



**TRHCUEMEE**



# *Physiology of Menstruation*

# Learning objectives:

**By the end of this lecture the students should be able to:**

- n Define menstruation.**
- n List the Characters of normal menstruation**
- n Enumerate Components of normal menstrual cycle.**
- n Describe each of these components.**

# Menstruation:

- n It is the **cyclic, visible, predictable** bleeding caused by endometrial shedding.
- n It occurs **in the childbearing period** (between menarche & menopause).

# Characters of normal menstruation:

- n **Menarche** :10-16 ys.
- n **Duration the period**: 3-7 days.
- n **Length of the cycle**: 3-5 weeks
- n **Amount** : 30-80 ml.
- n **Menstrual blood**: doesn't coagulate.
- n May precedes by **menstrual molimina**

# Components of normal menstruation:

n hypothalamo-hypophyseal axis.

n Ovarian Cycle.

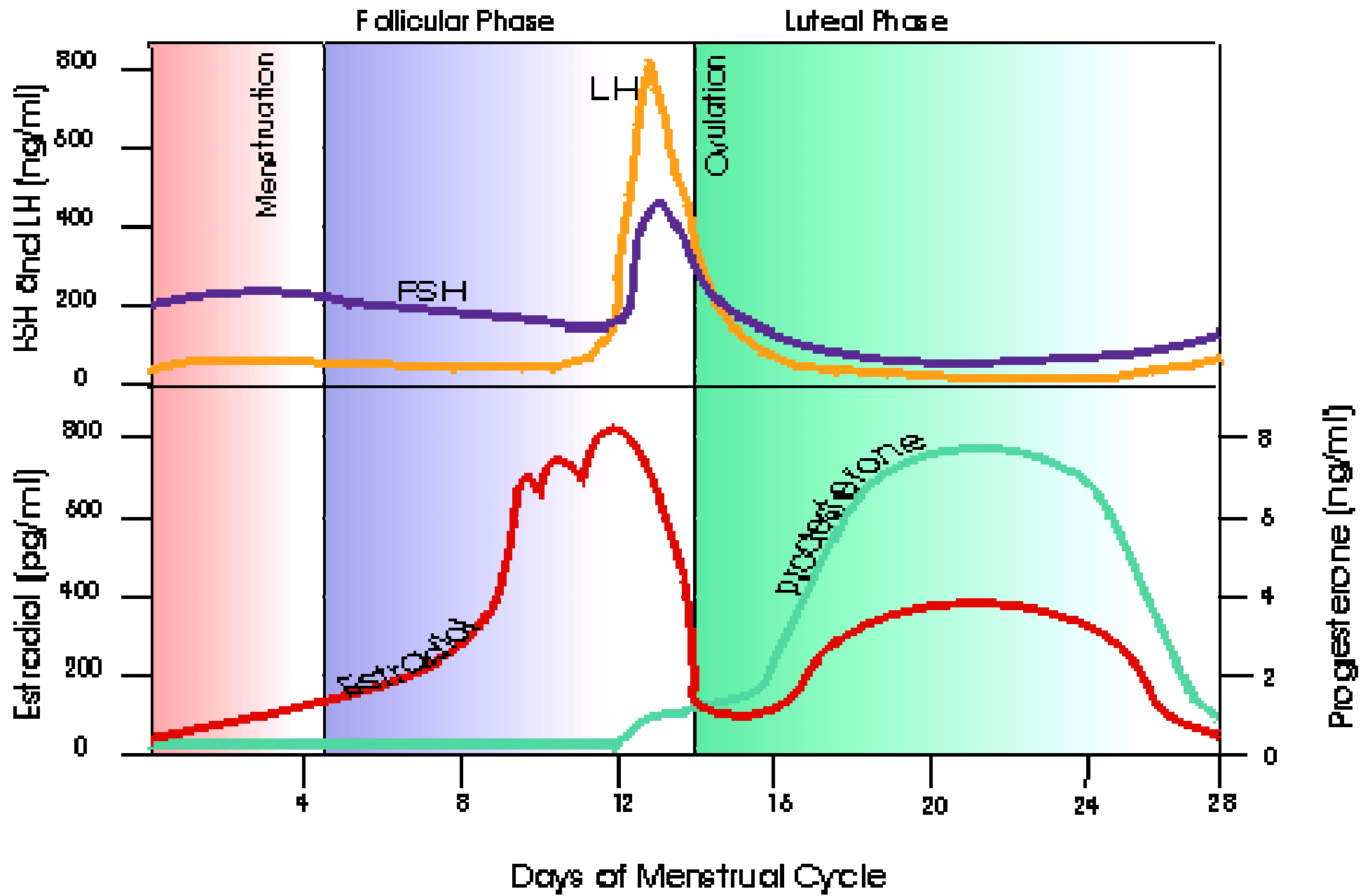
n Endometrial cycle

n Cervical cycle

n Vaginal cycle

n Breast cycle.

