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1. **Briefly explain the cyclic changes in cervix**

The life of the ovum is short and spermatozoa cannot survive long in the female genital tract, only coitus close to the time of ovulation can result in conception. For this reason investigators of the period of fertility in the sexual cycle have directed greatest attention to the elaboration of methods for determining the time of ovulation. Conception does not require only a fertilizable ovum and potent spermatozoa; conditions prevalent in the genital tract must also permit the spermatozoa to pass through the cervical mucus and reach the ovum. During the ovulation phase estrogenic secretion is increased. This increase is associated with characteristic changes in the cervical mucus, which in-creases in quantity and becomes watery, clear, and translucent. In view of these changes, I have designated this cyclic phase "the water phase of the cervical mucus"; it immediately precedes and coincides with the thermal shift, as determined by basal temperature recordings. But the cyclic changes in the cervix are not limited to the function of the glandular structures and to the physicochemical properties of the cervical mucus. The diameter of the cervical canal also undergoes cyclic changes and is larger during the proliferative phase than during the secretory phase. This also applies to the width of the uterine isthmus. The increase in diameter of the cervical canal and isthmus during the ovulation phase favors migration of the spermatozoa into the uterine cavity. [Fertility & Sterility of spermatozoa passing into the uterine cavity during other phases of the cycle. Rubenstein et al. sprayed semen onto the cervix exposed by speculum before laparotomy. Mter operation the cervix, fundus, and tubes were sep-arated, opened, and washed separately with saline. The washings were examined microscopically for mobile spermatozoa. Spermatozoa were found in the cervix, fundus, and fallopian tubes 30 minutes after the semen had been sprayed onto the cervix; spermatozoal penetration was found to occur at any time during the menstrual cycle. In these authors' series, which consisted of 49 cases, spermatozoa were demonstrated in the uterine cavity of 37 and in one or both of the tubes in 25. It is strange that such migration was recorded so often in Rubenstein et al.'s series, which consisted of women undergoing surgical treatment be-cause of myoma, endometriosis, or other gynecologic disease. Their series cannot, however, be considered representative of conditions prevalent dur-ing reproductive life. The average age was high (39.6 years). Furthermore, spermigration was more frequent in the higher age-groups. Thirty of the patients were 40 or more years old. Spermatozoa were found in the uterine fundus of 25 of them and in the tubes of 17 of 25 in whom one or both of the tubes were examined. Nineteen of the women were under 40; the corre-sponding figures for this group were 12 and 8 of 15. This tendency for conditions to be more favorable for spermigration in the higher age group may be explained by the higher frequency of anovulatory cycles in this group. Persistent estrogenic stimulation, such as in the absence of ovulation, favors spermigration, for then the cervix continuously shows the characteristics of the ovulation phase. Mter ovulation by progesterone stimulation, however, the cervical mucus changes in character, and then, at least in vivo, spermigration is inhibited. It is questionable whether spermatozoa are capable of passing into the uterine cavity at any time of the menstrual cycle. There are several argu-ments against this possibility. It has shown in an earlier study in vitro that spermigration depends on the physicochemical properties of the cervical mucus. The purpose of the present study was to determine whether the passage of spermatozoa into the uterine cavity is dependent on the physicochemical properties of the cervical mucus in vivo.

**2. Briefly explain the cyclic changes in breasts**

**Normal breast development**

Breast development is a vital part of a woman’s reproduction. Breast development happens in certain stages during a woman's life: first before birth, again at puberty, and later during the childbearing years. Changes also happen to the breasts during the menstrual cycle and when a woman reaches menopause.

**When does breast development begin?**

Breasts begin to form while the unborn baby is still growing in the mother’s uterus. This starts with a thickening in the chest area called the mammary ridge or milk line. By the time a baby girl is born, nipples and the beginnings of the milk-duct system have formed.

Breast changes continue to happen over a woman’s life. The first thing to develop are lobes, or small subdivisions of breast tissue. Mammary glands develop next and consist of 15 to 24 lobes. Mammary glands are influenced by hormones activated in puberty. Shrinkage (involution) of the milk ducts is the final major change that happens in the breast tissue. The mammary glands slowly start to shrink. This often starts around age 35.



**What breast changes happen at puberty?**

As a girl approaches her teen years, the first visible signs of breast development begin. When the ovaries start to produce and release (secrete) estrogen, fat in the connective tissue starts to collect. This causes the breasts to enlarge. The duct system also starts to grow. Often these breast changes happen at the same that pubic hair and armpit hair appear.

Once ovulation and menstruation begin, the maturing of the breasts begins with the formation of secretory glands at the end of the milk ducts. The breasts and duct system continue to grow and mature, with the development of many glands and lobules. The rate at which breasts grow is different for each young woman.

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| **Female breast developmental stages**  | **Description** |
| Stage 1  | Preteen. Only the tip of the nipple is raised.  |
| Stage 2  | Buds appear, and breast and nipple are raised. The dark area of skin around the nipple (the areola) gets larger.  |
| Stage 3  | Breasts are slightly larger, with glandular breast tissue present.  |
| Stage 4  | The areola and nipple become raised and form a second mound above the rest of the breast.  |
| Stage 5  | Mature adult breast. The breast becomes rounded and only the nipple is raised.  |

**What cyclical changes happen to the breasts during the menstrual cycle?**

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 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. Once menstruation starts, the cycle begins again.

**What happens to the breasts during pregnancy and milk production?**

Many healthcare providers believe the breasts are not fully mature until a woman has given birth and made milk. Breast changes are one of the earliest signs of pregnancy. This is a result of the hormone progesterone. In addition, the dark areas of skin around the nipples (the areolas) begin to swell. This is followed by the rapid swelling of the breasts themselves. Most pregnant women feel soreness down the sides of the breasts, and nipple tingling or soreness. This is because of the growth of the milk duct system and the formation of many more lobules.

