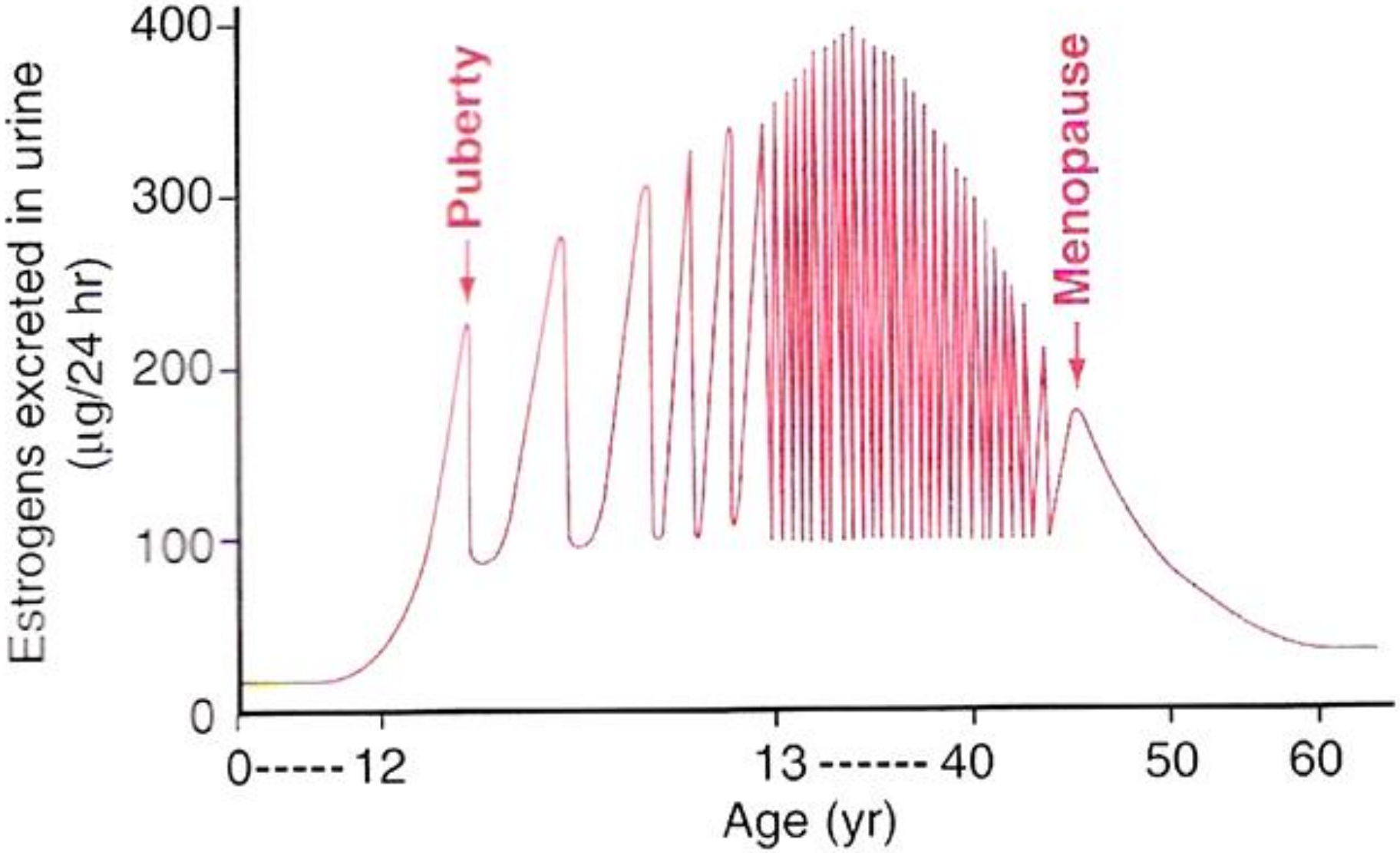
## Climacterium:

- The sexual cycles become irregular
- Ovulation fails to occur during many of the cycles → anovulatory cycles
- Caused by a gradual decrease of female sex hormones
- Beginning in ± $40^{th}$ yr of life

