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QUESTION 1: BRIEFLY DISCUSS THE CYCLIC CHANGES IN THE FOLLOWING;

A) VAGINA

Vaginal cytology was evaluated weekly over 12 months in 20 adult female *Cynomolgus* monkeys (*Macaca fascicularis*). After sacrifice of the animals the histology of the ovaries, uterus and vagina were studied in different phases of the menstrual cycle. The cytological examination of the vaginal smears showed that the superficial cells increased in number towards the middle of the cycle and the number of intermediate cells declined gradually. Parabasal cells were observed mainly at the beginning of the cycle; they disappeared towards the middle of the menstrual cycle. During the early follicular phase, the cells were moderately separated from each other, and during the second half of the proliferative or follicular phase, the superficial cells appeared clumped together. Leucocytes were usually absent except for at the beginning of the cycle and in the last few days of the late secretory or luteal phase. The maturation index of the vaginal smears can be considered as a tool for distinguishing the different phases of the menstrual cycle. The microscopic examination of the genital organs showed that during the proliferative or follicular phase of the cycle, which corresponds to the development of the ovarian follicles, the uterus showed growth of endometrial glands, stroma and endothelial cell proliferation with capillary sprouts. Shortly after ovulation and parallel to the formation of the corpora lutea, the endometrium enters the secretory or luteal phase, which is characterized by coiling of endometrial glands, glandular secretion and the differentiation of the spiral artery. The most striking changes in the vagina, is the marked basal cell proliferation and thickening of the stratum granulosum during the follicular phase of the menstrual cycle. The histological changes observed in the vagina demonstrated a good correlation with the observation on cytological examination of the smears. The present study demonstrated that the process of angiogenesis in the uterus during the different phases of the menstrual cycle is a multiple phenomenon involving proliferation, maturation and differentiation.

B) BREAST

What Is 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.

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.

QUESTION 2: EXPLICATE MENSTRUAL CYCLE

What is menstruation?

Menstruation is a woman's monthly bleeding, often called your "period." When you menstruate, your body discards the monthly buildup of the lining of your uterus (womb). Menstrual blood and tissue flow from your uterus through the small opening in your cervix and pass out of your body through your vagina. During the monthly menstrual cycle, the uterus lining builds up to prepare for pregnancy. If you do not get pregnant, estrogen and progesterone hormone levels begin falling. Very low levels of estrogen and progesterone tell your body to begin menstruation.

What Is The Menstrual Cycle?

The menstrual cycle is the monthly hormonal cycle a female's body goes through to prepare for pregnancy. Your menstrual cycle is counted from the first day of your period up to the first day of your next period. Your hormone levels (estrogen and progesterone) usually change throughout the menstrual cycle and can cause menstrual symptoms.

How Long Is A Typical Menstrual Cycle?

The typical menstrual cycle is 28 days long, but each woman is different.² Also, a woman's menstrual cycle length might be different from month-to-month. Your periods are still "regular" if they usually come every 24 to 38 days.³ This means that the time from the first day of your last period up to the start of your next period is at least 24 days but not more than 38 days. Some women's periods are so regular that they can predict the day and time that their periods will start. Other women are regular but can only predict the start of their period within a few days.

What Is Ovulation?

Ovulation is when the ovary releases an egg so it can be fertilized by a sperm in order to make a baby. A woman is most likely to get pregnant if she has sex without birth control in the three days before and up to the day of ovulation (since the sperm are already in place and ready to fertilize the egg as soon as it is released). A man's sperm can live for 3 to 5 days in a woman's reproductive organs, but a woman's egg lives for just 12 to 24 hours after ovulation. Each woman's cycle length may be different, and the time between ovulation and when the next period starts can be anywhere from one week (7 days) to more than 2 weeks (19 days). At different times in a woman's life, ovulation may or may not happen: Women who are pregnant do not ovulate. Women who are breastfeeding may or may not ovulate. Women who are breastfeeding should talk to their doctor about birth control methods if they do not want to get pregnant. During perimenopause, the transition to menopause, you may not ovulate every month. After menopause you do not ovulate.

How Do I Know If I'm ovulating?

A few days before you ovulate, your vaginal mucus or discharge changes and becomes more slippery and clear. This type of mucus helps sperm move up into your uterus and into the fallopian

tubes where it can fertilize an egg. Some women feel minor cramping on one side of their pelvic area when they ovulate. Some women have other signs of ovulation.

