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CERVIX: CHANGES IN CERVIX- Mucous membrane of cervix shows cyclic changes during different phases of menstrual cycle- (i). Proliferative phase- During the proliferative phase, the mucous membrane of cervix becomes thinner and more alkaline . Several hundred glands in the endocervix produce 20–60 mg of cervical [mucus](https://en.wikipedia.org/wiki/Mucus) a day, increasing to 600 mg around the time of ovulation. It is viscous because it contains large proteins known as [mucins](https://en.wikipedia.org/wiki/Mucin%22%20%5Co%20%22Mucin). The viscosity and water content varies during the [menstrual cycle](https://en.wikipedia.org/wiki/Menstrual_cycle); mucus is composed of around 93% water, reaching 98% at midcycle. These changes allow it to function either as a barrier or a transport medium to spermatozoa. It contains electrolytes such as calcium, sodium, and potassium; organic components such as glucose, amino acids, and soluble proteins; trace elements including zinc, copper, iron, manganese, and selenium; free fatty acids; enzymes such as [amylase](https://en.wikipedia.org/wiki/Amylase); and [prostaglandins](https://en.wikipedia.org/wiki/Prostaglandins). Its consistency is determined by the influence of the hormones estrogen and progesterone. At midcycle around the time of [ovulation](https://en.wikipedia.org/wiki/Ovulation)—a period of high estrogen levels— the mucus is thin and serous to allow sperm to enter the uterus and is more alkaline and hence more hospitable to sperm. It is also higher in electrolytes, which results in the "ferning" pattern that can be observed in drying mucus under low magnification; as the mucus dries, the salts crystallize, resembling the leaves of a fern. The mucus has a stretchy character described as *Spinnbarkeit* most prominent around the time of ovulation.

At other times in the cycle, the mucus is thick and more acidic due to the effects of progesterone. This "infertile" mucus acts as a barrier to keep sperm from entering the uterus.[[](https://en.wikipedia.org/wiki/Cervix#cite_note-26) Women taking an [oral contraceptive pill](https://en.wikipedia.org/wiki/Oral_contraceptive_pill) also have thick mucus from the effects of progesterone. Thick mucus also prevents [pathogens](https://en.wikipedia.org/wiki/Pathogen) from interfering with a nascent pregnancy.

BREAST: 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 cyclical changes that many women feel in their breasts just before 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.

THE M ENSTRUAL CYCLE:

The **menstrual cycle** is the regular natural change that occurs in the [female reproductive system](https://en.wikipedia.org/wiki/Female_reproductive_system) (specifically the [uterus](https://en.wikipedia.org/wiki/Uterus) and [ovaries](https://en.wikipedia.org/wiki/Ovary)) that makes [pregnancy](https://en.wikipedia.org/wiki/Pregnancy) possible.The cycle is required for the production of [oocytes](https://en.wikipedia.org/wiki/Oocyte%22%20%5Co%20%22Oocyte), and for the preparation of the uterus for pregnancy The menstrual cycle occurs due to the rise and fall of [estrogen](https://en.wikipedia.org/wiki/Estrogen). This cycle results in the thickening of the lining of the uterus, and the growth of an [egg](https://en.wikipedia.org/wiki/Ovum), (which is required for pregnancy). The egg is released from an ovary around day fourteen in the cycle; the thickened lining of the uterus provides [nutrients](https://en.wikipedia.org/wiki/Nutrient) to an embryo after [implantation](https://en.wikipedia.org/wiki/Implantation_%28human_embryo%29). If pregnancy does not occur, the lining is released in what is known as [menstruation](https://en.wikipedia.org/wiki/Menstruation).

Up to 80% of women report having some symptoms during the one to two weeks prior to menstruation. Common symptoms include [acne](https://en.wikipedia.org/wiki/Acne_vulgaris), tender breasts, bloating, feeling tired, irritability and mood changes. These symptoms interfere with normal life and therefore qualify as [premenstrual syndrome](https://en.wikipedia.org/wiki/Premenstrual_syndrome) in 20 to 30% of women. In 3 to 8%, they are severe.