## Menopause:

- The cycles cease and the female sex hormones diminish to almost none
- Caused by “burning out” of the ovaries


Female
Male
Puberty
Menopause
Total urinary gonadotropins
(rat units/24 hr)
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Age (yr)


Estrogens excreted in urine (µg/24 hr)
400
300
200
100
0
Puberty
Menopause
0----- 12
13 ------ 40
50
60
Age (yr)

# Endometrial Cycle

## 1. Proliferative phase:

- estrogen → estrogen phase
- before ovulation

## 2. Secretory phase:

- progesterone → progestational phase
- after ovulation

## 3. Menstruation

- estrogen & progesterone decreased

# 1. Proliferative Phase

- **Stromal cells & epithelial cells: rapidly proliferate → re-epithelization within 4-7 days after the beginning of menstruation**

  **↓ increase progressively**

  - **stromal cells**
  - **blood vessels**
  - **endometrial glands: especially cervical region**

  **→ thin mucus: help guide sperm in the proper direction**

- **At the time of ovulation: thickness: 3-4 mm**

# 2. Secretory phase

- **Swelling**
  - Secretory development → more thick
  - Peak: 1 week after ovulation → thickness: 5-6 mm
- **Uterine secretions ("uterine milk")**
  - Appropriate condition for implantation
  - Fertilized ovum enter uterine cavity: 3-4 days after ovulation
  - Ovum implant: 7-9 days after ovulation

# 3. Menstruation

- ± 5 days
- Corpus luteum suddenly involution ⇒ estrogen & progesterone fall ⇒ stimulation by the hormones decreased
  ↓
- involution of endometrium (65 %)
- mucosal layer become spastic
- vasoconstriction (by prostaglandin)
  ↓
- necrosis of endometrium → fibrinolysin
  ↓
- menstruation: - 45 ml blood and 35 ml serous fluid
  - leucorrhea → protective

**FIGURE 28.24** Relative concentrations of anterior pituitary gland hormones (FSH and LH) and ovarian hormones (estrogens and progesterone) during a normal female sexual cycle. Note the relationship of the hormones to the ovarian and uterine cycles.