Luteinizing hormone (LH) is a hormone released by your brain that tells the ovary to release an egg (called ovulation). LH levels begin to surge upward about 36 hours before ovulation, so some women and their doctors test for LH levels. LH levels peak about 12 hours before ovulation.¹ Women who are tracking ovulation to become pregnant will notice a slight rise in their basal temperature (your temperature after sleeping before you get out of bed) around ovulation.

How Does My Menstrual Cycle Change As I Get Older?

Your cycles may change in different ways as you get older. Often, periods are heavier when you are younger (in your teens) and usually get lighter in your 20s and 30s. This is normal. For a few years after your first period, menstrual cycles longer than 38 days are common. Girls usually get more regular cycles within three years of starting their periods. If longer or irregular cycles last beyond that, see your doctor or nurse to rule out a health problem, such as polycystic ovary syndrome (PCOS). In your 20s and 30s, your cycles are usually regular and can last anywhere from 24 to 38 days. In your 40s, as your body starts the transition to menopause, your cycles might become irregular. Your menstrual periods might stop for a month or a few months and then start again. They also might be shorter or last longer than usual, or be lighter or heavier than normal.

Why Should I Keep Track Of My Menstrual Cycle?

If your periods are regular, tracking them will help you know when you ovulate, when you are most likely to get pregnant, and when to expect your next period to start. If your periods are not regular, tracking them can help you share any problems with your doctor or nurse. If you have period pain or bleeding that causes you to miss school or work, tracking these period symptoms will help you and your doctor or nurse find treatments that work for you. Severe pain or bleeding that causes you to miss regular activities is not normal and can be treated.\

How Can I Keep Track Of My Menstrual Cycle?

You can keep track of your menstrual cycle by marking the day you start your period on a calendar. After a few months, you can begin to see if your periods are regular or if your cycles are different each month.

The Premenstrual Syndrome (PMS)

Premenstrual syndrome (PMS) symptoms: Did you have cramping, headaches, moodiness, forgetfulness, bloating, or breast tenderness? When your bleeding begins: Was it earlier or later than expected? How heavy the bleeding was on your heaviest days: Was the bleeding heavier or lighter than usual? How many pads or tampons did you use? Period symptoms: Did you have pain or bleeding on any days that caused you to miss work or school? You can also download apps (sometimes for free) for your phone to track your periods. Some include features to track your PMS symptoms, energy and activity levels, and more.

When Does A Girl Usually Get Her First Period?

The average age for a girl in the United States to get her first period is 12.6 this does not mean that all girls start at the same age. A girl may start her period anytime between 8 and 15. The first period normally starts about two years after breasts first start to develop and pubic hair begins to grow. The age at which a girl's mother started her period can help predict when a girl may start her period.

A Girl Should See Her Doctor If:

She starts her period before age 8.

She has not had her first period by age 15.

She has not had her first period within three years of breast growth.

Get more information for girls about getting their period at girlshealth.gov.

How Long Does A Woman Usually Have Periods?

On average, women get a period for about 40 years of their life.^{6,7} Most women have regular periods until perimenopause, the time when your body begins the change to menopause. Perimenopause, or transition to menopause, may take a few years. During this time, your period may not come regularly. Menopause happens when you have not had a period for 12 months in a row. For most women, this happens between the ages of 45 and 55. The average age of menopause in the United States is 52. Periods also stop during pregnancy and may not come back right away if you breastfeed. But if you don't have a period for 90 days (three months), and you are not pregnant or breastfeeding, talk to your doctor or nurse. Your doctor will check for pregnancy or a health problem that can cause periods to stop or become irregular.

What Is A Normal Amount Of Bleeding During My Period?

The average woman loses about two to three tablespoons of blood during her period.⁸ your periods may be lighter or heavier than the average amount. What is normal for you may not be the same for someone else. Also, the flow may be lighter or heavier from month to month. Your periods may also change as you get older. Some women have heavy bleeding during perimenopause, the transition to menopause. Symptoms of heavy menstrual bleeding may include:

Bleeding through one or more pads or tampons every one to two hours

Passing blood clots larger than the size of quarters

Bleeding that often lasts longer than eight days