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1A: BREAST

Each month, women go through changes in the hormones that make up the normal menstrual cycle. The hormone estrogen is produced by the ovaries in the first half of the menstrual cycle. It stimulates the growth of milk ducts in the breasts. The increasing level of estrogen leads to ovulation halfway through the cycle. Next, the hormone progesterone takes over in the second half of the cycle. It stimulates the formation of the milk glands. These hormones are believed to be responsible for the cyclic changes that many women feel in their breasts just before the menstruation. These include swelling, pain, and soreness. During menstruation, many women also have changes in breast texture. Their breasts may feel very lumpy. This is because the glands in the breast are enlarging to get ready for a possible pregnancy. If pregnancy does not happen, the breasts go back to normal size. Once menstruation starts, the cycle begins again.

CERVIX

Ovarian function can be assessed clinically by the secondary characteristics and by the condition of the pelvic tissues. More precise measurement of ovarian activity can be made by vaginal cytology, by endometrial histology or by steroid excretion. An additional means of assessment is by study of the changes in cervical mucus. Because the technique of sampling the mucus and interpretations with the findings are relatively simple, the method deserves to be more widely used in routine clinical practice. The mucus changes rhythmically throughout the cycle in response to ovarian function. Between the post-menstrual and the mid-cycle phase the quantity of mucus increases ten times and the maximum at mid-cycle precedes the rise in basal temperature by 1 to 3 days. At this time the mucus is very elastic, showing maximum spinnbarkeit and sperm will penetrate readily. The secretion of cervical mucus is stimulated by oestrogen and inhibited by progesterone. If the mucus is spread on a slide and left to dry it shows a crystal pattern which is maximal about ovulation; at other times of the cycle; in pregnancy or after the menopause, crystallization has been described as resembling fern or palm leaves. Progesterone exerts an inhibitory effect on the crystals as on the mucus itself.

2A MENSTRUAL CYCLE

ACT 1: The first part of the cycle

Uterus: Menstruation

When: From the time bleeding starts to the time it ends. What: Old blood and tissue from inside the uterus is shed through the vagina.

Each menstrual cycle starts with menstruation{period}. A period is the normal shedding of blood and endometrium{ the lining of the uterus} through the cervix and vagina. A normal period may last up to 8 days{1}, but on average lasts about 5 or 6{4}.

Ovaries: Follicular phase

When: From the start of the period until ovulation. What: Signals from the brain tell the ovaries to prepare an egg that will be released. During the period, the pituitary gland{ a small area at the base of the brain that makes hormone} produces a hormone called follicle stimulating hormone[FSH]. FSH tells the ovaries to prepare an egg for ovulation [release of an egg from the ovary]. Throughout the menstrual cycle, there are multiple follicles [fluid filled sacs containing eggs] in each ovary at different stages of development[5,6]. About halfway through the follicular phase [just as the period is ending] one follicle in one of the ovaries is the largest of all the follicles at about 1cm[0.4 in] [6,7]. This follicle becomes the dominant follicle and is the one prepared to be released at ovulation. The dominant follicle produces estrogen as it grows[8] which peaks just before ovulation happens[7]. For most people, the follicular phase lasts 0-22 days, but this can vary from cycle-to-cycle[4].

Uterus: Proliferative phase

When: From the end of the period until ovulation. What: The uterus builds up a thick inner lining.

While the ovaries are working on developing the egg-containing follicles, the uterus is responding to the estrogen produced by the follicles, rebuilding the lining that was just shed during the last period. This is called the proliferative phase because the endometrium[the lining of the uterus] becomes thicker. The endometrium is the thinnest during the period, and thickens throughout this phase until ovulation occurs. The uterus does this to create a place where a potential fertilized egg can implant and grow.

Interlude: Ovulation

When: About midway through the cycle, but this can change cycle to cycle. Ovulation divides the two phases of the ovarian cycle[the follicular phase and the luteal phase]. What: An egg is released from the ovary into the fallopian tube.

The dominant follicle in the ovary produces more and more estrogen as it grows larger. The dominant follicle reaches about 2cm[0.8in]- but can be up to 3cm- at its largest right before ovulation. When estrogen levels are high enough, they signal to the brain causing a dramatic increase in luteinizing hormone. This spike is what causes ovulation[release of the egg from the ovary] to occur. Ovulation usually happens about 13-15 days before the start of the next period.

Act 2: The second part of the cycle.

Ovary: Luteal phase

When: From ovulation until the next period. What: The sac contained the egg produces estrogen and progesterone.

Once ovulation occurs, the follicle that contained the egg transformed into something called a corpus luteum and begins to produce progesterone as well as estrogen. Progesterone level peaks about halfway through this phase. The hormonal changes of the luteal phase are associated with common premenstrual symptoms that many people experience, such as mood changes, headaches, acne, bloating, and breast tenderness.

If an egg fertilized, progesterone from the corpus luteum supports the early pregnancy. If no fertilization occurs, the corpus luteum will start to break between 9 and 11 days after ovulation. This results in a drop in estrogen and progesterone levels, which causes menstruation. The luteal phase typically lasts about 14 days, but between 9 and 16 days is common.

Uterus: Secretory phase

When: From ovulation until the start of the next period. What: The lining of the uterus releases or secretes chemicals that will either help an early pregnancy attach if an egg was fertilized, or help the lining break down and shed if no egg was fertilized.

During this phase, the endometrium prepares to either support a pregnancy or to break down for menstruation. Rising levels of progesterone cause the endometrium to stop thickening and to start preparing for the potential attachment of a fertilized egg. The secretory phase gets its name because the endometrium is secreting [producing and releasing] many types of chemical messengers. The most notable of these messengers are the prostaglandins, which are secreted by endometrial cells and cause changes to other cells nearby.

Two prostaglandins in particular called, PGF_{2a} and PGF₂, cause the uterine muscle to contract [cramp]. The amounts of these prostaglandins rise after ovulation and reach their peak during menstruation. The cramping caused by this prostaglandin helps trigger the period. If a pregnancy occurs, prostaglandin production is inhibited so that these contractions won't impact an early pregnancy. If pregnancy does not occur, the corpus luteum stops producing estrogen and progesterone. The drop in hormones, along with the effects of the prostaglandins, cause the blood vessels to constrict [tighten] and tissue of the endometrium to break down.

Menstruation begins, and the whole cycle starts all over again.