

OVARIAN AND UTERINE CYCLES

Sultan Al-Salem
Lecture two and three

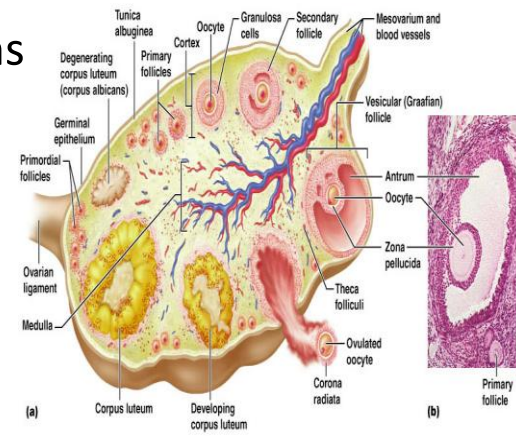
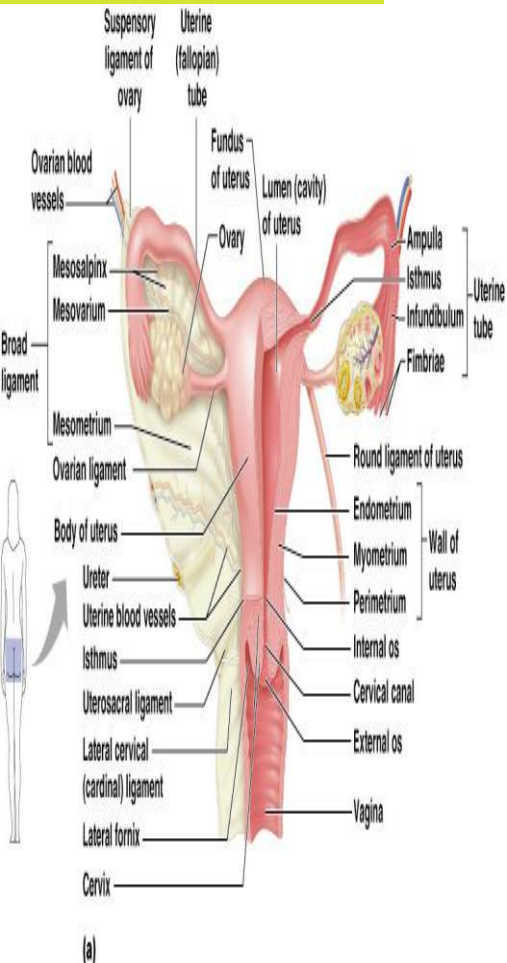
WHAT YOU NEED TO KNOW

Ovarian Cycle LEC :

- ⊙ Hormones of Female reproduction and their actions
- ⊙ Menstrual cycle, the whole story
- ⊙ Hormonal control on ovarian
 - ⊙ Follicles , mature oocyte, and corpus luteum
- ⊙ Relationship with Anterior pituitary

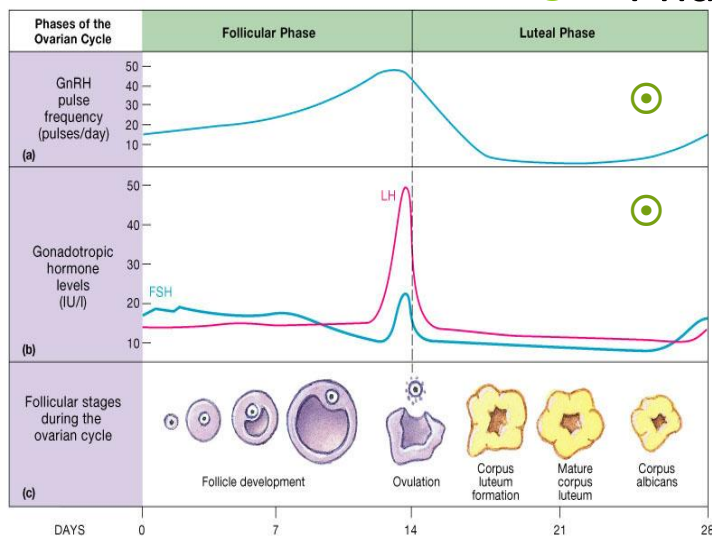
INTRO

- Ovaries are the primary female reproductive organs
 - Make female gametes (ova)
 - Secrete female sex hormones (estrogen and progesterone)
- Accessory ducts include uterine tubes, uterus, and vagina
- Internal genitalia – ovaries and the internal ducts
- External genitalia – external sex organs



