**NAME: UBAH CHIDINMA FAVOU**

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**ASSIGNMENT TITLE: FEMALE REPRODUCTIVE PHYSIOLOGY**

**COURSE TITLE: PHYSIOLOGY**

**COURSE CODE: PHS 212**

**QUESTION 1**

Discuss the cyclic CHANGES in any two of the following;

* Cervix
* Vagina
* Breasts

**QUESTION 2**

Explicate any one if the following.

* Menstrual cycle

 -Hormonal regulation of the menstrual cycle

**ANSWERS**

1. **CYCLIC CHANGES IN THE VAGINA**

 The vagina also changes in response to hormonal fluctuations of the menstrual cycle. Around mid cycle, when estrogen is highest, vaginal tissues 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 centre of the cervix us closed. During the fertile window, the hole in the cervix opens to facilitate the entrance of sperm into vagina and it is softer when touched. During the luteal and follicular phases of the estrous cycle the structure of the vaginal epithelium varies. The number of cell layers vary during the days of the estrous cycle:

Day 10, 22 layers

Days 12-14, 46 layers

Day 19, 32 layers

Day 24, 24 layers

The glycogen levels in the cells is at its highest immediately before ovulation.

 The **vaginal epithelium** is the inner lining of the [vagina](https://en.m.wikipedia.org/wiki/Vagina%22%20%5Co%20%22Vagina) consisting of multiple layers of ([squamous](https://en.m.wikipedia.org/wiki/Epithelium%22%20%5Co%20%22Epithelium)) cells. The basal membrane provides the support for the first layer of the epithelium-the basal layer. The intermediate layers lie upon the basal layer and the superficial layer is the outermost layer of the epithelium. Anatomists have described the epithelium as consisting of as many as 40 distinct layers.[ The mucus found on the epithelium is secreted by the cervix and uterus. The rugae of the epithelium create an involuted surface and result in a large surface area that covers 360 cm3. This large surface area allows the trans-epithelial absorption of some medications via the vaginal route. In the course of the [reproductive cycle](https://en.m.wikipedia.org/wiki/Biological_life_cycle%22%20%5Co%20%22Biological%20life%20cycle), the vaginal epithelium is subject to normal, cyclic changes, that are influenced by [estrogen](https://en.m.wikipedia.org/wiki/Estrogen%22%20%5Co%20%22Estrogen): with increasing circulating levels of the [hormone](https://en.m.wikipedia.org/wiki/Hormone%22%20%5Co%20%22Hormone), there is proliferation of epithelial cells along with an increase in the number of cell layers. As cells proliferate and mature, they undergo partial cornification. Although hormone induced changes occur in the other tissues and organs of the female reproductive system, the vaginal epithelium is more sensitive and its structure is an indicator of estrogen levels. Some [Langerhans cells](https://en.m.wikipedia.org/wiki/Langerhans_cell%22%20%5Co%20%22Langerhans%20cell) and [melanocytes](https://en.m.wikipedia.org/wiki/Melanocyte%22%20%5Co%20%22Melanocyte) are also present in the epithelium. The epithelium of the [ectocervix](https://en.m.wikipedia.org/wiki/Ectocervix%22%20%5Co%20%22Ectocervix) is contiguous with that of the vagina, possessing the same properties and function. The vaginal epithelium is divided into layers of cells, including the [basal cells](https://en.m.wikipedia.org/wiki/Stratum_basale%22%20%5Co%20%22Stratum%20basale), the parabasal cells, the superficial [squamous flat cells](https://en.m.wikipedia.org/wiki/Squamous_cell%22%20%5Co%20%22Squamous%20cell), and the intermediate cells..  The superficial cells [exfoliate](https://en.m.wikipedia.org/wiki/Exfoliation_corrosion%22%20%5Cl%20%22Exfoliation%22%20%5Co%20%22Exfoliation%20corrosion) continuously and basal cells replace the superficial cells that die and slough off from the [stratum corneum](https://en.m.wikipedia.org/wiki/Stratum_corneum%22%20%5Co%20%22Stratum%20corneum). Under the stratus corneum is the [stratum granulosum](https://en.m.wikipedia.org/wiki/Stratum_granulosum%22%20%5Co%20%22Stratum%20granulosum) and [stratum spinosum](https://en.m.wikipedia.org/wiki/Stratum_spinosum%22%20%5Co%20%22Stratum%20spinosum). The cells of the vaginal epithelium retain a usually high level of glycogen compared to other epithelial tissue in the body. The surface patterns on the cells themselves are circular and arranged in longitudinal rows. The epithelial cells of the uterus possess some of the same characteristics of the vaginal epithelium.

**CYCLIC CHANGES IN THE BREAST**

 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. 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. 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. Each month, women go through changes in the hormones that make up the normal menstrual cycle. The hormones estrogen is produced by the ovaries in first half of the menstrual cycle, it stimulates the growth of milk ducting the breast.

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

## 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.

## 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. 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

 **2. THE MENSTRUAL CYCLE**

The menstrual cycle is the monthly series of changes a woman’s body goes through in preparation for the possibility of pregnancy. Each month, one of the ovaries releases an egg (a process called ovulation). At the same time hormonal changes prepare the uterus for pregnancy.

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

The menstrual cycle is divided into four (4) phases;

* Menstrual phase
* Follicular phase
* Ovulation phase
* Luteal phase

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

**MENSTRUAL PHASE**

This is the first stage of menstrual cycle; it is also when a woman gets her period.

It starts when an egg from the previous cycle isn’t fertilizer because pregnancy hasn’t taken place, levels of the hormones estrogen and progesterone drop. During a woman period, a combination of blood, mucus and issues is released from the uterus.

On average, women are on the menstrual phase of their cycle for 3 to 7 days. Some women have longer period than other.

**FOLLICULAR PHASE**

 This phase starts on the first day of your period and ends when you ovulate. It starts when the hypothalamus sends a signal to your pituitary gland to release FOLLICLE- STIMULATING HORMONE (FSH) which stimulates the ovaries to produce around 5 to 20 small sacs called follicles. Each follicle contains an immature egg. Only the healthiest egg will eventually mature. The rest of the follicle will be reabsorbed into the body.

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

**OVULATION PHASE**

 The process of ovulation starts when the rising estrogen levels during the follicular phase trigger the pituitary gland to release luteinizing hormone (LH).

Ovulation is when your ovary releases a mature egg. The egg travels down the fallopian tube toward the uterus to the fertilized sperm. It is possible to know that a woman is ovulating by

1. A slight rise on basal body temperature.

2. Thicker discharge that has the texture of egg wholes.

Ovulation happens at around day 14 if you have a 28 days 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**

In this stage, after the follicle release its egg, it changes into the CORPUS LUTEUM. This structure releases hormones, mainly progesterone and some estrogen. The rise on hormones keeps your uterine lining thick and ready for a fertilized egg to implant.

If a woman gets pregnant, the body will produce human chronic gonadotropin (HCG) which helps maintain the corpus lute van and keeps the uterine lining thick.

If a woman does not get pregnant, the corpus lute van 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.