# Approximate Concentrations of Pituitary and Ovarian Hormones During Menstrual Cycle

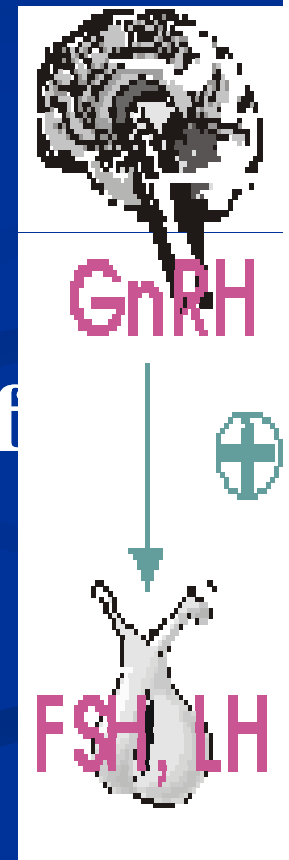


# The hypothalamo-hypophyseal axis:

n **The hypothalamus secretes:**

1. GnRH in pulsatile manner (every 60-90 min).

n GnRH stimulates the production of FSH and LH from the anterior pituitary.



# Ovarian Cycle:

## Follicular phase:

- n **Recruitment:** starts 4-5 days before menstruation, as **cohort of follicles**; caused by the relative high level of FSH.
- n **Selection & dominance:** the **leading follicle** is selected within the 1<sup>st</sup> 7 days of the cycle; with atresia of the others; due to gradually **increasing estrogen** level with gradually **decreasing FSH** with **different sensitivities** of the follicles to this low level of FSH with **low threshold in the dominant follicle** than the atretic ones.

# Ovarian Cycle:

## Follicular phase (cont):

n Growth & development of the dominant Follicle: from the 7<sup>th</sup> day till ovulation under the effect of FSH with production of rising estrogen.

# Ovarian Cycle:

**Ovulatory phase:** caused by estrogen-provoked LH surge which causes:

n **1<sup>st</sup> meiotic division.**

n **Follicular rupture & extrusion:** caused by

1. **Enzymatic:** - plasmin.

2. **Prostaglandins.**

3. - antral pressure.

4. **Ovarian contractility**

n **Luteinization.**

# Ovarian Cycle (cont.):

n **Luteal phase:** from ovulation till either **nidation** or **menstruation**:

n 14±2 days.

n Corpus luteum formation with production of estrogen and progesterone which produce:

1. - Basal body temp.
2. Secretory end.
3. Cervical mucus changes.
4. -ve feedback: ⊕ - FSH & LH

