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Briefly discuss the cyclic changes in any of the following

(1) Cervix (2) vagina (3) breasts

Explicate the menstrual cycle

The cylic changes in breast development

Breast development, also known as mammogenesis, is a complex biological process in primates that takes place throughout a female's life. It occurs across several phases, including prenatal development, puberty, and pregnancy. At menopause, breast development ceases and the breasts atrophy. Breast development results in prominent and developed structures on the chest known as breasts in primates, which serve primarily as mammary glands. The process is mediated by an assortment of hormones (and growth factors), the most important of which include estrogen, progesterone, prolactin, and growth hormone.

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 happens to the breasts 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.

The female breast developmental stages consists of 5 stages:

Stage 1Preteen. Only the tip of the nipple is raised.

Stage 2Buds appear, and breast and nipple are raised. The dark area of skin around the nipple (the areola) gets larger.

Stage 3Breasts are slightly larger, with glandular breast tissue present.

Stage 4The areola and nipple become raised and form a second mound above the rest of the breast.

Stage 5Mature adult breast. The breast becomes rounded and only the nipple is raised.

CYCLICAL CHANGES THAT HAPPENS TO THE BRESTS 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. 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 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.

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.

CYCLICAL CHANGES OF THE CERVIX

The cervix acts as a barrier that limits access to the uterine cavity.

During the follicular phase, increasing estradiol levels increase cervical vascularity and edema and cervical mucus quantity, elasticity, and salt (sodium chloride or potassium chloride) concentration. The external os opens slightly and fills with mucus at ovulation.

During the luteal phase, increasing progesterone levels make the cervical mucus thicker and less elastic, decreasing success of sperm transport.

Menstrual cycle phase can sometimes be identified by microscopic examination of cervical mucus dried on a glass slide; ferning (palm leaf arborization of mucus) indicates increased salts in cervical mucus. Ferning becomes prominent just before ovulation, when estrogen levels are high; it is minimal or absent during the luteal phase. Spinnbarkeit, the stretchability (elasticity) of

the mucus, increases as estrogen levels increase (eg, just before ovulation); this change can be used to identify the periovulatory (fertile) phase of the menstrual cycle.

MENSTUAL CYCLE

The female reproductive functions can br divided into 2 phases

(1) preparation of the female body for conception:This involves regular cyclic changes : ovarian, menstrual and uterine cycles
(2) the period of pregnancy.

Menstrual cycle is the series of change in which the uterine lining is shed, rebuilds, and prepares for implantation. A female's menstrual cycle occurs to allow for oocyte release and prepare the uterus for possible pregnancy. It begins at puberty, ranging from the ages of 10 to 16, and ends at menopause at an average age of 51. It may last anywhere from 21 days to 35 days with an average duration of 28 days

Stages of menstrual cycle

Phase 1: The Follicular, or Proliferative Phase

The first phase of the menstrual cycle is the follicular or proliferative phase. It occurs from day zero to day 14 of the menstrual cycle, based on the average duration of 28 days. The variability in length of the menstrual cycle occurs due to variations in the length of the follicular phase. The main hormone during this phase is estrogen, specifically 17-beta-estradiol. The increase in this hormone occurs by upregulation of the FSH receptors within the follicle at the beginning of the cycle. However, as the follicular phase progresses to the end, the increased amounts of 17-beta-estradiol will provide negative feedback to the anterior pituitary. The purpose of this phase is to grow the endometrial layer of the uterus. 17-beta-estradiol achieves this by increasing growth of the endometrial layer of the uterus, stimulating increased amounts of stroma and glands, and

increasing the depth of the arteries that supply the endometrium, the spiral arteries. Additionally, this phase is also important to create an environment that is friendly and helpful to possible incoming sperm. 17-beta-estradiol achieves this by creating channels within the cervix allowing for sperm entry. The channels are made within the abundant, watery and elasticity changes of the cervical mucous. During this phase, a primordial follicle begins to mature to a Graafian follicle. The surrounding follicles begin to degenerate which is when the Graafian follicle becomes the mature follicle. This sets up the follicle for ovulation, the next step.