By the fifth or sixth month of pregnancy, the breasts are fully capable of producing milk. As in puberty, estrogen controls the growth of the ducts, and progesterone controls the growth of the glandular buds. Many other hormones also play vital roles in milk production. These include follicle-stimulating hormone (FSH), luteinizing hormone (LH), prolactin, oxytocin, and human placental lactogen (HPL).

Other physical changes happen as well. These include the blood vessels in the breast becoming more visible and the areola getting larger and darker. All of these changes are in preparation for breastfeeding the baby after birth.

**What happens to the breasts at menopause?**

By the time a woman reaches her late 40s and early 50s, perimenopause is starting or is well underway. At this time, the levels of estrogen and progesterone begin to change. Estrogen levels dramatically decrease. This leads to many of the symptoms commonly linked to menopause. Without estrogen, the breast’s connective tissue becomes dehydrated and is no longer elastic. The breast tissue, which was prepared to make milk, shrinks and loses shape. This leads to the "saggy" breasts associated with women of this age.

Women who are taking hormone therapy may have some of the premenstrual breast symptoms that they had while they were still menstruating, such as soreness and swelling. But if a woman’s breasts were saggy before menopause, this will not change with hormone therapy.

1. **Explicate menstrual cycle**



Menstruation is the technical term for getting your period. About once a month, females who have gone through puberty will experience menstrual bleeding. This happens because the lining of the uterus has prepared itself for a possible pregnancy by becoming thicker and richer in blood vessels. If pregnancy does not occur, this thickened lining is shed, accompanied by bleeding. Bleeding usually lasts for 3-8 days. For most women, menstruation happens in a fairly regular, predictable pattern. The length of time from the first day of one period to the first day of the next period normally ranges from 21-35 days.

**How the menstrual cycle work**

The menstrual cycle is controlled by a complex orchestra of hormones, produced by two structures in the brain, the pituitary gland and the hypothalamus along with the ovaries.

If you just want a quick, general overview of the menstrual cycle, For a more detailed review of the physical and hormonal changes that happen over the menstrual cycle,

**General overview of the menstrual cycle**:

The menstrual cycle includes several phases. The exact timing of the phases of the cycle is a little bit different for every woman and can change over time.

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| **Cycle days (approximate)** | **Events of the menstrual cycle** |
| **Days 1-5** | The first day of menstrual bleeding is considered Day 1 of the cycle.Your period can last anywhere from 3 to 8 days, but 5 days is average.Bleeding is usually heaviest on the first 2 days. |
| **Days 6-14** | Once the bleeding stops, the uterine lining (also called the endometrium) begins to prepare for the possibility of a pregnancy.The uterine lining becomes thicker and enriched in blood and nutrients. |
| **Day 14-25** | Somewhere around day 14, an egg is released from one of the ovaries and begins its journey down the fallopian tubes to the uterus.If sperm are present in the fallopian tube at this time, fertilization can occur.In this case the fertilized egg will travel to the uterus and attempt to implant in the uterine wall. |
| **Days 25-28** | If the egg was not fertilized or implantation does not occur, hormonal changes signal the uterus to prepare to shed its lining, and the egg breaks down and is shed along with lining.The cycle begins again on Day 1 menstrual bleeding. |

The menstrual cycle has three phases:

1. **Follicular phase ( days 1-14)**

This phase of the menstrual cycle occurs from approximately day 1-14. Day 1 is the first day of bright red bleeding, and the end of this phase is marked by ovulation. While menstrual bleeding does happen in the early part of this phase, the ovaries are simultaneously preparing to ovulate again. The pituitary gland (located at the base of the brain) releases a hormone called FSH – follicle stimulating hormone. This hormone causes several ‘follicles’ to rise on the surface of the ovary. These fluid filled “bumps” each contain an egg. Eventually, one of these follicle becomes dominant and within it develops a single mature egg; the other follicles shrink back. If more than one follicle reaches maturity, this can lead to twins or more. The maturing follicle produces the hormone estrogen, which increases over the follicular phase and peaks in the day or two prior to ovulation. The lining of the uterus (endometrium) becomes thicker and more enriched with blood in the second part of this phase (after menstruation is over), in response to increasing levels of estrogen. High levels of estrogen stimulate the production of gonadotropin-releasing hormone (GnRH), which in turn stimulates the pituitary gland to secrete luteinizing hormone (LH). On about day 12, surges in LH and FSH cause the egg to be released from the follicle. The surge in LH also causes a brief surge in testosterone, which increases sex drive, right at the most fertile time of the cycle.

1. **Ovulatory phase (day 14)**

The release of the mature egg happens on about day 14 as a result of a surge in LH and FSH over the previous day. After release, the egg enters the fallopian tube where fertilization may take place, if sperm are present. If the egg is not fertilized, it disintegrates after about 24 hours. Once the egg is released, the follicle seals over and this is called the corpus luteum.

1. **Luteal phase (days 14-28)**

After the release of the egg, levels of FSH and LH decrease. The corpus luteum produces progesterone.  If fertilization has occurred, the corpus luteum continues to produce progesterone which prevents the endometrial lining from being shed. If fertilization has not occurred, the corpus luteum disintegrates, which causes progesterone levels to drop and signals the endometrial lining to begin shedding.

**Normal bleeding**

There is a range of normal bleeding – some women have short, light periods and others have longer, heavy periods. Your period may also change over time.

**Normal menstrual bleeding has the following features:**

* Your period lasts for 3-8 days
* Your period comes again every 21-35 days (measured from the first day of one period to the first day of the next)
* The total blood loss over the course of the period is around 2-3 tablespoons but secretions of other fluids can make it seem more

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