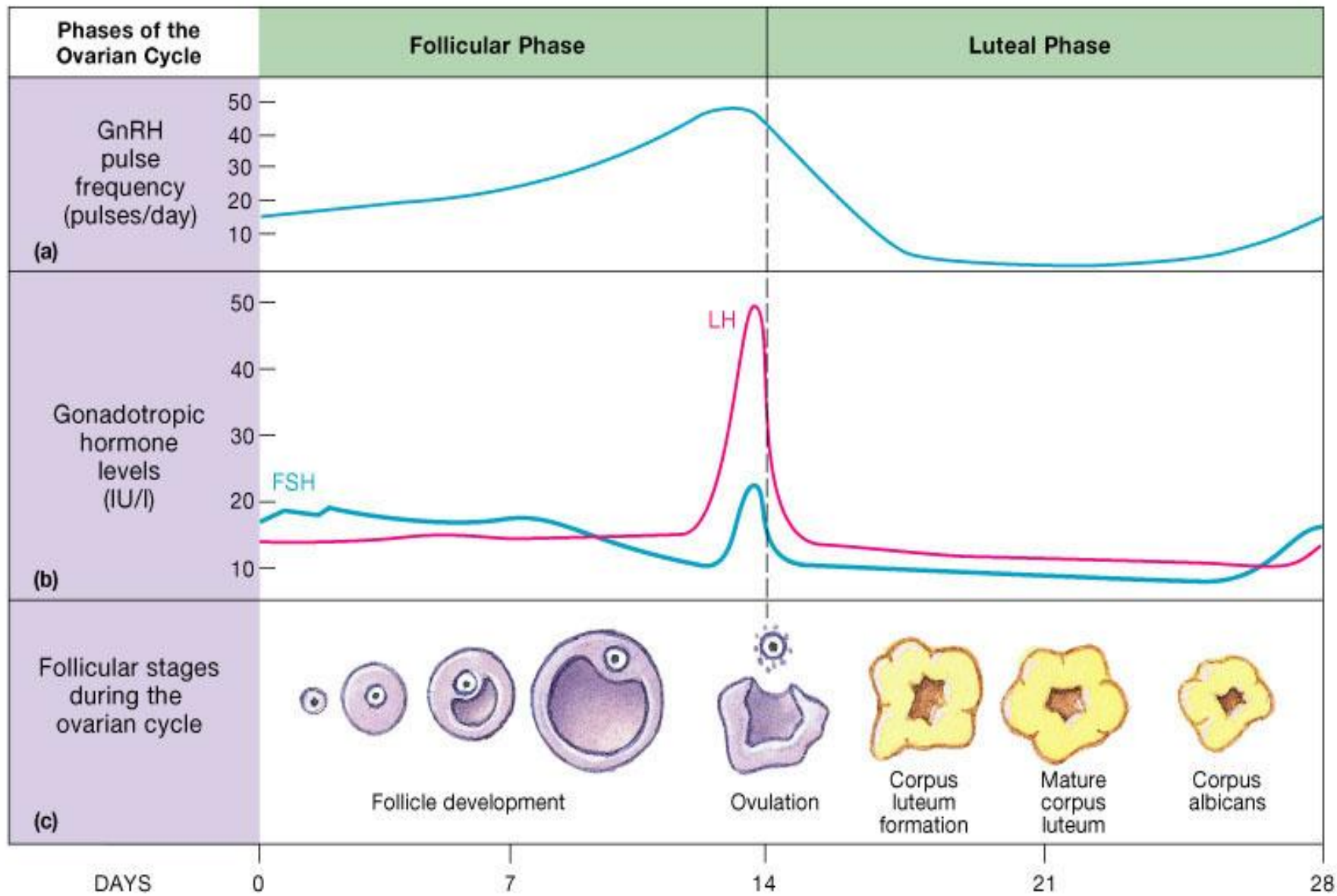
OVARIAN CYCLE

- ⊙ Purpose? --->One egg from ONE ovary each month
- ⊙ When? ---->Starts with Puberty
- ⊙ For how long? ----> 28 days average
- ⊙ Phases?



⊙ 14day Follicular -----> Ovarian follicles

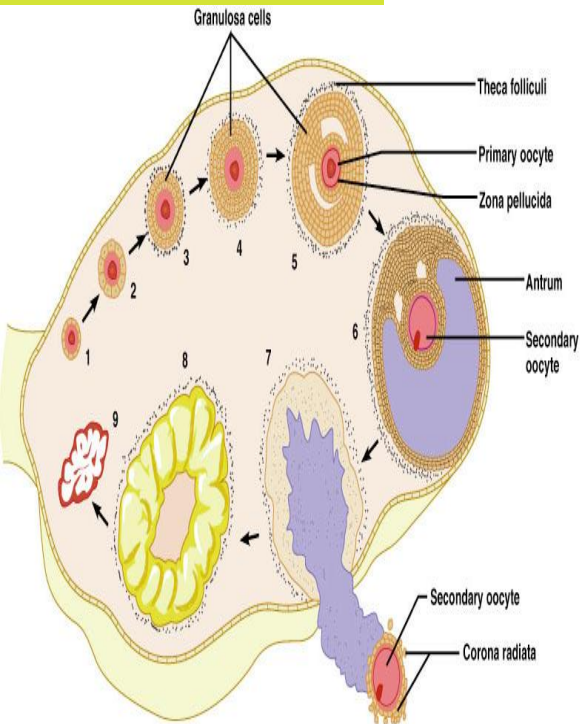
⊙ 14 day Luteal -----> Corpus luteum



FOLLICULAR PHASE

1-14 DAYS

◎ FSH is most needed to grow follicles (6-12 follicle)



◎ Primordial ---> primary follicles ---> secondary follicles ---> antral follicle---> graafian follicle

◎ Granulosa cells proliferate (increase in number)

◎ Theca cells appear

◎ Granulosa and theca cells work to produce Estrogen

◎ it ends by ovulation and remaining follicles degenerate

FOLLICULAR PHASE CONT.