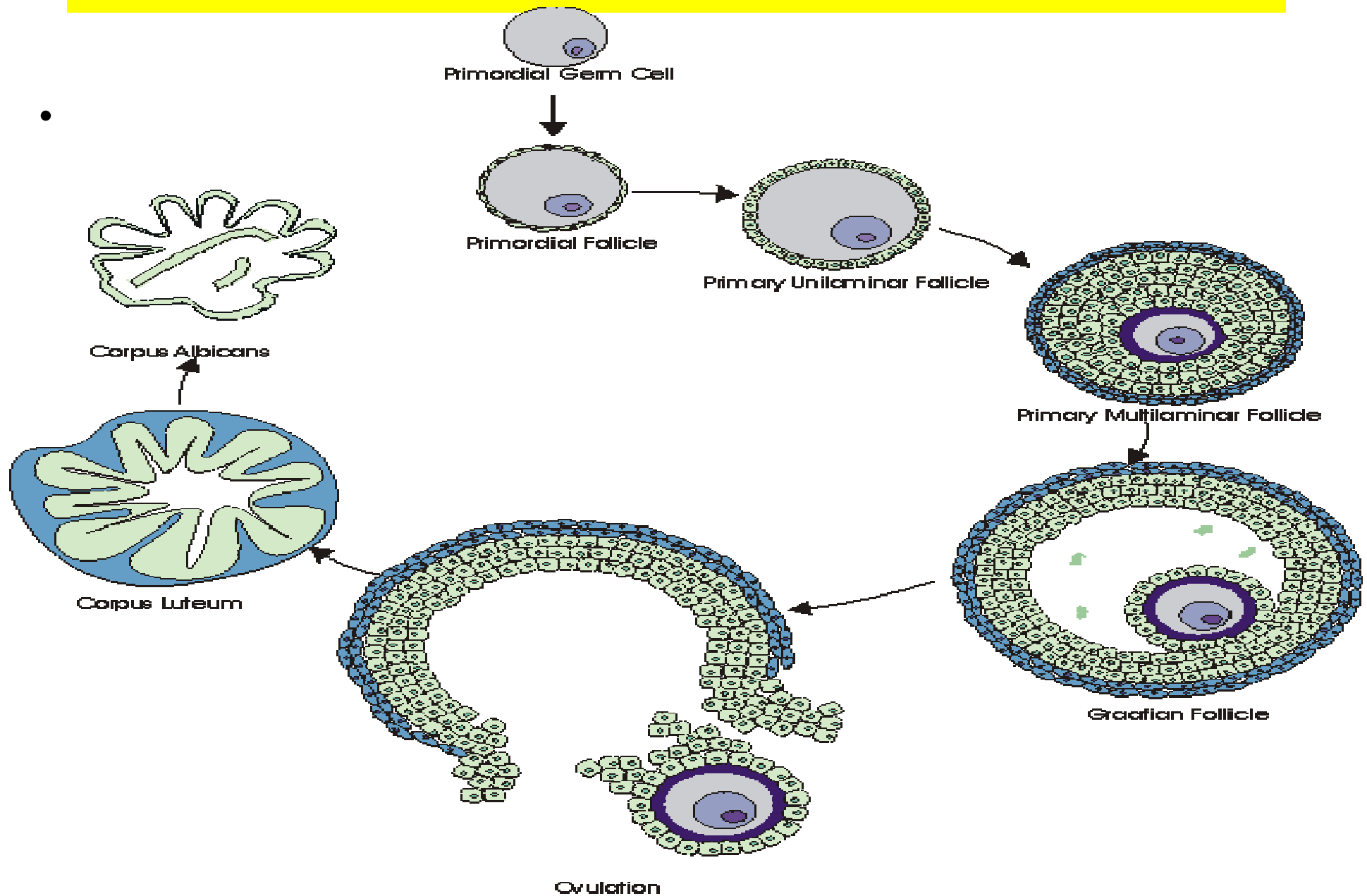
# Ovarian Cycle (cont.):