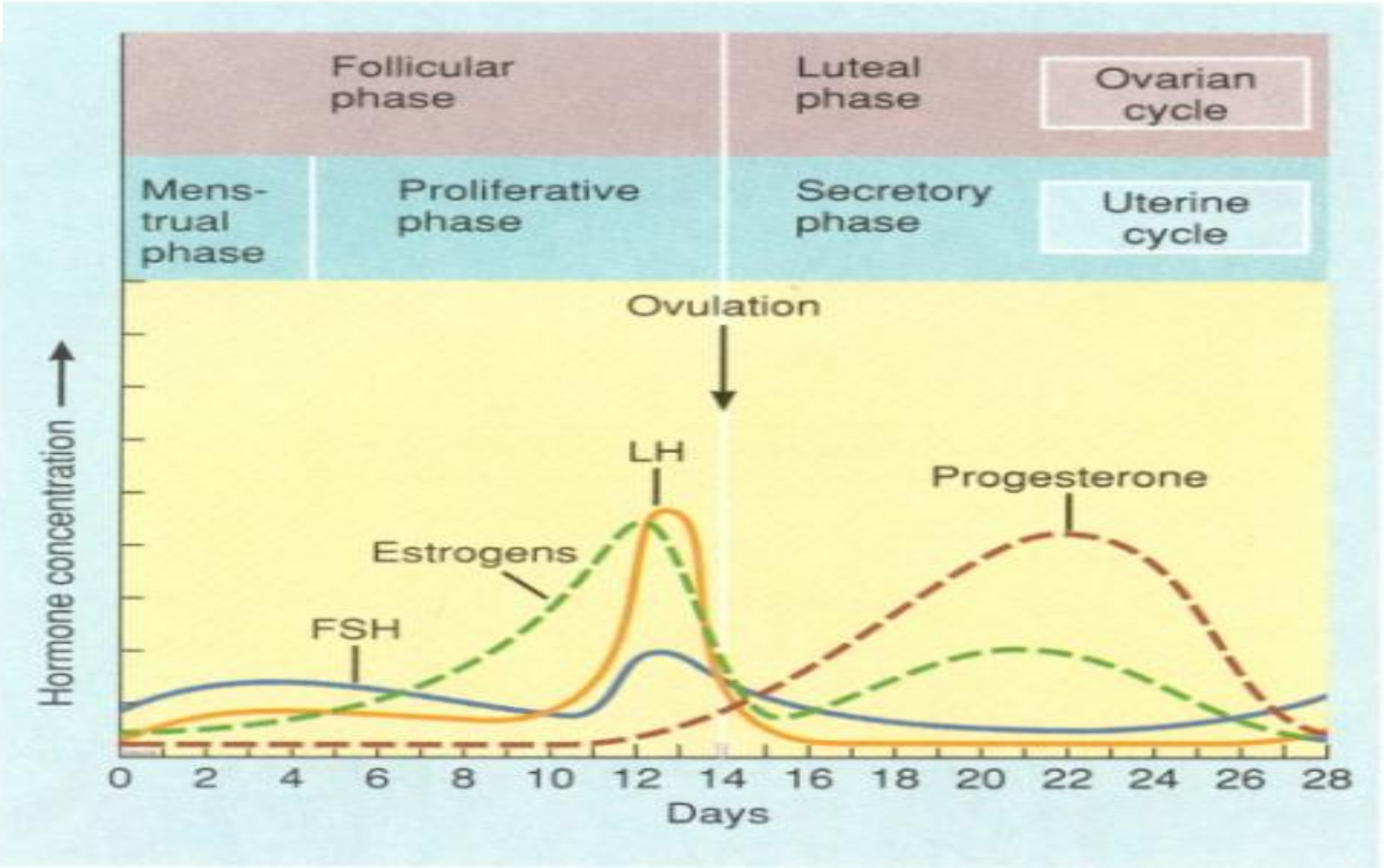
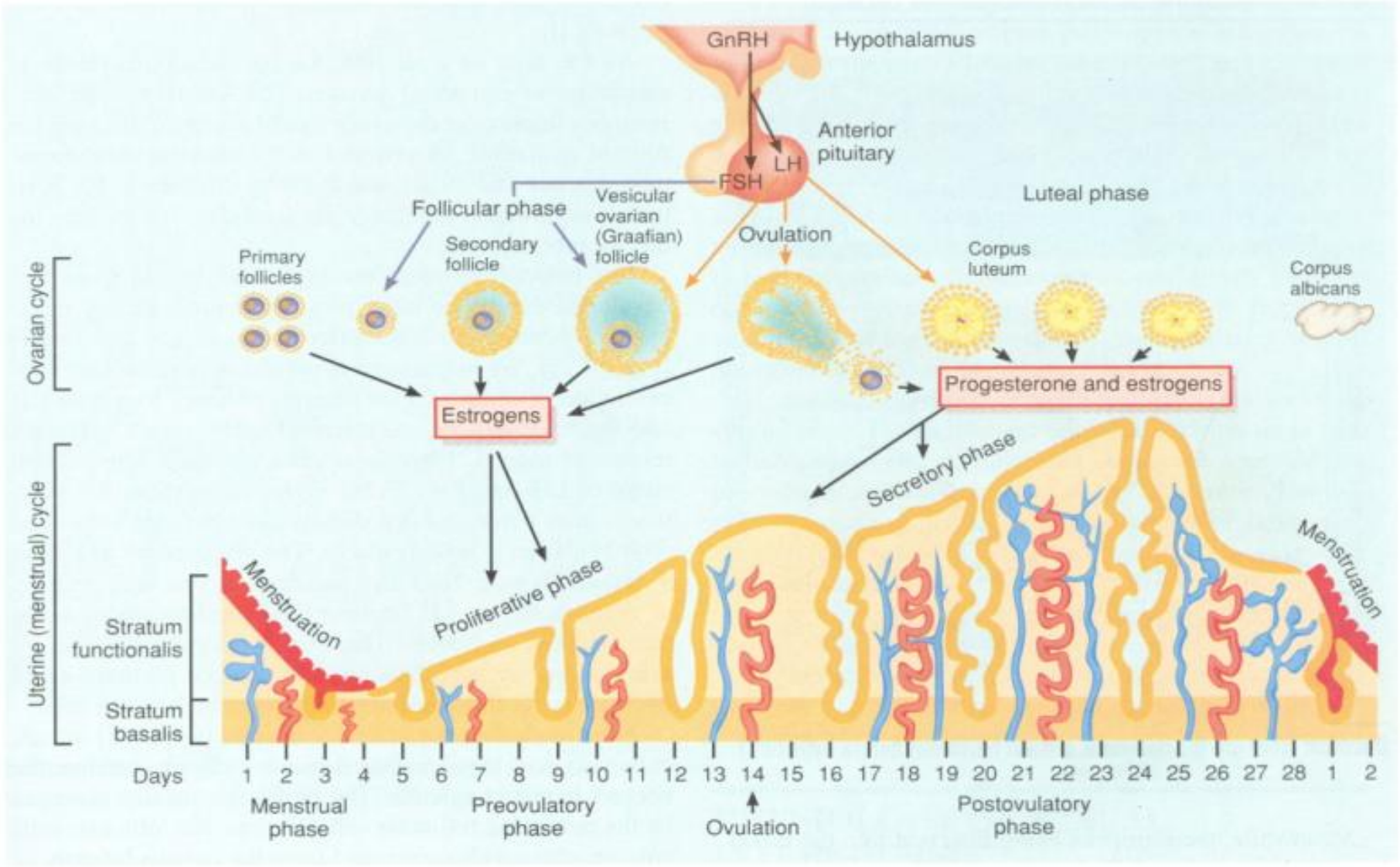