- ⊙ Hormonal activity:
 - ⊙ GnRH increased at the beginning because of low
 - ⊙ Inhibin, and sex steroids
 - ⊙ GnRH----> increases FSH and LH (Isn--> FSH is slightly more)
 - ⊙ FSH
 - ⊙ New follicle growth to graafian
 - ⊙ As it grows, it produces estrogen and LH receptors
 - ⊙ LH
 - ⊙ Theca cell growth, increased vascularity, more androgens

OVULATION

- ⊙ High Estrogen--->LH surge for 24-48 hrs before
 - ⊙ Ovulation ----> Due to Positive feedback of estrogen on ant pit.
- ⊙ LH will be highest at 1-2 days before ovulation
- ⊙ LH-----> RUPTURE of ovary -----> release of oocyte (ovum)
- ⊙ Fimbriae from fallopian tube catches the ovum
- ⊙ The follicle that ruptured is now Corpus luteum

LUTEAL PHASE

14-28 DAYS

- ⊙ Corpus luteum (yellow body) is formed due to LH
 - ⊙ Luteal granulosa cells , luteal thecal cells
 - ⊙ They now produce **HIGHer Progesterone** and Estrogen
 - ⊙ If no fertilization, ---> it degenerates in 12 days forming
 - Corpus albicans (white body)
 - ⊙ If theres fertilization? (pregnancy?) ---> corpus luteum stays for up to **THREE MONTHS (90 days) (ONE TRIMESTER)** then degenerates.
 - ⊙ Estrogen, progesterone, and inhibin **DECREASE** FSH and LH by **NEGATIVE** feedback!!!! ---> at day 26-28 Decrease in Estrogen and progesterone and inhibin ---> start of a new cycle

QUICK REVISION

① 1- Female sex hormones during the first trimester of pregnancy are produced by?

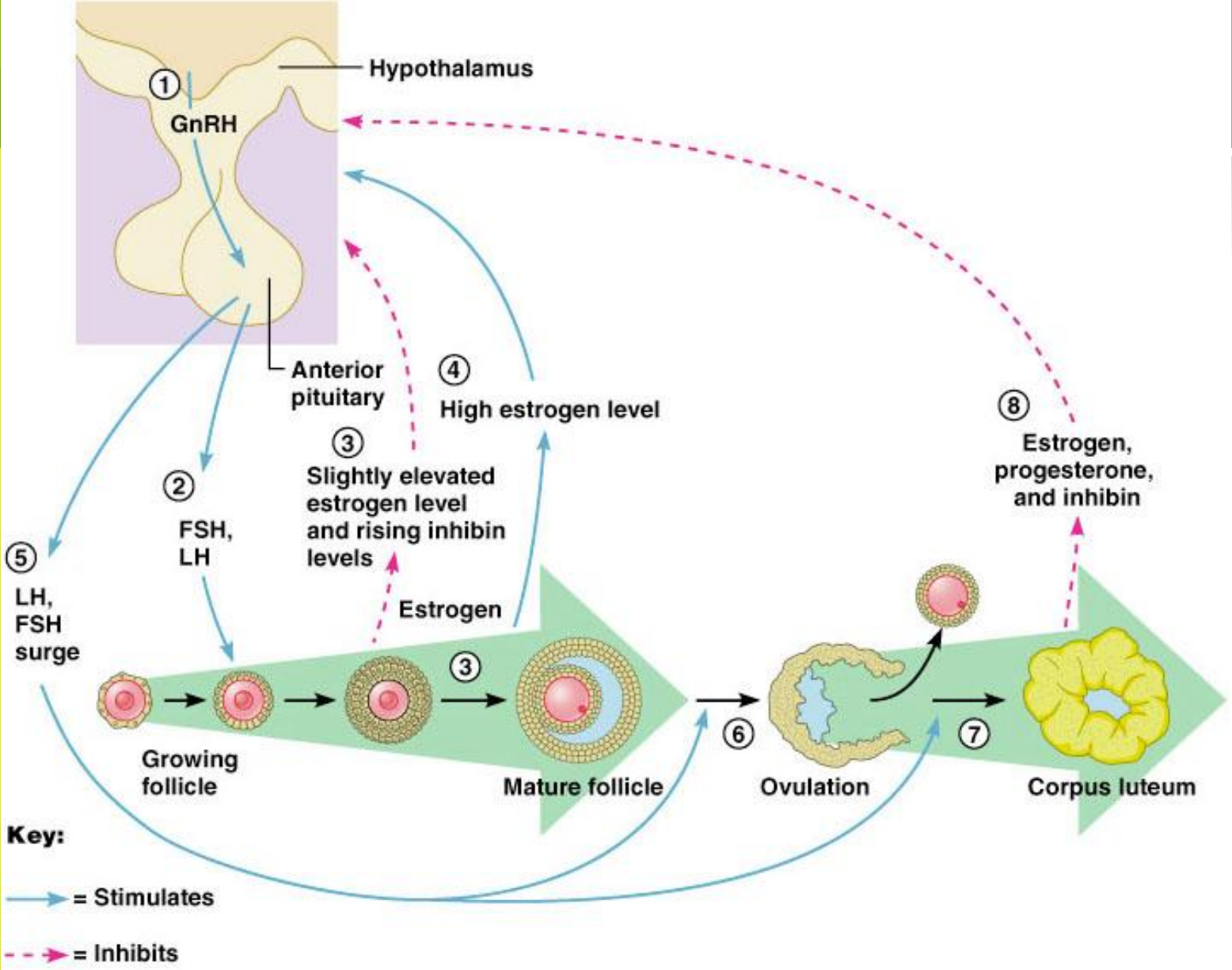
A- Placenta B- Adrenal med. C- Corpus Luteum D- Ant. Pituitary

