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Question

1. Briefly explain the cyclic changes in
 - o **Vagina**

Vaginal discharge changes over the course of a woman's menstrual cycle. These changes in color and thickness are associated with **ovulation** and help to create conditions that are favorable for fertilization of the egg. These changes are completely natural. Discharge may vary based on the amount of **progesterone and estrogen** levels in the blood throughout the menstrual cycle. Progesterone and estrogen are two hormones that regulate the menstrual cycle.

A significant increase in the estimated volume of vaginal discharge was observed over the menstrual cycle; a higher proportion of women had a normal amount (1–3 mL) later in the cycle ($P < .001$)

There are normal variations that may occur in **the vagina of normal macaques** as a result of aging or changes in the menstrual cycle. A study was conducted to determine if differences occur in the thickness of the vaginal mucosa with menses.

Vaginal mucosal thickness was compared in 46 rhesus macaques grouped as juvenile (1-3 years old), mature cycling (3-21 years old), and geriatric (> 21 years old). Epithelia of mature cycling macaques were also compared at different stages of the menstrual cycle. Older females (> 21 years) had the thinnest and least keratinized epithelium of all groups, followed by the youngest females (< 3 years).

The vaginal epithelium was also thinner in cycling macaques during menses compared to the follicular stage. In addition, young, geriatric, or cycling

macaques during menses had minimal keratinization. We hypothesize that normal physiologic changes in the vaginal epithelium of women occur with menses, which may affect a woman's susceptibility to HIV-1 transmission and other sexually transmitted diseases. Also, menstrual cycle should be considered when designing vaginal transmission experiments in rhesus macaques

- **Breasts**

Each month, women go through changes in the hormones that make up the normal menstrual cycle.

For many, breast size will enlarge before they start their period, and is one of many **premenstrual syndrome (PMS) symptoms**. Hormonal changes that occur before and during your menstrual cycle can cause bloating and swollen breasts among other side effects. Symptoms usually calm down once your period starts.

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 not, the breasts go back to normal size. Once menstruation starts, the cycle begins again.

2. Explicate:

- **Menstrual Cycle**

Medically, menstruation (also termed period or bleeding) is the process in a woman of discharging (through the vagina) blood and other materials from the lining of the uterus at about one monthly interval from puberty until menopause (ceasing of regular menstrual cycles), except during pregnancy. This discharging process lasts about 3-5 days or even about 5 to 7 days in some women. The average age for a girl to get her first period in the US is 12, but the range of age is about 8 to 15 years old. Women usually have periods until about ages 45 to 55.

During each menstrual cycle, an egg develops and is released from the ovaries. The lining of the uterus builds up. If a pregnancy doesn't happen, the uterine lining sheds during a menstrual period. Then the cycle starts again.

A woman's menstrual cycle is divided into four phases:

- menstrual phase
- follicular phase
- ovulation phase
- luteal phase

The length of each phase can differ from woman to woman, and it can change over time.

Menstrual phase

The menstrual phase is the first stage of the menstrual cycle. It's also when you get your period.

This phase starts when an egg from the previous cycle isn't fertilized. Because pregnancy hasn't taken place, levels of the hormones estrogen and progesterone drop. The thickened lining of your uterus, which would support a pregnancy, is no longer needed, so it sheds through your vagina. During your period, you release a combination of blood, mucus, and tissue from your uterus.

You may have period symptoms like these:

- cramps (try these home remedies)
- tender breasts
- bloating
- mood swings
- headaches
- low back pain

On average, women are in the menstrual phase of their cycle for 3 to 7 days. Some women have longer periods than others.

Follicular phase

The follicular phase starts on the first day of your period (so there is some overlap with the menstrual phase) and ends when you ovulate.

It starts when the hypothalamus sends a signal to your pituitary gland to release follicle-stimulating hormone (FSH). This hormone stimulates your ovaries to produce around 5 to 20 small sacs called follicles. Each follicle contains an immature egg.

Only the healthiest egg will eventually mature. (On rare occasions, a woman may have two eggs mature.) The rest of the follicles will be reabsorbed into your body. The maturing follicle sets off a surge in estrogen that thickens the lining of your uterus. This creates a nutrient-rich environment for an embryo to grow.

The average follicular phase lasts for about 16 days. It can range from 11 to 27 days, depending on your cycle.

Ovulation Phase

Rising estrogen levels during the follicular phase trigger your pituitary gland to release luteinizing hormone (LH). This is what starts the process of ovulation.

Ovulation is when your ovary releases a mature egg. The egg travels down the fallopian tube toward the uterus to be fertilized by sperm.

The ovulation phase is the only time during your menstrual cycle when you can get pregnant. You can tell that you're ovulating by symptoms like these:

- a slight rise in basal body temperature
- thicker discharge that has the texture of egg whites

Ovulation happens at around day 14 if you have a 28-day cycle right in the middle of your menstrual cycle. It lasts about 24 hours. After a day, the egg will die or dissolve if it isn't fertilized.

Luteal Phase

After the follicle releases its egg, it changes into the **corpus luteum**. This structure releases hormones, mainly **progesterone** and some **estrogen**. The rise in hormones keeps your uterine lining thick and ready for a fertilized egg to implant.

If you do get pregnant, your body will produce human chorionic gonadotropin (hCG). This is the hormone pregnancy tests detect. It helps maintain the corpus luteum and keeps the uterine lining thick.

If you don't get pregnant, the corpus luteum will shrink away and be resorbed. This leads to decreased levels of estrogen and progesterone, which causes the onset of your period. The uterine lining will shed during your period.

During this phase, if you don't get pregnant, you may experience symptoms of premenstrual syndrome (PMS). These include: bloating, breast swelling, or tenderness, headache, weight gain, food cravings

The luteal phase lasts for 11 to 17 days. The average length is 14 days.

Every woman's menstrual cycle is different. What's normal for you might not be normal for someone else. 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 include:

- 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

It's important to get familiar with your cycle. Be alert for any changes, and report them to your healthcare provider.