**FIGURE 28.23** Correlation of ovarian and uterine cycles with the hypothalamic and anterior pituitary gland hormones. In the cycle shown, fertilization and implantation have not occurred.




*Question:* Which hormones stimulate proliferation of the endometrium? Ovulation? Growth of the corpus luteum? The surge of LH at midcycle?

# Regulation of Female Monthly Rhythm

**Regulation of**

**the female monthly rhythm**

⇓

**Interplay between**

**the hypothalamic – pituitary hormones**

**and the ovarian hormones**

# Hypothalamus - Hypophysial Portal System

- **Hypothalamic centers: release GnRH**
  - **Mediobasal hypothalamic: arcuate nuclei → pulsatile**
  - **Anterior hypothalamus: area preoptic → moderate amounts**
  - **Limbic system: transmit signals into arcuate nuclei to modify:**
    - **intensity of releasing GnRH**
    - **frequency of the pulse**

**Psychic factors often modify female sexual function**

# …..Hypothalamus - Hypophysial Portal System

## Effect GnRH on Anterior pituitary:

- LH releasing → **pulsatile**
- FSH releasing → also pulsatile, but more important **prolonged effect on FSH** secretion that persist for many hours
- Experiment: continuously infusing of GnRH → its effect in causing releasing FSH & LH are lost → the pulsatile nature is essential to GnRH function