Phase 2: The Luteal or Secretory Phase

The next phase of the menstrual cycle is the luteal or secretory phase. This phase always occurs from day 14 to day 28 of the cycle. Progesterone stimulated by LH is the dominant hormone during this phase to prepare the corpus luteum and the endometrium for possible fertilized ovum implantation. As the luteal phase ends, progesterone will provide negative feedback to the anterior pituitary to decrease FSH and LH levels and subsequently, the 17-beta-estradiol and progesterone levels. The corpus luteum is a structure formed in the ovary at the site of the mature follicle rupture to produce 17-beta-estradiol and progesterone, which is predominate at the end of the phase due to the negative feedback system. The endometrium prepares by increasing its vascular supply and stimulating more mucous secretions. This is achieved by the progesterone stimulating the endometrium to slow down endometrial proliferation, decrease lining thickness, develop more complex glands, accumulate energy sources in the form of glycogen, and provide more surface area within the spiral arteries. Contrary to the cervical mucous changes seen during the proliferative phase and ovulation, progesterone decreases and thickens the cervical mucous making it non-elastic, since the fertilization time period passed, and sperm entry is no longer a priority. Additionally, progesterone increases the hypothalamic temperature, so body temperature increases during the luteal phase. Near the end of the secretory phase, plasma levels of 17-beta-estradiol and progesterone are produced by the corpus luteum. If pregnancy occurs, a fertilized ovum is implanted within the endometrium, and the corpus luteum will persist and maintain the hormone levels. However, if no fertilized ovum is implanted, then the corpus luteum regresses, and the serum levels of 17-beta-estradiol and progesterone decrease rapidly.

Phase 3:Menses phase/desquamation of the endometrium, which is also known as menstruation

When the hormone levels decrease, the endometrium layer as it has been changed throughout the menstrual cycle is not able to be maintained. This is called menses, considered day 0 to day 5 of the next menstrual cycle. The duration of menses is variable. Menses or menstrual bleeding is when there is sloughing of the endometrial lining and its blood. To continue the process of the menstrual cycle, primordial follicles begin to develop and start the follicular phase again in hopes of a pregnancy.

The wall of the uterus is made up of three layers.

• The most superficial layer - is the serous membrane, or perimetrium, which

consists of epithelial tissue that covers the exterior portion of the uterus.

• The middle layer, or myometrium - is a thick layer of smooth muscle responsible

for uterine contractions.

• The innermost layer of or endometrium - The endometrium contains a connective tissue lining, the lamina propria, which is covered by epithelial tissue that lines the lumen.

Structurally, the endometrium consists of two layers:

The stratum basalis and the stratum functionalis (the basal and functional layers)

The stratum functionale, is supplied by long, coiled spiral arteries.

The stratum basale, is supplied by short, straight basilar arteries.This layer does not shed during menses. In contrast, the thicker stratum functionalis layer contains the glandular portion of the lamina propria and the endothelial tissue that lines the uterine lumen. It is the stratum functionalis that grows and thickens in response to increased levels of estrogen and progesterone. This layer is shed when hormonal support for the endometrium is withdrawn.

Ovulation

Ovulation always occurs 14 days before menses; therefore, with an average 28-day cycle, ovulation occurs on day 14. At the end of the proliferative phase, 17-beta-estradiol levels are at a high due to the follicle maturation and increased production of the hormone. During this time only, 17-beta-estradiol provides positive feedback for FSH and LH production. This occurs when a critical level of 17-beta-estradiol is reached, at least 200 picograms per milliliter of plasma. The high levels of FSH and LH present during this time is called the LH surge. As a result, the mature follicle breaks, and an oocyte is released. The changes to the cervix as initiated during the follicular phase further increases allowing for increased, waterier cervical mucous to better accommodate the possible sperm. The levels of 17-beta-estradiol fall at the end of ovulation.