① 2- Which ONE of the following is not true regarding Estrogen

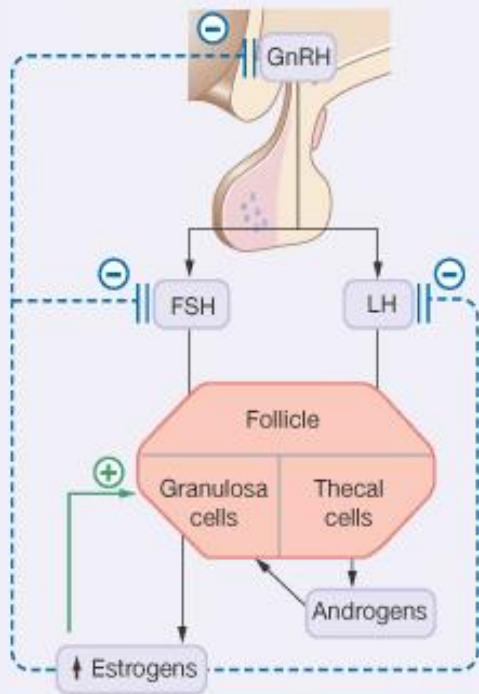
A- endometrial proliferation B- secreted by maturing follicles

C- Produces paradoxical positive feedback to ant. Pituitary to induce LH secretion

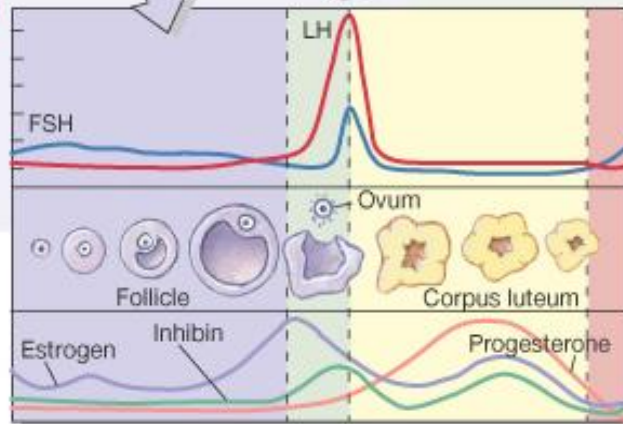
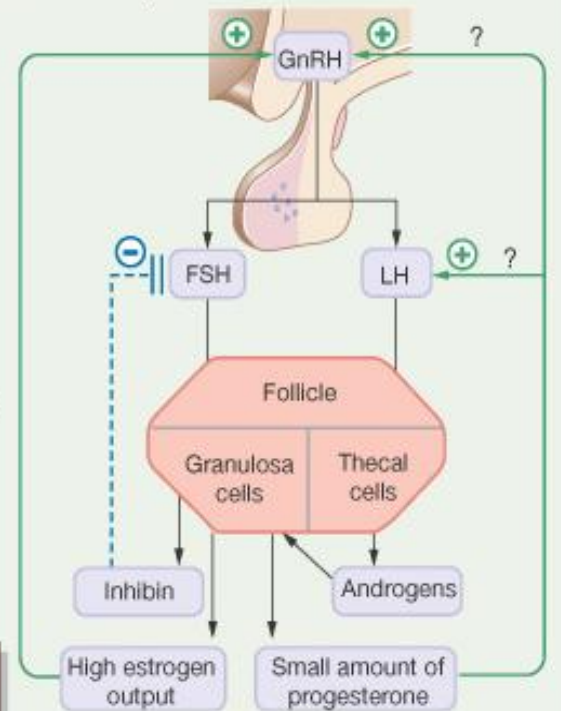
D- Is highly secreted in the luteal phase of ovarian cycle