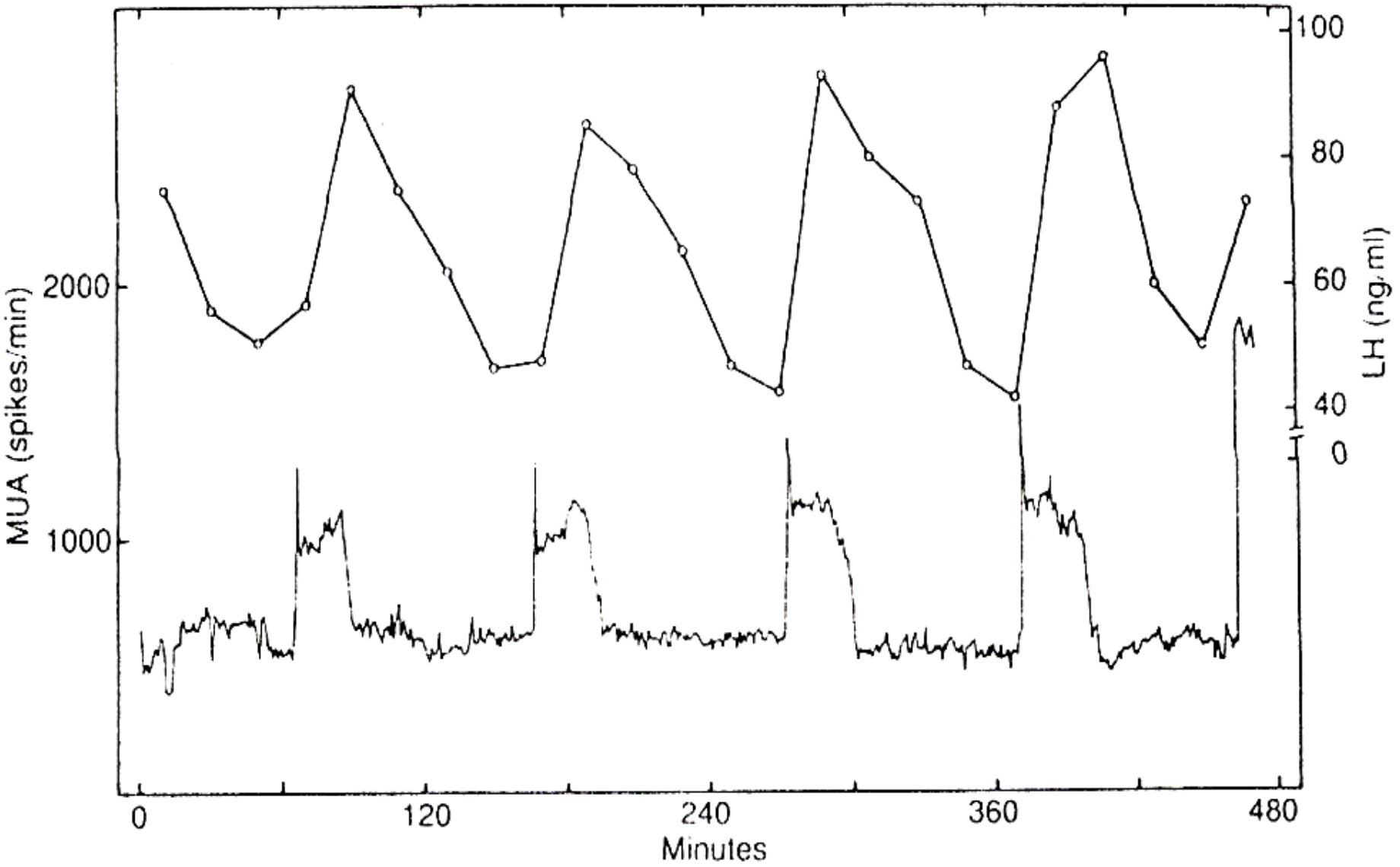
