

MENSTRUAL CYCLE

(SEM III, CC-6)

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In human female the reproductive phase is for 30-33 years. This starts at the puberty age and ends with menopause. During this phase the reproductive tract and the ovary undergoes cyclic changes which are meant for fertilisation and the preparation of reproductive tract to receive fertilised egg.

Menstrual cycle is also seen in other primates.

Menstrual cycle includes

- Ovarian cycle:** Changes in ovary.
- Uterine cycle:** Changes in uterus, oviduct and vagina.

Menstrual cycle has the following phases

I. Menstrual phase: 1-5th day

- The cycle starts with menstrual flow (bleeding).
- It lasts for 3-5 days.
- It is due to breakdown of endometrial lining and blood vessels of the uterus that comes out through vagina.
- Menstruation occurs if the released ovum is not fertilized.
- Lack of menstruation may be indicative of pregnancy. It may also be caused due to stress, poor health etc.

II. Follicular (Proliferative) phase: 5-13th day

- It starts from 5th day after menstruation and completed within 8-12 days.
- In this phase, the action of gonadotropins (FSH & LH) from pituitary occurs. FSH stimulates
 - Development of primary follicles into **Graafian follicles**.
 - Secretion of **oestrogens** by **Graafian follicles**.
- **Oestrogens stimulate**
 - **Proliferation of ruptured uterine endometrium** and mucous lining of **oviduct & vagina**.
 - Development of secondary sexual characters.
 - Suppression of FSH secretion.
 - Secretion of LH (Luteinizing hormone).

III. Ovulatory phase: 14th day

- LH & FSH attain a peak level in the middle of cycle.
- Rapid secretion of LH (**LH surge**) induces rupture of Graafian follicle and thereby **ovulation** (on 14th day).

IV. Secretory (Luteal) phase: 15-28th day

- After ovulation, **Graafian follicle** is transformed into a yellow endocrine mass called **Corpus luteum**. It secretes **progesterone**.