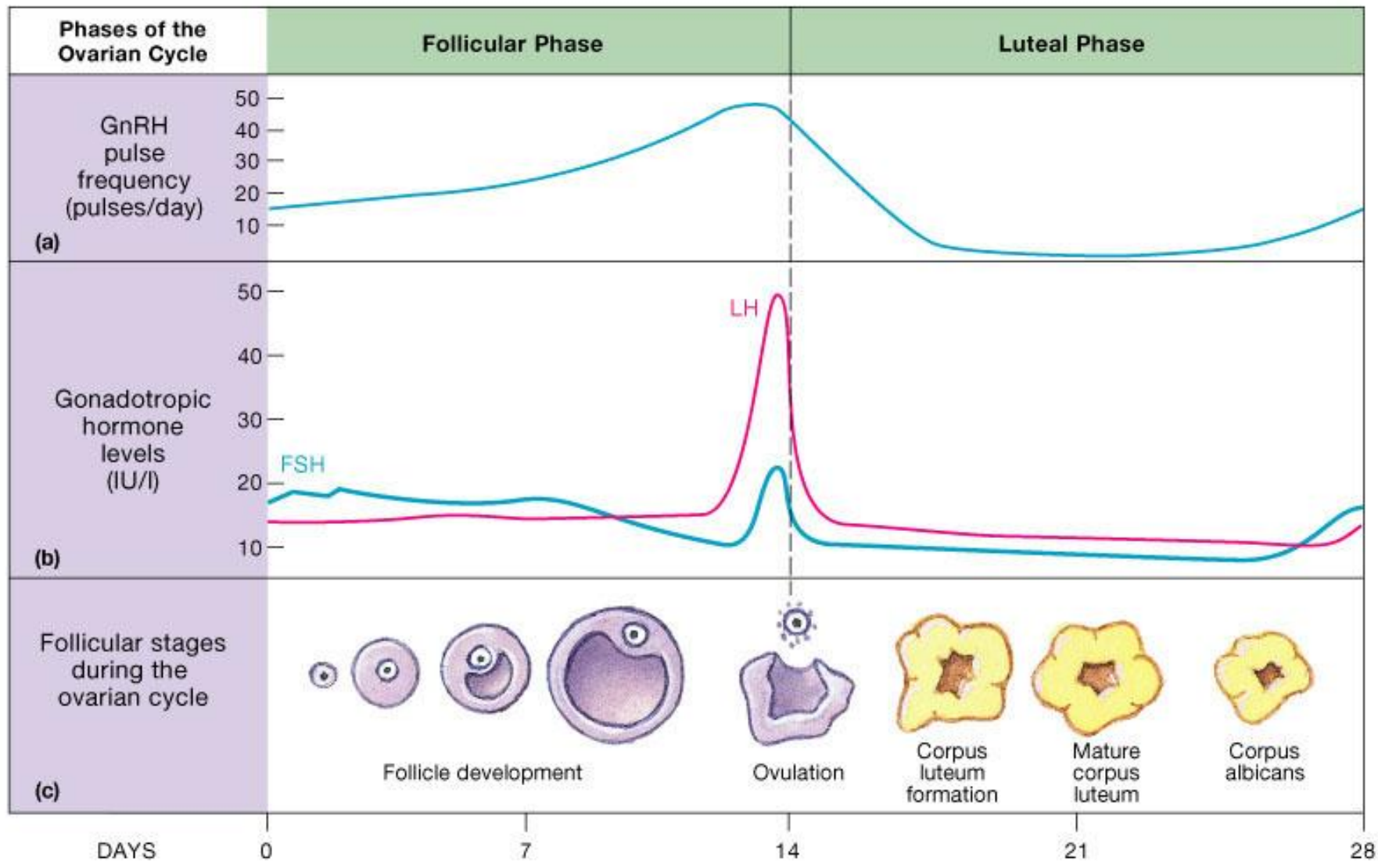


(a) Early to mid-follicular phase



(b) Late follicular phase and ovulation





Phases of the Ovarian Cycle

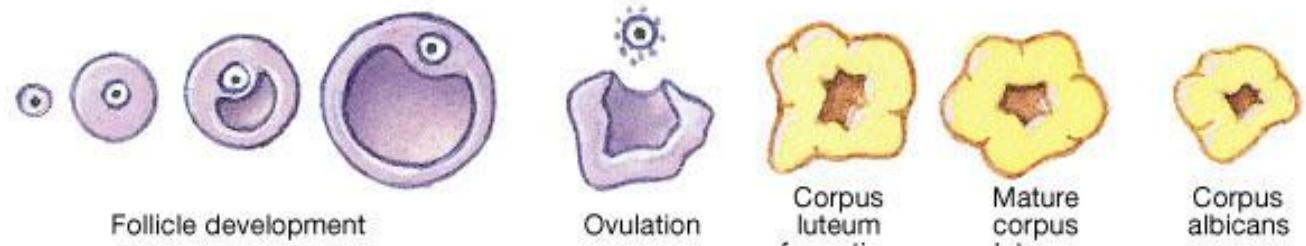
Follicular Phase

Luteal Phase

(a) GnRH pulse frequency (pulses/day)

(b) Gonadotropin hormone levels (IU/l)

