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ANSWERS

QUESTION 1- Briefly discuss the cyclic changes in any two of the following

a) Cervix (b) vagina (c) breasts

CYCLIC CHANGES IN THE BREAST

The breast is the tissue overlying the chest (pectoral) muscles. It is more prominent in women. Women's breasts are made of specialized tissue that produces milk(glandular tissue) as well as fatty tissue. The amount of fat determines the size of the breast. The dark skin area surrounding the nipple is called the areola. Connective tissues and ligaments provide support to the breast and give it its shape. The breast also contains blood vessels, lymph vessels and lymph nodes. The primary function of the female breast is to produce milk for nutrition of the infant and baby.

As the breast develops it undergoes some cyclic changes at different for example, during puberty, or during menstrual cycle etc. Breast begins to form while the unborn child is growing in the mother's uterus. It starts thickening in the chest area called the mammary ridge or milk line. 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 are influenced by hormones such as **estrogen** 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.

When the ovaries start to produce and release estrogen, fat in the connective tissue starts to collect. This causes the breast to enlarge. The duct system also starts to grow. Often these breasts changes happen at the same time that pubic hair and armpit hair starts to appear. This cyclic change occurs at puberty

Another cyclic change occurs during 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. 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 milk glands. These hormones believed to be responsible for the cyclical changes that many women feel in their breast just before menstruation. These includes **swelling, pain and soreness.** During menstruation, many women also have their changes in breast texture. Their breast may feel very lumpy. This is because the glands in their breast are enlarging to get ready for a possible pregnancy. If pregnancy does not occur, the breast goes back to normal size.

Most people believe 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) begins the swell. This is followed by 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. Other physical changes happen as well. These includes the blood vessels in the breast becoming more visible and the areola getting larger and darker. All of the changes are in preparation for breastfeeding the baby after birth.

By premenopause stage (late 40s and early 50s), the levels of estrogen and progesterone begins 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 which was prepared to make milk shrinks and loses and shape. This leads to the saggy breasts associated with women of this age.

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

CYCLIC CHANGES IN THE VAGINA

The vagina is an organ of the female reproductive tract. It is an elastic, muscular canal with a soft, flexible lining that provides lubrication and sensation. The vagina connects the uterus to the outside world. The vulva and labia form the entrance, and the cervix of the uterus protrudes into the vagina, forming the interior end. The vagina receives the penis during sexual intercourse and also serves as a conduit for menstrual flow from the uterus. During child birth, the baby passes through the vagina (birth canal). The vagina undergo some changes as a result of age, menstrual cycle and also during sex.

The vagina can change a lot throughout a person's life. An average adult vagina is slightly curved, and can range between 7 to 12cm in length but everybody is different and there's no such thing as a too small or too large vagina. The vagina is also influenced by changing hormone levels during pregnancy. Increased blood flow is directed to the pelvis, causing a deeper color change to the vulva and the vagina. Throughout a pregnancy, the connective tissue of the vaginal walls progressively relaxes, in preparation for the delivery of a baby. After delivery, the vagina and vaginal opening temporarily widen but 6-12 weeks post-delivery, the vagina returns to its pre-pregnancy size. As people age, the walls of the vagina become more relaxed, and the diameter of the vagina becomes wider. After menopause , when estrogen is lower, the walls of the vagina become thinner and frailer, which can cause symptoms of vaginal dryness and decreased vaginal secretions. This may result in discomfort during sex and increase the chances of vaginal irritation or infection.

Also, the vagina changes in response to hormonal fluctuations of the menstrual cycle. Around mid-cycle when estrogen is highest, vaginal tissue becomes thicker and fuller. The cervix at the top of the vagina moves and changes shape throughout the cycle. Before and after the fertile window, the cervix is low and can be felt in the vagina, with a firm texture, and the hole in the center of the

cervix is closed. During the fertile window, the hole in the cervix opens to facilitate the entrance of sperm into the uterus. The cervix rises higher in the vagina and is softer when touched.

During sex, the vagina undergo more rapid changes, such as during sexual activity. When a person with a vagina is sexually aroused, increased blood flow is directed towards the genitals, causing the vaginal tissues to become engorged with blood, and additional lubrication to be produced. This is called **arousal fluid.** During sexual excitement, the vagina expands by lengthening and widening in shape. This is called vaginal tenting and ballooning. This shape changes happens in the uterus and cervix are drawn higher into the pelvis, which creates more space and moves the cervix farther away from any semen that is ejaculated into the vagina. This allows time for semen to mix with female genital fluids, stimulating the sperm to undergo the physical changes necessary for fertilizing an egg.

QUESTION 2- Explicate any one of the following : (1) menstrual cycle (2) hormonal regulation of the menstrual cycle.

MENSTRUAL CYCLE

Menstrual cycle also called the endometrial cycle. It constitutes the monthly changes in the internal layer of the uterus. During this period, menstruation (flow of blood from the uterus) is an obvious event. The average menstrual cycle is 28 days. Day 1 of this 28 days cycle designated as the day on which menstrual flow begins. Menstrual cycles normally vary in length by several days. In 90% of women, the length of the cycles ranges between 23 to 35 days. Almost all these variations result from alterations in the duration of the proliferative phase of the menstrual cycle.

There are four phases that occur during menstrual cycle. They are:

- Menstrual phase
- Proliferative phase
- Luteal phase
- Ischemic phase (only occurs if the oocyte is not fertilized)

  Menstrual phase: usually last for 4 to 5 days. Here, the functional layer of the uterine wall is sloughed off and discarded with the menstrual flow (monthly bleeding). The blood discharged through the vagina is combined with small pieces of endometrial tissue. After menstruation, the eroded endometrium is thin.

  Proliferative phase: Also known as the follicular/estrogenic phase which lasts approximately 9 days. It coincides with the growth of ovarian follicles and is controlled by estrogen secreted by these follicles. There is a 2-3 fold increase in the thickness of the endometrium and in its water content. Early during this phase, the surface epithelium reforms and covers the endometrium. Uterine glands increase in number and length and the spiral arteries elongate.

  Luteal phase: Also called the secretory/progesterone phase. It lasts for 13 days and coincides with the formation, functioning and growth of the corpus luteum. The progesterone produced by the corpus luteum stimulates the glandular epithelium to secrete a glycogen-rich material.

The glands become wide, tortuous, and saccular and the endometrium thickens because of the influence of progesterone and estrogen from the corpus luteum. Also because of increased fluid in the connective tissues. As the spiral arteries grow into superficial compact layer, they become increasingly coiled. The venous network becomes complex and large lacunae (venous spaces) develop. Direct arteriovenous anastomoses are prominent features of this phase.

If fertilization does not occur;

-The corpus luteum degenerates

-Estrogen and progesterone levels fall and the secretory endometrium enters an ischemic phase

-Menstruation occurs.

Ischemic phase: this occurs when the oocyte is not fertilized. Ischemia (reduced blood supply) occurs as a result of constriction of spiral arteries giving the endometrium a pale appearance. There is decrease secretion of hormones, primarily progesterone, by the degenerating corpus luteum. A loss of interstitial fluid and shrinkage of the endometrium occurs.

This results in venous stasis and patchy ischemic necrosis (death) in the superficial tissues. Eventually, rupture of damaged vessel walls flows and blood seeps into the surrounding connective tissue. Small pools of blood form and break through the endometrial surface, resulting in bleeding into the uterine lumen and from the vagina.