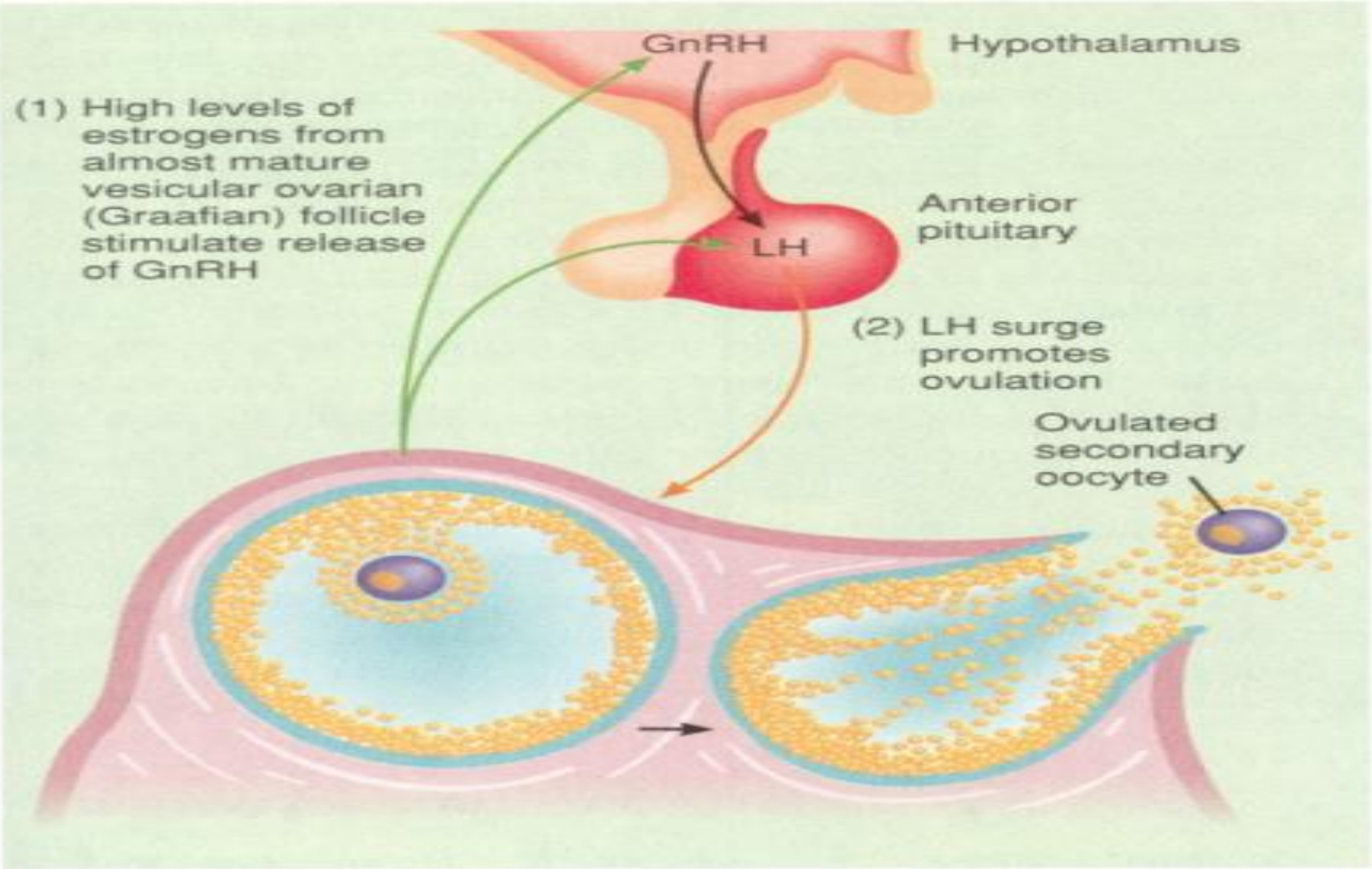