(c) Follicular stages during the ovarian cycle



DAYS

0

7

14

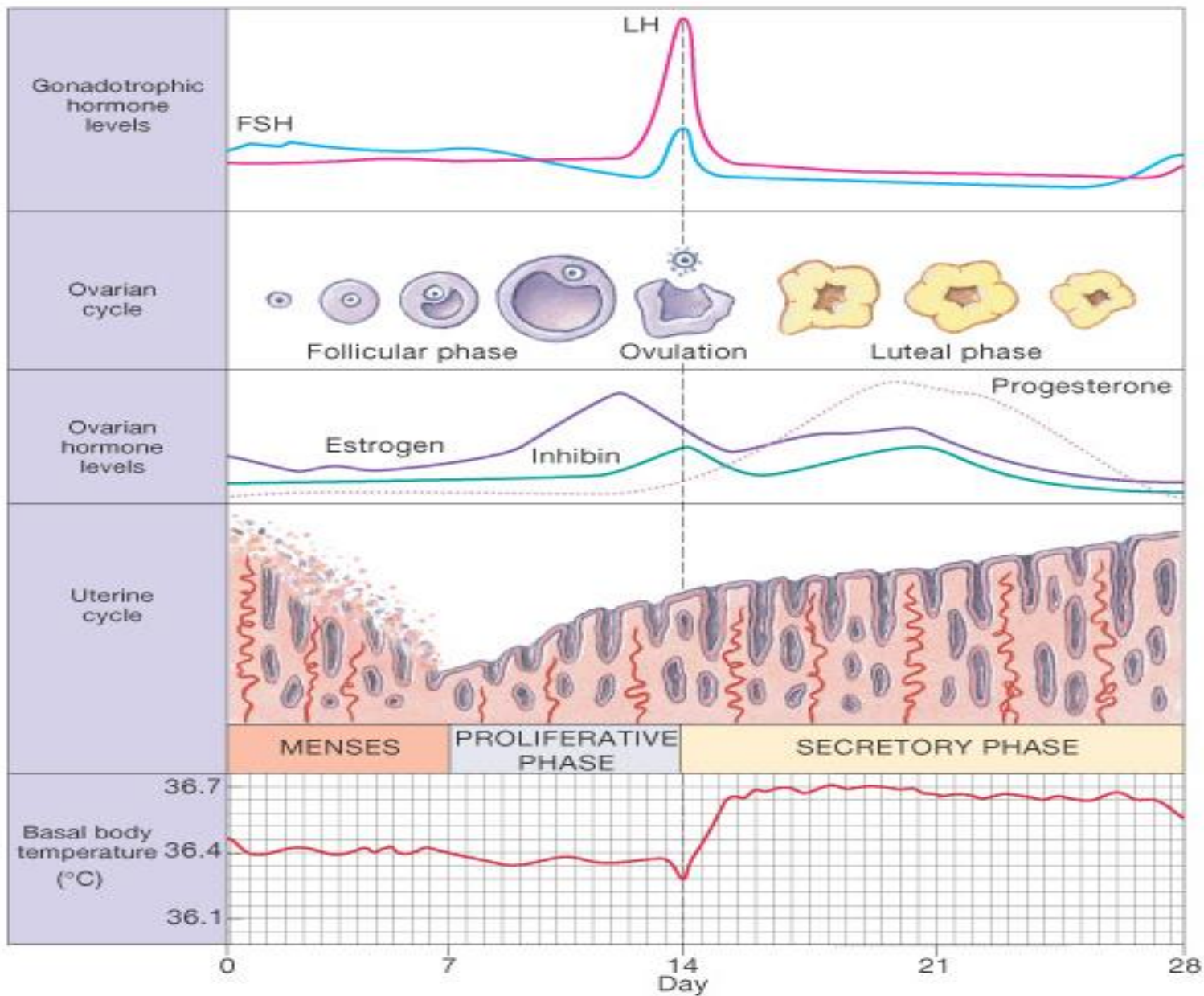
21

28



LECT 2 UTERINE CYCLE

YAAAAAAAAAY



UTERINE CYCLE

1-28

- ⊙ It occurs at the same time with Ovarian cycle
 - ⊙ The changes that occur in the uterus
 - ⊙ “The Endometrium”
 - ⊙ 3 phases:
 - ⊙ Menstrual, proliferative, and secretory
- 1-14----> Menstrual and Proliferative
- 14-28 --> Secretory

PROLIFERATIVE PHASE

6-14

- ⊙ Rebuilding of the uterus after menstruation(1-6)
 - ⊙ At its beginning, deep glands, stromal cells, and only one layer of epithelium are there
 - ⊙ After normal epithelial is restored ---> ↑ thickness
 - ⊙ Increased glands, vascularity, and thickness by Estrogen
- ⊙ It happens with Follicular Phase of Ovarian cycle
 - ⊙ What was the major sex steroid of that phase??
- ⊙ Preovulatory
 - ⊙ When does ovulation occur? Mediated by LH or FSH surge?

PROLIFERATIVE PHASE CONT.

- ③ At day 12, LH increased rapidly and causing ovulation on day 14 because of + feedback of estrogen!!!
- ③ At the end of Proliferative Phase, at ovulation, The cycle shifts to ----> Secretory phase
- ③ Start of endometrial gland secretion for sperm movement and nutrition
 - Secretion from Cervical UTERUS

SECRETORY PHASE

14-28

- ⊙ After ovulation!
- ⊙ Now we have the Luteal phase of Ovarian cycle
 - ⊙ Corpus luteum or growing follicle??
- ⊙ Now we have two high hormones
 - ⊙ PROGESTERONE!! And Estrogen
- ⊙ Estrogen will cause more growth
- ⊙ Progesterone will cause SECRETION of the GLANDS
- ⊙ Those secretions help with nutrition and motility of OVUM and SPERM

SECRETORY PHASE CONT.

- ⊙ lipid & glycogen deposits in the Stromal cells
 - ⊙ Trophoblasts of placenta digest them if pregnant
- ⊙ More blood supply (more than proliferative P.)
- ⊙ The primary purpose is to prepare for IMPLANTATION OF fertilized ovum
- ⊙ Uterine milk ----> Secretions help the ovum and sperm to have nutrition and motility