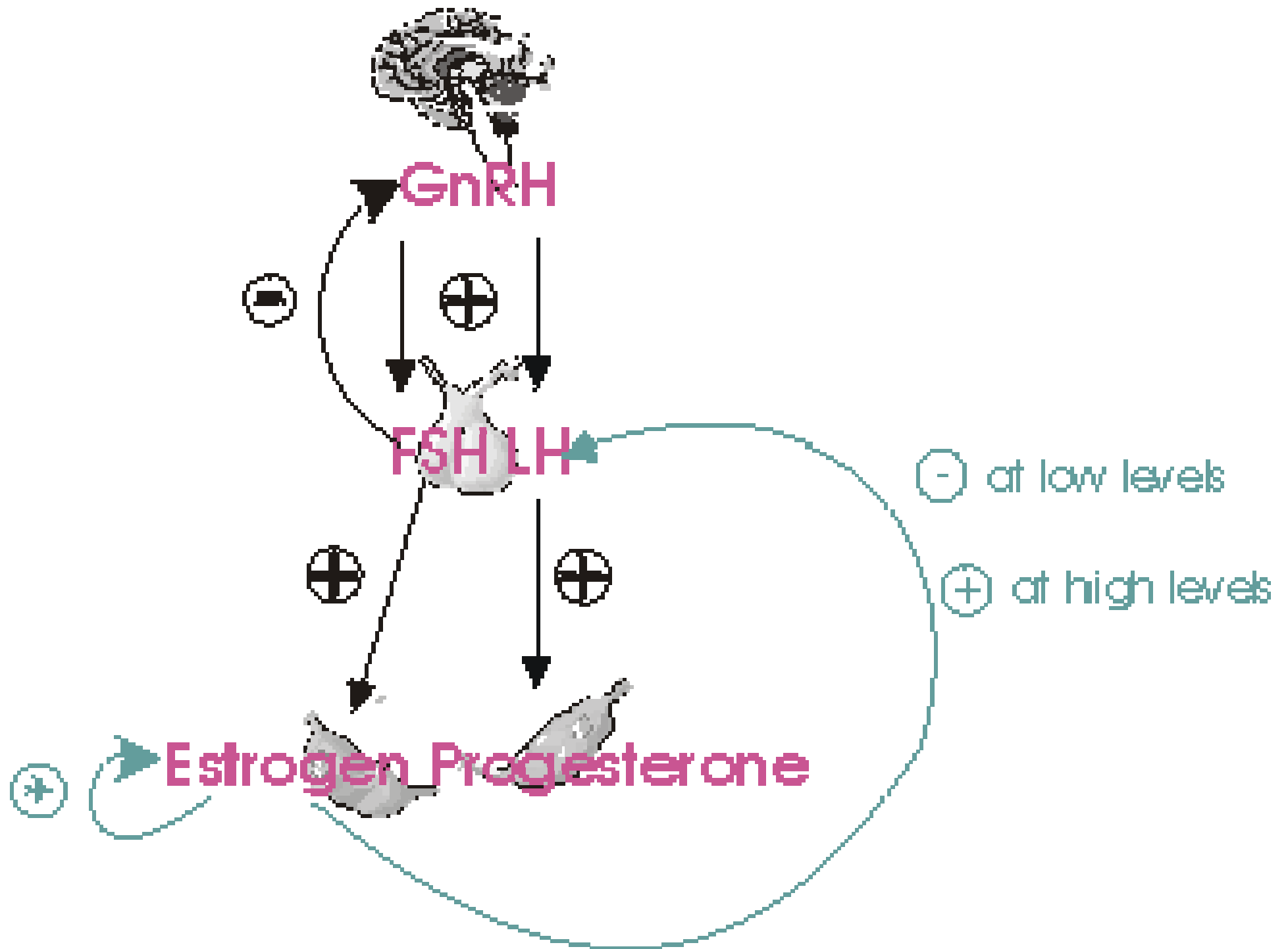
## n Luteal phase (cont):

### n Fate of CL:

1. **Nidation** : hCG appears by the 9<sup>th</sup> day post ovulatory & maintains CL
2. **No nidation** : the corpus luteum degenerates by the 10<sup>th</sup> day post ovulatory ® corpus albicans with - estrogen and progesterone levels ® :
  - separation of the endometrium and menstruation.
  - Premenstrual - FSH ® new follicular recruitment

# Ovarian Cycle:





# Endometrial cycle:

## n Menstrual phase:

n 3-7 days, the time of bleeding.

## n Proliferative phase:

n 9-10 days.

n **Microscopically;** Characterized by

1. **Endometrial thickness** 3-4 mm
2. **Glands** ↑ in number and length.
3. **Stromal cell** ↑ in size.
4. **Vascularity** increases.

# Endometrial cycle:

## n Secretory phase:

n 14±2 days.

n **Microscopically;** Characterized by:

