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1a) Development of the cervix

As a component of the female reproductive system, the cervix is derived from the two paramesonephric ducts (also called Müllerian ducts), which develop around the sixth week of embryogenesis.

The cervix or cervix uteri is the lower part of the uterus in the human female reproductive system. The cervix is usually 2 to 3 cm long (1 inch) and roughly cylindrical in shape, which changes during pregnancy. The narrow, central cervical canal runs along its entire length, connecting the uterine cavity and the lumen of the vagina. The opening into the uterus is called the internal os, and the opening into the vagina is called the external os. The lower part of the cervix, known as the vaginal portion of the cervix (or ectocervix), bulges into the top of the vagina.The cervical canal is a passage through which sperm must travel to fertilize an egg cell after sexual intercourse. Several methods of contraception, including cervical caps and cervical diaphragms, aim to block or prevent the passage of sperm through the cervical canal. Cervical mucus is used in several methods of fertility awareness, such as the Creighton model and Billings method, due to its changes in consistency throughout the menstrual period. During vaginal childbirth, the cervix must flatten and dilate to allow the fetus to progress along the birth canal.

Cyclic Changes in the Surface Structure of the Cervix

Thirty parous ewes were divided into six groups and sacrificed on day 0 (first day of estrus), 1, 2, 10, 15 or 16 of the estrous cycle. The cervices were removed immediately and processed for examination with the scanning electron microscope. Observation of the tissues reveals that the surface of the cervix is highly convoluted, which results in the formation of numerous folds or crypts. Two forms of columnar epithelial cells, a ciliated and a non-ciliated cell with microvilli, line the luminal surface of the cerix in the day 10, luteal-phase ewes. However, on day 15, 2 days before estrus, the non-ciliated cells differentiate into two morphologically distinct types of secretory cells. One type forms when the apex of the non-ciliated cell dilates outward into the lumen of the cervix. Concurrent with apical enlargement, the microvilli are lost and the limiting cell membrane becomes smooth. The other type of cell is characterized by only a slight apical swelling. Consequently, remnants of microvilli along with secretory granules can be observed on the limiting membrane of this cell. Both cells release a particulate component, which is believed to be a precursor of mucus, into the lumen of the cerix. These particles undergo a series of morphological transformations to form a fibrillar layer, generally referred to as 'cervical mucus', that covers the epithelial surface at estrus. One to 2 days following the onset of estrus, the fibers become more closely assoicated with amorphous material that begins to coagulate, thereby revealing the underlying ciliated and non-ciliated cells that characterize the cervix of the luteal-phage ewe.

The cervical mucus appears to have an important function in the process of

human reproduction. In response to stimulation by estrogen, cervical

glands produce increasing amounts of a characteristic mucoid secretion. 16

At the peak of this secretory activity, prior to ovulation, these glands produce copious amounts of a thin, isotonic mucus which is easily penetrated

by the sperm. 5 , 7, 15, 16 Progesterone, on the other hand, is known to bring

about both quantitative and qualitative alterations in the cervical secretion.

During the luteal phase of the menstrual cycle, cervical mucus has been

shown to become scanty in amount, as well as viscous and cellular. During

the progestational phase also, such properties as spinnbarkeit and crystallization of the cervical mucus, which characterize estrogen stimulation, are

markedly reduced or absent and consequently sperm migration is inhibited.

Since endogenous progesterone causes an inhibition of sperm migration

through cervical mucus, exogenously administered progestins, as prescribed

for oral contraception, might be expected to have a similar effect.

1b) Development of the Breast

The newborn baby has nipples, areolas, and the beginnings of breast tissue, but most of breast development occurs in two different periods of time in a woman's life: first in puberty , then during pregnancy. Breast development is a vital part of puberty in the human female. Interestingly, humans are the only mammals whose breasts develop before they are needed to serve their biological purpose breastfeeding.

Breast development occurs in five stages:

Stage One: In preadolescence, the breasts are flat and only the tip of the nipple is raised.

Stage Two: Buds appear, breast and nipple are raised, fat tissue begins to form and the areola (dark area of skin that surrounds the nipple) enlarges.

Stage Three: Breasts are slightly larger with glandular breast tissue present. Initially this happens in a conical shape and later in a rounder shape. The areola begins to darken.

Stage Four: The nipple and areola become raised and form a second mound above the rest of the breast. Menstruation typically starts within two years of reaching this stage, and some girls skip this stage completely.

Stage Five: Mature adult breast is rounded and only the nipple is raised.

The cyclic changes in the Breast

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.

2) Menstrual Cycle

Menstruation is the shedding of the lining of the uterus (endometrium) accompanied by bleeding. It occurs in approximately monthly cycles throughout a woman's reproductive life, except during pregnancy. Menstruation starts during puberty (at menarche) and stops permanently at menopause.

By definition, the menstrual cycle begins with the first day of bleeding, which is counted as day 1. The cycle ends just before the next menstrual period. Menstrual cycles normally range from about 25 to 36 days. Only 10 to 15% of women have cycles that are exactly 28 days. Also, in at least 20% of women, cycles are irregular. That is, they are longer or shorter than the normal range. Usually, the cycles vary the most and the intervals between periods are longest in the years immediately after menstruation starts (menarche) and before menopause.

Menstrual bleeding lasts 3 to 7 days, averaging 5 days. Blood loss during a cycle usually ranges from 1/2 to 2 1/2 ounces. A sanitary pad or tampon, depending on the type, can hold up to an ounce of blood. Menstrual blood, unlike blood resulting from an injury, usually does not clot unless the bleeding is very heavy.

The menstrual cycle is regulated by hormones. Luteinizing hormone and follicle-stimulating hormone, which are produced by the pituitary gland, promote ovulation and stimulate the ovaries to produce estrogen and progesterone. Estrogen and progesterone stimulate the uterus and breasts to prepare for possible fertilization.

The menstrual cycle has three phases:

-Follicular (before release of the egg)

-Ovulatory (egg release)

-Luteal (after egg release)

The menstrual cycle begins with menstrual bleeding (menstruation), which marks the first day of the follicular phase.

When the follicular phase begins, levels of estrogen and progesterone are low. As a result, the top layers of the thickened lining of the uterus (endometrium) break down and are shed, and menstrual bleeding occurs. About this time, the follicle-stimulating hormone level increases slightly, stimulating the development of several follicles in the ovaries. Each follicle contains an egg. Later in this phase, as the follicle-stimulating hormone level decreases, only one follicle continues to develop. This follicle produces estrogen.

The ovulatory phase begins with a surge in luteinizing hormone and follicle-stimulating hormone levels. Luteinizing hormone stimulates egg release (ovulation), which usually occurs 16 to 32 hours after the surge begins. The estrogen level decreases during the surge, and the progesterone level starts to increase.

During the luteal phase, luteinizing hormone and follicle-stimulating hormone levels decrease. The ruptured follicle closes after releasing the egg and forms a corpus luteum, which produces progesterone. During most of this phase, the estrogen level is high. Progesterone and estrogen cause the lining of the uterus to thicken more, to prepare for possible fertilization.

If the egg is not fertilized, the corpus luteum degenerates and no longer produces progesterone, the estrogen level decreases, the top layers of the lining break down and are shed, and menstrual bleeding occurs (the start of a new menstrual cycle).

If the egg is fertilized, the corpus luteum continues to function during early pregnancy. It helps maintain the pregnancy.