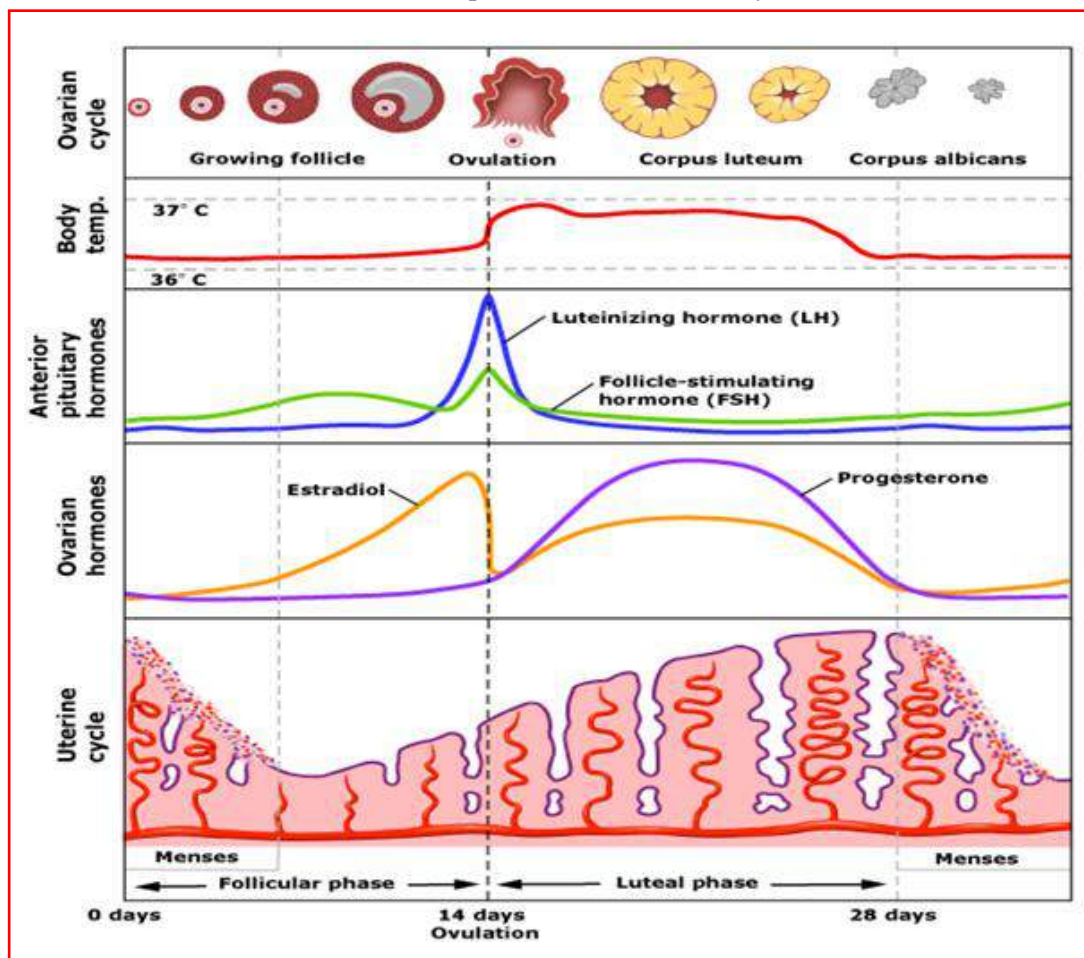
By the action of progesterone,

- Endometrium attains **maximum vascularity, thickness and softness**. Thus the uterus gets ready for implantation.
- FSH secretion is inhibited to prevent development of a second ovarian follicle.
- During pregnancy all events of menstrual cycle stop and there is no menstruation.
- If fertilization does not occur, corpus luteum degenerates and becomes a whitish mass (**corpus albicans**). As it has no secretory ability, progesterone level in blood decreases. It leads to **menstruation** indicating a new cycle.

§ **Menarche:** The first menstruation during puberty.

Menopause (Climacteric Period):

This is a period when ovulation and menstrual cycle stops. This takes place between the ages of 45-55 years. Menopause is characterised by hot flushes and a number



of psychic symptoms. During this phase FSH is secreted in urine. Menopause occurs because of decline of estrogen.

Hormonal Control of menstruation cycle:

The process of menstruation is controlled by three endocrine glands – hypothalamus, anterior pituitary gland and ovaries.

The hormones released are Gonadotropin Release Hormone from hypothalamus, Follicle Stimulating hormone and Luteinizing hormone secreted by anterior pituitary and Estrogen and Progesterone from the ovaries.

Hormonal pattern can be understood by following the normal monthly cycle of development of ovum and the physical events in the menstrual cycle.

The sequence is as follows:

- a. Controlling center of menstruation and ovulation is the hypothalamus. It releases GnRH, which stimulates the release of FSH and LH from the anterior pituitary.
- b. FSH initiates the development of the oocyte within one of the immature ovarian follicles.
- c. Ovarian follicle produces Estrogen, which causes the build-up of endometrium as well as the inhibition of further production of FSH.
- d. The increased level of estrogen stimulates the anterior pituitary to secrete LH, which helps in enlarging the mature follicle and releases the secondary oocyte. It also helps in changing the collapsed follicle into corpus luteum, an endocrine body.
- e. Estrogen and Progesterone are secreted by corpus luteum. This helps in completing the development of endometrium.
- f. If the oocyte is not fertilised and not implanted in the endometrium, the corpus luteum disintegrates and is known as corpus albicans, and estrogen and progesterone secretion is stopped.
- g. Without progesterone and estrogen, the endometrium

pituitary to start secretion of FSH, which stimulates the development of another ovum. The cycle begins again.

SHORT NOTES

LH surge and ovulation

In the late follicular phase, the level of estrogen secretion from the dominant follicle crosses a certain threshold, and the feedback effect of estrogen now switches to **positive feedback**. This means that estrogen now *stimulates* LH secretion, which in turn stimulates more estrogen production by the follicle. The result is a rapid rise in LH secretion, the **LH surge**.