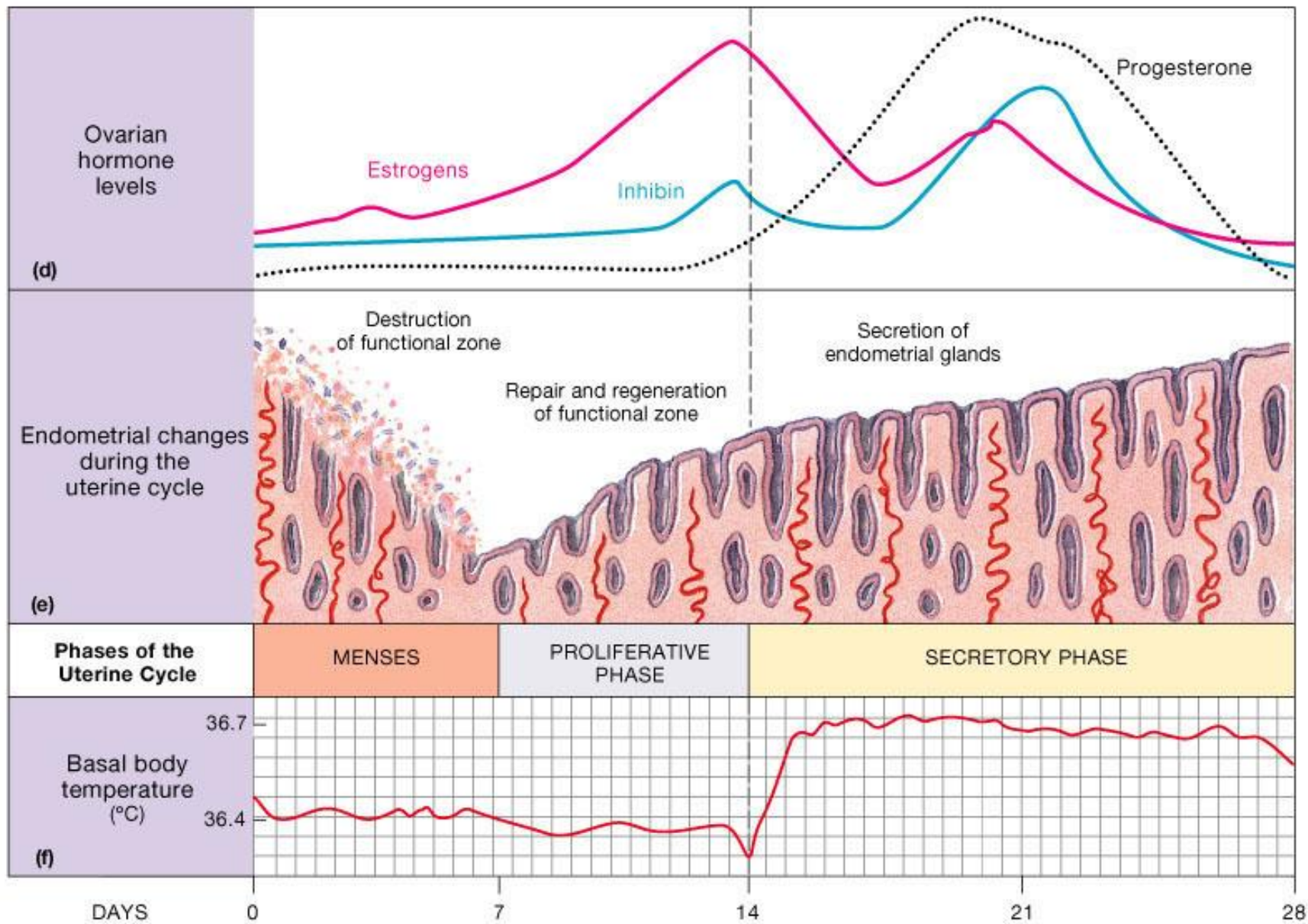
MENSTRUATION

1-5

- ◎ It happens after the secretory phase if no fertilization occurs
 - ◎ Corpus luteum will degenerate at day 25-26
- ◎ LOW estrogen, progesterone due to corpus luteum loss -----> LOW stimulation of uterus
- ◎ The Endometrium sheds its layers and vasospasm occurs
 - ◎ Due to prostaglandins----> vasoconstriction

MENSTRUATION

- ⊙ We have 3 important things to remember
 - ⊙ No hormonal stimulation
 - ⊙ Decreased nutrients
 - ⊙ Vasospasm
- ⊙ All lead to blood vessel necrosis and vasoconstriction leading to bleeding
 - ⊙ All layers except deep areas are destroyed
- ⊙ This blood has fibrinolysin and WBC's and is about 40 ml. + 35 serous fluid. ----> **no infection or clot formation**



DAYS

0

7

14

21

28

Ovarian hormone levels

(d)

Estrogens

Inhibin

Progesterone

Endometrial changes during the uterine cycle

(e)