Figure 81–8. *Lower curve:* Changes in multiunit electrical activity (MUA) recorded from mediobasal hypothalamus. *Upper curve:* Luteinizing hormone (LH) pulses in peripheral circulation in a pentobarbital-anesthetized ovariectomized rhesus monkey. (From Wilson, Kesner, Kaufman, Uemura, Akema, and Knobil: *Neuroendocrinology* 39:256, 1984.)

# Effect of Estrogen & Progesterone on LH & FSH Secretion

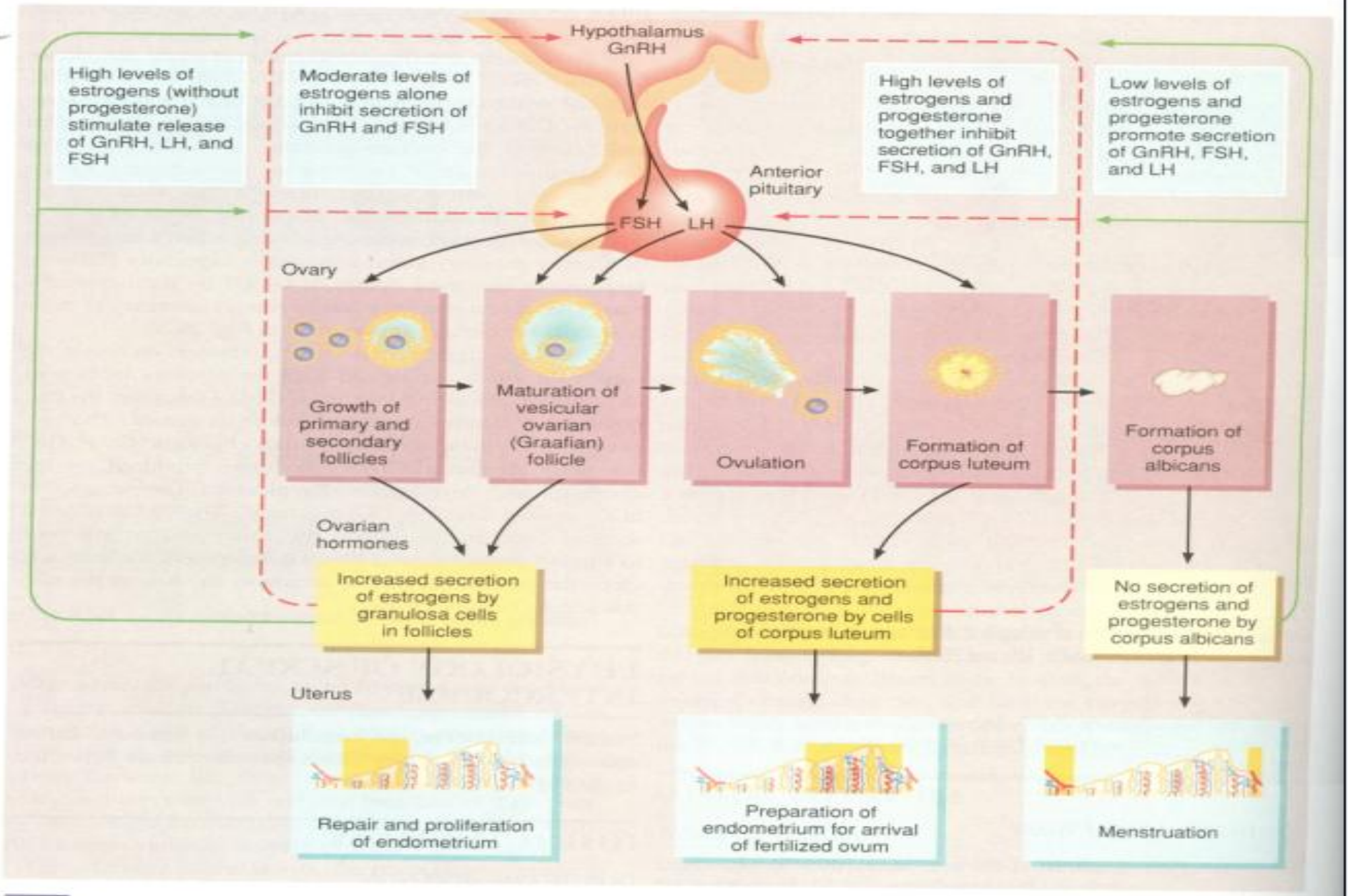
- **Estrogen**
  - moderate level: inhibit secretion of GnRH, FSH
  - high levels: stimulate release of GnRH, LH, FSH
- **Progesterone:**
  - inhibit secretion of GnRH, FSH & LH
- **Inhibin:**
  - mainly on FSH, lesser extent on LH
  - especially important at the end of cycle

**FIGURE 28.25** Positive feedback effect of *high* levels of estrogens on secretion of GnRH and LH.




***Question***: **What is the effect of rising but still moderate levels of estrogens on secretion of GnRH, LH, and FSH?**

**FIGURE 28.26** Summary of hormonal interactions of the uterine and ovarian cycles.




*Question:* When declining levels of estrogens and progesterone stimulate secretion of GnRH, is this a positive or negative feedback effect? Why?

# Thank You

# Tugas

**Hormon androgen pada wanita:**

- **Sintesis**
- **Efek**