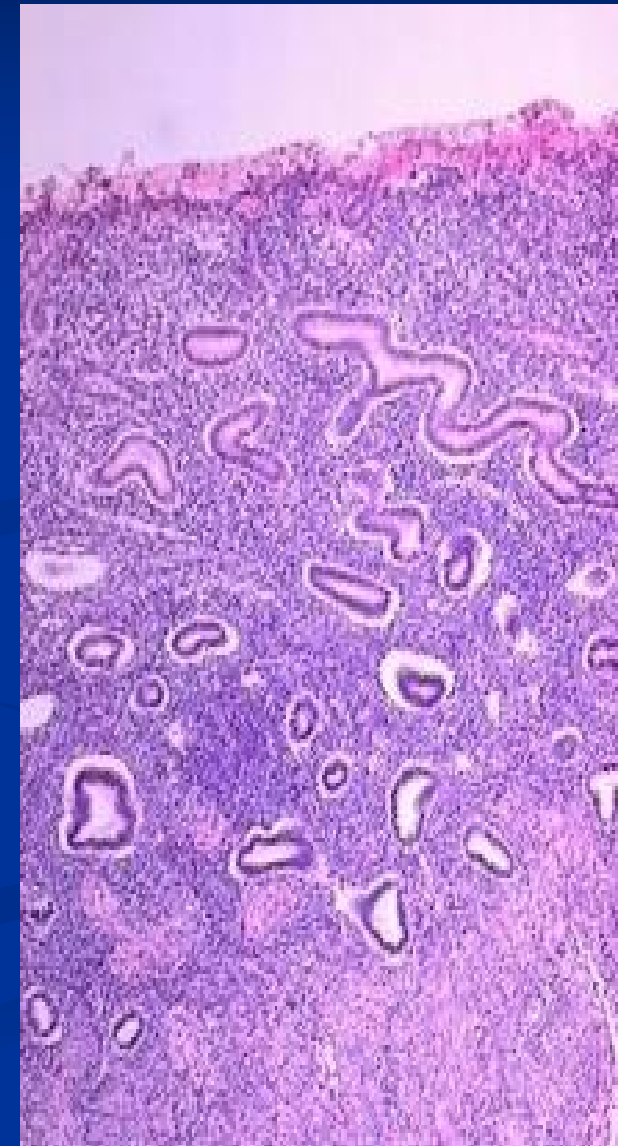
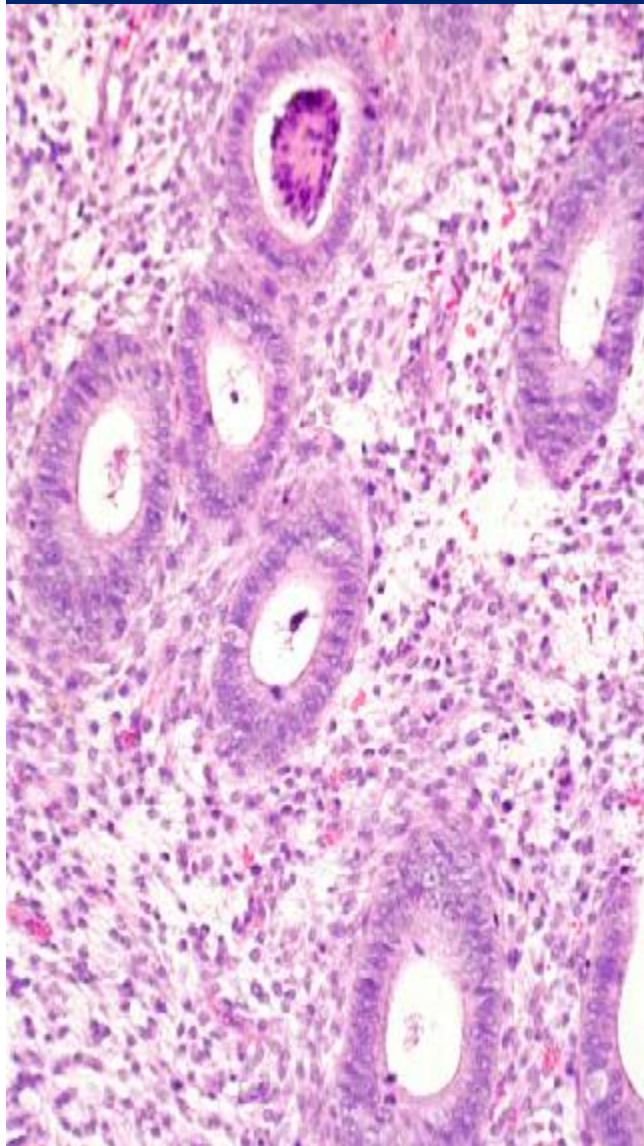
1. **Endometrial thickness:** 6-8 mm.
2. **Glands:** continue to grow, become tortuous
3. **Stromal cell:** ↑ in size, forming 3 layers: superficial compact layer, middle spongy layer and deep compact layer.
4. **Vascularity:** ↑ forming 2 types: basal arteriols, spiral arteriols.