The first period usually begins between twelve and fifteen years of age, a point in time known as [menarche](https://en.wikipedia.org/wiki/Menarche). They may occasionally start as early as eight, and this onset may still be normal. The average age of the first period is generally later in the [developing world](https://en.wikipedia.org/wiki/Developing_world) and earlier in [developed world](https://en.wikipedia.org/wiki/Developed_world). The typical length of time between the first day of one period and the first day of the next is 21 to 45 days in young women and 21 to 35 days in adults (an average of 28 day). Menstruation stops occurring after [menopause](https://en.wikipedia.org/wiki/Menopause) which usually occurs between 45 and 55 years of age. Bleeding usually lasts around 3 to 7 days.

The menstrual cycle is governed by hormonal changes. These changes can be altered by using [hormonal birth control](https://en.wikipedia.org/wiki/Hormonal_birth_control) to prevent pregnancy. Each cycle can be divided into three phases based on events in the ovary (ovarian cycle) or in the uterus (uterine cycle). The ovarian cycle consists of the [follicular phase](https://en.wikipedia.org/wiki/Follicular_phase), [ovulation](https://en.wikipedia.org/wiki/Ovulation), and [luteal phase](https://en.wikipedia.org/wiki/Luteal_phase%22%20%5Co%20%22Luteal%20phase) whereas the uterine cycle is divided into [menstruation](https://en.wikipedia.org/wiki/Menstruation), proliferative phase, and secretory phase.

Stimulated by gradually increasing amounts of [estrogen](https://en.wikipedia.org/wiki/Estrogen) in the follicular phase, discharges of blood (menses) flow stop, and the [lining](https://en.wikipedia.org/wiki/Endometrium) of the uterus thickens. [Follicles](https://en.wikipedia.org/wiki/Ovarian_follicle) in the ovary begin developing under the influence of a complex interplay of hormones, and after several days one or occasionally two become dominant (non-dominant follicles shrink and die). Approximately mid-cycle, 24–36 hours after the [luteinizing hormone](https://en.wikipedia.org/wiki/Luteinizing_hormone) (LH) surges, the dominant follicle releases an [ovocyte](https://en.wikipedia.org/wiki/Ovocyte%22%20%5Co%20%22Ovocyte), in an event called ovulation. After ovulation, the ovocyte only lives for 24 hours or less without fertilization while the remains of the dominant follicle in the ovary become a [corpus luteum](https://en.wikipedia.org/wiki/Corpus_luteum); this body has a primary function of producing large amounts of [progesterone](https://en.wikipedia.org/wiki/Progesterone). Under the influence of progesterone, the [uterine lining](https://en.wikipedia.org/wiki/Endometrium) changes to prepare for potential [implantation](https://en.wikipedia.org/wiki/Implantation_%28human_embryo%29) of an embryo to establish a pregnancy. If implantation does not occur within approximately two weeks, the corpus luteum will involute, causing a sharp drop in levels of both progesterone and estrogen. The hormone drop causes the uterus to shed its lining in a process termed menstruation.

The menstrual cycle is regulated by a complex hormonal system with positive and negative feedback mechanisms and changes in sensitivity of peripheral tissues. Four concepts appear to be fundamental: -- regular, pulsatile secretion of LHR is necessary to the functioning of the system; -- regulation is to a great extent effected by the pituitary gland in response to changes in ovarian steroid levels; -- changes in ovarian steroid levels are due to regulatory changes in receptivity to pituitary hormones, as well as to variations in enzyme activities; -- at the periphery, changes in hormonal impacts are accompanied by modifications of receptivity to steroid hormones.

**PIP:**

The menstrual cycle is the most evident manifestation of an extremely complex phenomenon which concerns not only reproduction, but the general health of the individual. In the light of the most recent clinical acquisitions, the menstrual cycle can be described as follows: 1) regular, pulsatile secretion by the hypothalamus of luteinizing hormone-releasing hormone (LH-RH), which, in turn, liberates follicle stimulating hormone (FSH) and luteinizing hormone (LH); 2) the FSH makes possible the ovarian action of LH, which, in turn, permits the synthesis of estradiol; 3) negative feedback of estradiol and inhibin on the hypophysis cerebri; 4) ovulation is caused by a peak level of LH, but is dependent on progesterone levels; 5) synthesis of progesterone by the corpus luteum; 6) negative biofeedback of progesterone at the hypothalamic level; and 7) at the endometrial level increase in the number of estradiol receptors during the follicular phase and decrease of cytoplasmatic progesterone receptors during the luteal phase. The discovery of the mechanism of the menstrual cycle has helped women with hypothalamic disorders by using a pump releasing LH-RH in a pulsatile fashion.