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**BREASTS:**

**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 for. 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.**

**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.**

**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.**

**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.**

**VAGINA:**

**The vaginal epithelium is the inner lining of the vagina consisting of multiple layers of (squamous) 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, the vaginal epithelium is subject to normal, cyclic changes, that are influenced by estrogen: with increasing circulating levels of the hormone, 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 and melanocytes are also present in the epithelium. The epithelium of the ectocervix 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, the parabasal cells, the superficial squamous flat cells, and the intermediate cells. The superficial cells exfoliate continuously and basal cells replace the superficial cells that die and slough off from the stratum corneum. Under the stratus corneum is the stratum granulosum and stratum spinosum. 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.** **The epithelium of the vagina originates from three different precursors during embryonic and fetal development. These are the vaginal squamous epithelium of the lower vagina, the columnar epithelium of the endocervix, and the squamous epithelium of the upper vagina. The distinct origins of vaginal epithelium may impact the understanding of vaginal anomalies. Vaginal adenosis is a vaginal anomaly traced to displacement of normal vaginal tissue by other reproductive tissue within the muscular layer and epithelium of the vaginal wall. This displaced tissue often contains glandular tissue and appears as a raised, red surface.**

**Cyclic variations[edit]**

**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**

**2. Menstrual cycle:**

**Menstruation is the technical term for getting your period. About once a month, females who have gone through puberty will experience menstrual bleeding. This happens because the lining of the uterus has prepared itself for a possible pregnancy by becoming thicker and richer in blood vessels. If pregnancy does not occur, this thickened lining is shed, accompanied by bleeding. Bleeding usually lasts for 3-8 days. For most women, menstruation happens in a fairly regular, predictable pattern. The length of time from the first day of one period to the first day of the next period normally ranges from 21-35 days.**

**How does the menstrual cycle work?**

**The menstrual cycle is controlled by a complex orchestra of hormones, produced by two structures in the brain, the pituitary gland and the hypothalamus along with the ovaries.**

**If you just want a quick, general overview of the menstrual cycle, read this description.**

**For a more detailed review of the physical and hormonal changes that happen over the menstrual cycle, click here.**

**General overview of the menstrual cycle:**

**The menstrual cycle includes several phases. The exact timing of the phases of the cycle is a little bit different for every woman and can change over time.**

**Cycle days (approximate) Events of the menstrual cycle**

**Days 1-5**

**The first day of menstrual bleeding is considered Day 1 of the cycle.**

**Your period can last anywhere from 3 to 8 days, but 5 days is average.**

**Bleeding is usually heaviest on the first 2 days.**

 **Days 6-14**

**Once the bleeding stops, the uterine lining (also called the endometrium) begins to prepare for the possibility of a pregnancy.**

**The uterine lining becomes thicker and enriched in blood and nutrients.**

 **Day 14-25**

**Somewhere around day 14, an egg is released from one of the ovaries and begins its journey down the fallopian tubes to the uterus.**

**If sperm are present in the fallopian tube at this time, fertilization can occur.**

**In this case the fertilized egg will travel to the uterus and attempt to implant in the uterine wall.**

 **Days 25-28**

**If the egg was not fertilized or implantation does not occur, hormonal changes signal the uterus to prepare to shed its lining, and the egg breaks down and is shed along with lining.**

**The cycle begins again on Day 1 menstrual bleeding.**

**Comprehensive explanation of the menstrual cycle:**

**The menstrual cycle has three phases:**

**1. Follicular Phase (Days 1-14)**

**This phase of the menstrual cycle occurs from approximately day 1-14. Day 1 is the first day of bright red bleeding, and the end of this phase is marked by ovulation. While menstrual bleeding does happen in the early part of this phase, the ovaries are simultaneously preparing to ovulate again. The pituitary gland (located at the base of the brain) releases a hormone called FSH – follicle stimulating hormone. This hormone causes several ‘follicles’ to rise on the surface of the ovary. These fluid filled “bumps” each contain an egg. Eventually, one of these follicle becomes dominant and within it develops a single mature egg; the other follicles shrink back. If more than one follicle reaches maturity, this can lead to twins or more. The maturing follicle produces the hormone estrogen, which increases over the follicular phase and peaks in the day or two prior to ovulation. The lining of the uterus (endometrium) becomes thicker and more enriched with blood in the second part of this phase (after menstruation is over), in response to increasing levels of estrogen. High levels of estrogen stimulate the production of gonadotropin-releasing hormone (GnRH), which in turn stimulates the pituitary gland to secrete luteinizing hormone (LH). On about day 12, surges in LH and FSH cause the egg to be released from the follicle. The surge in LH also causes a brief surge in testosterone, which increases sex drive, right at the most fertile time of the cycle.**

**2. Ovulatory Phase (Day 14)**

**The release of the mature egg happens on about day 14 as a result of a surge in LH and FSH over the previous day. After release, the egg enters the fallopian tube where fertilization may take place, if sperm are present. If the egg is not fertilized, it disintegrates after about 24 hours. Once the egg is released, the follicle seals over and this is called the corpus luteum.**

**3. Luteal Phase (Days 14-28)**

**After the release of the egg, levels of FSH and LH decrease. The corpus luteum produces progesterone. If fertilization has occurred, the corpus luteum continues to produce progesterone which prevents the endometrial lining from being shed. If fertilization has not occurred, the corpus luteum disintegrates, which causes progesterone levels to drop and signals the endometrial lining to begin shedding.**

**What is normal bleeding?**

**There is a range of normal bleeding – some women have short, light periods and others have longer, heavy periods. Your period may also change over time.**

**Normal menstrual bleeding has the following features:**

**.Your period lasts for 3-8 days**

**.Your period comes again every 21-35 days (measured from the first day of one period to the first day of the next)**

**.The total blood loss over the course of the period is around 2-3 tablespoons but secretions of other fluids can make it seem more**