The LH surge triggers the rupture of the dominant follicle, in other words, **ovulation**. Just prior to ovulation, LH stimulates a small increase in progesterone secretion, which appears to be necessary for ovulation, since ovulation can be blocked by progesterone antagonists. The first division of meiosis occurs just prior to ovulation (the second division occurs after the egg is penetrated by the sperm).

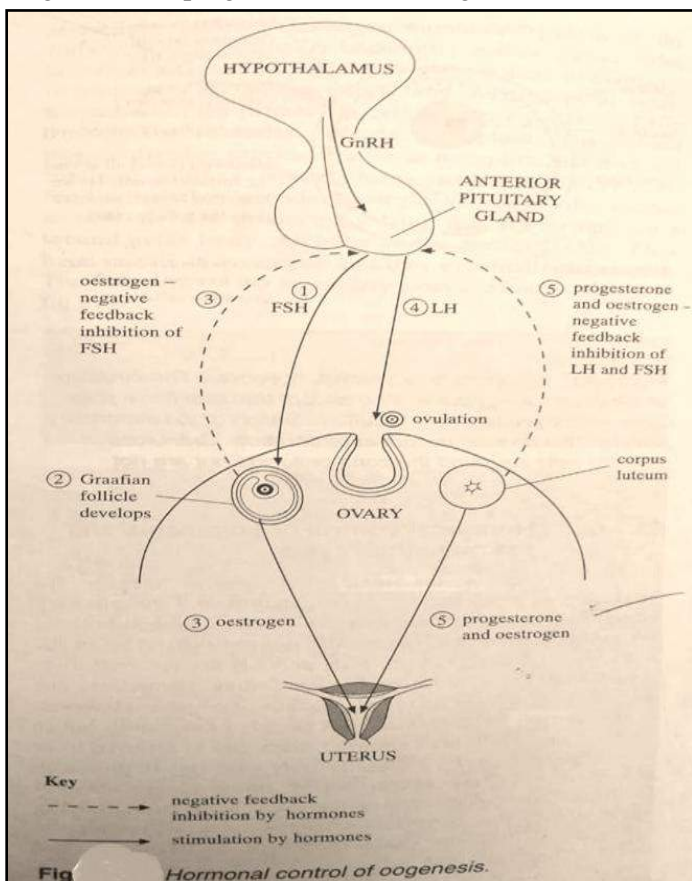
What is Mid-Cycle Bleeding?

Mid-cycle bleeding is any **spotting or bleeding** that occurs outside of your periods. It may happen a week after you've just got done with your periods. Mid-cycle bleeding causes can vary based on your condition. It could happen due to **ovulation**, abnormalities in the cervix, endometriosis, etc.

Menstrual disorders

Infrequent or irregular ovulation is called *oligoovulation*. The absence of ovulation is called *anovulation*. Normal menstrual flow can occur without ovulation preceding it: an **anovulatory cycle**. In some cycles, follicular development may start but not be completed; nevertheless, estrogens will be formed and stimulate the uterine lining. Anovulatory flow resulting from a very thick endometrium caused by prolonged, continued high estrogen levels is called *estrogen breakthrough bleeding*. Anovulatory bleeding triggered by a sudden drop in estrogen levels is called **withdrawal bleeding**. Anovulatory cycles commonly occur before **menopause** (perimenopause) and in women with **polycystic ovary syndrome**.

Very little flow (less than 10 ml) is called *hypomenorrhea*. Regular cycles with intervals of 21 days or fewer are *polymenorrhea*; frequent but irregular menstruation is known as *metrorrhagia*. Sudden heavy flows or amounts greater than 80 ml are termed *menorrhagia*. Heavy menstruation that occurs frequently and irregularly is *menometrorrhagia*. The term for cycles with intervals exceeding 35 days is *oligomenorrhea*. **Amenorrhea** refers to more than three to six¹ months without menses (while not being pregnant) during a woman's reproductive years. The term for painful periods is *Dysmenorrhea*.



breaks down and menstruation occurs.

- h. The level of progesterone decreases further, and the level of LH drops off too. This decrease in LH causes