# Endometrial cycle:

Proliferative phase

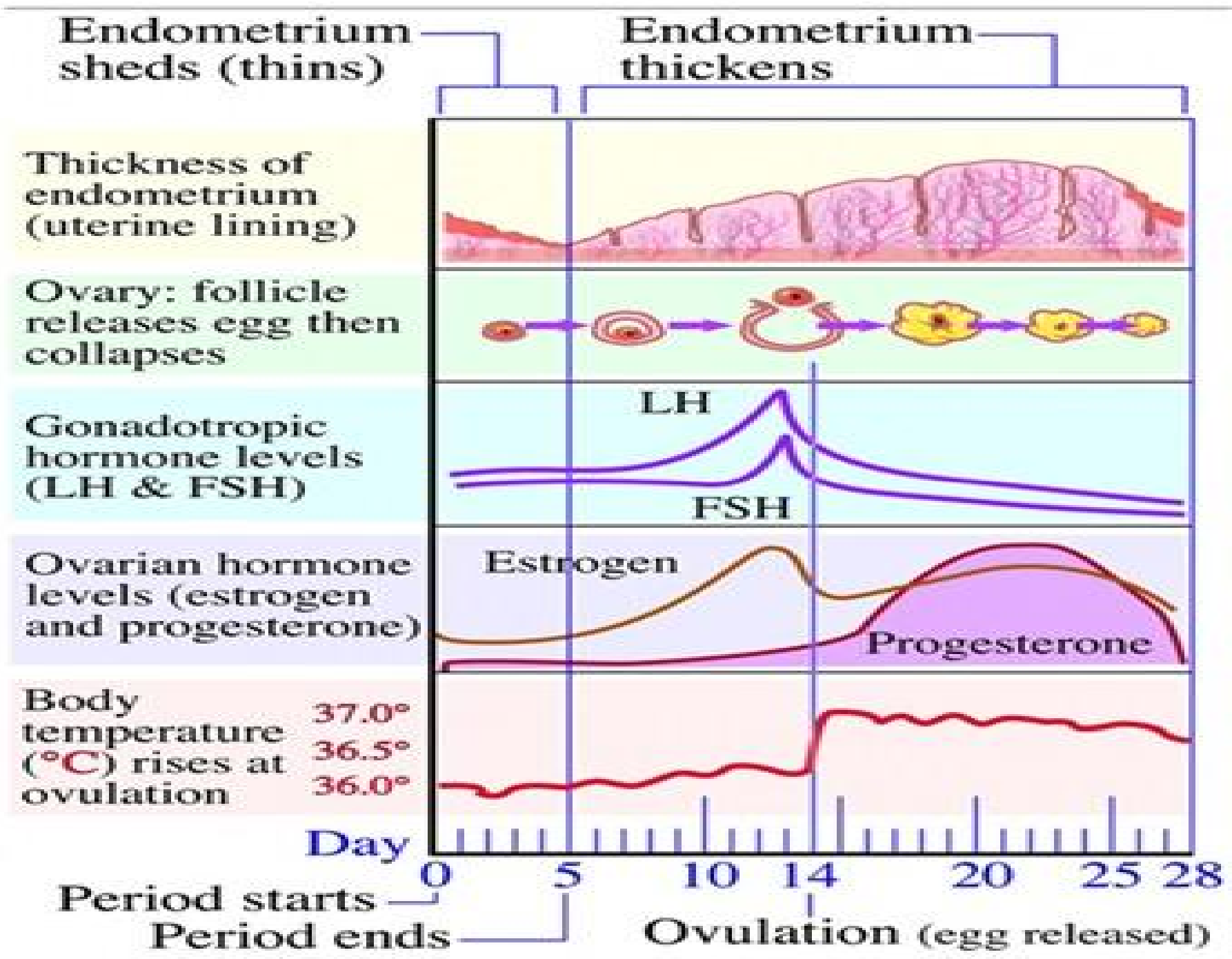
Secretory phase

Menstrual phase



## Mechanism of menstruation :

- n Corpus luteum degenerates leads to drop in estrogen and progesterone.
- n Leads to edema and shrinkage of the endometrium, ↑ coiling of spiral arterioles , ischemia & necrosis of superficial and middle layers of endometrium.
- n Necrotic area separate leading to bleeding.
- n Basal layer not involved because it is supplied by basal arterioles.



# Cervical Cycle:



<b>Day 3</b>	<b>Day 6</b>	<b>Day 14</b>	<b>Day 22</b>
She's still menstruating .	firm, os is closed, and she has no cervical fluid	soft, os is open, and her CF is stretchy, like eggwhite, probably about to ovulate	firmer, os is closed, and mucus is viscid than it was on Day .14

# Vaginal cycle

	1 <sup>st</sup> half	2 <sup>nd</sup> half
epithelium	cornified	proliferated
Smears	Cornified cells	leukocytes infiltration
Discharges	watery	thick mucus

# Breast cycle

	<b>Estrogen</b>	<b>Progesterone</b>
<b>Histologically</b>	<b>proliferation of mammary ducts</b>	<b>growth of lobules and alveoli</b>
<b>Clinically</b>	<b>Nearly free</b>	<b>breast swelling, tenderness and pain 10 days preceding menstruation</b>