Destruction of functional zone

Repair and regeneration of functional zone

Secretion of endometrial glands

Phases of the Uterine Cycle

MENSES

PROLIFERATIVE PHASE

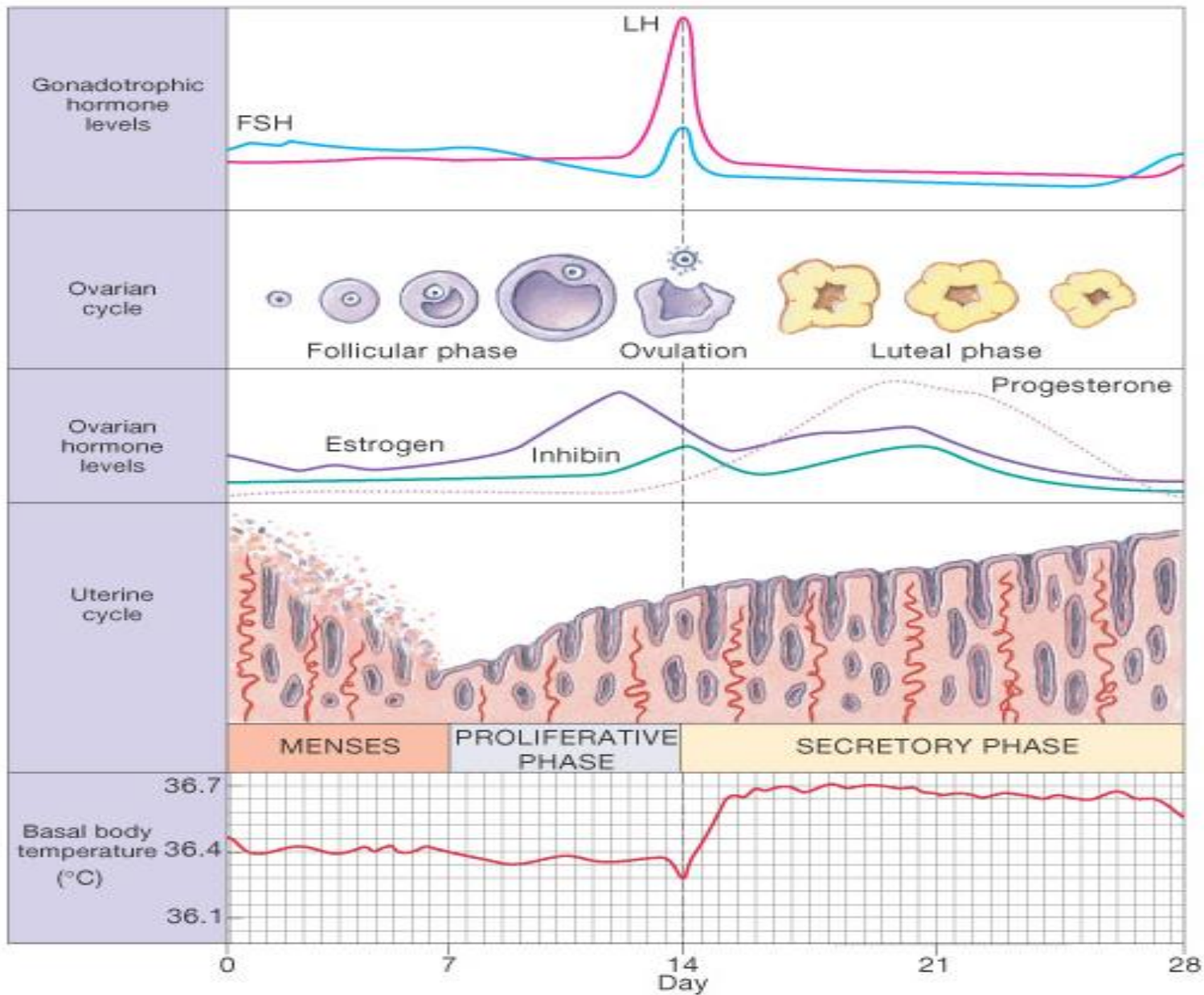
SECRETORY PHASE

Basal body temperature (°C)

(f)

36.7

36.4





END OF CYCLE

EFFECTS OF ESTROGENS

- Estrogen levels rise during puberty
- Change of vaginal epithelium from cuboidal to stratified
- Promote oogenesis and follicle growth in the ovary
- Exert anabolic effects on the female reproductive tract
 - Uterine tubes, uterus, and vagina grow larger and become functional
 - Uterine tubes and uterus exhibit enhanced motility
 - Vaginal mucosa thickens and external genitalia mature
 - In breast, estrogen causes development of stromal cells, ductile system, and fat deposition

EFFECTS OF ESTROGENS (CONT.)

- ⊙ Estrogens cause increased osteoblastic activity as well as closure of epiphyseal plates
- ⊙ The skin is thicker, smoother, and more vascular

ESTROGEN-INDUCED SECONDARY SEX CHARACTERISTICS

- ⊙ Growth of the breasts
- ⊙ Increased deposition of subcutaneous fat, especially in the hips and breasts
- ⊙ Widening and lightening of the pelvis
- ⊙ Growth of axillary and pubic hair

EFFECTS OF PROGESTERONE

- ⊙ Promote secretory changes in the uterus
- ⊙ Increased secretion of fallopian tubes
- ⊙ Promote development of ducts and alveoli of the breast

Menopause:


At the age of 40 to 50 years, the sexual cycle becomes irregular, ovulation fails to occur & the cycle ceases.

- ◎ With advanced age the ovaries become unresponsive (decline in the number of primordial follicles) to gonadotropins, and their function declines so that sexual cycles disappear (menopause). The ovaries no longer secrete estrogen and progesterone. The uterus and vagina atrophy. Due to removal of the negative feedback effect there is increased secretion of FSH and LH.



Definition of menopause:

The period during which the cycle ceases & the female sex hormones diminish to almost none. When estrogens production falls below the critical value, estrogens no longer inhibit the production of gonadotropins FSH & LH. The production of FSH & LH after menopause in large amount.



THE LOSS OF ESTROGENS CAUSES MARKED PHYSIOLOGICAL CHANGES IN THE FUNCTION OF THE BODY INCLUDING:

1. “hot flushes” characterized by extreme flushing of the skin;
2. psychic sensations and dyspnea;
3. irritability;
4. fatigue;
5. anxiety;
6. occasionally various psychotic states
7. decreased strength and calcification of bones throughout the body.

Amenorrhea:

Amenorrhea: Is absence of menstrual period either

- ⊙ Primary amenorrhea in which menstrual bleeding has never occurred.
- ⊙ Secondary amenorrhea cessation of cycles in a woman with previously normal periods, causes:
 - ⊙ Pregnancy (is the most common cause)
 - ⊙ Emotional stimuli and changes in the environment.
 - ⊙ Hypothalamic diseases (↓ GnRH pulses)
 - ⊙ Pituitary disorders
 - ⊙ Primary ovarian disorders and various systemic disease.