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CYCLIC CHANGES IN THE BREAST

What is normal breast development?

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.

When does breast development begin?

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 breast changes happen 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 time 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.

What cyclical changes happen to the breasts during the 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 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.

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.

CYCLIC CHANGES IN THE CERVIX

Cyclic changes in the cervical mucus as an indication of ovarian function.

Ovarian function can be assessed clinically by the secondary cell characteristics and by the condition of the pelvic tissues. More precise measurement of ovarian activity can be made by vagina cytology, by endometrial histology or by steroid excretion. An additional means of assessment is by study of the changes in cervical mucus. Because the technique of sampling the mucus and interpretation of the findings are relatively simple, the method deserves to be more widely used in routine clinical practice.

The mucus changes rhythmically throughout the cycle in response to ovarian function. Between the post-menstrual and the mid-cycle phase the quantity of mucus increases ten times and the maximum at mid-cycle precedes the rise in basal temperature by 1-3 days. At this time the mucus is very elastic, showing maximum spinnbarkeit and the sperm will penetrate readily. The secretion of cervical mucus is stimulated by estrogen and inhibited by progesterone. If the mucus is spread on a slide and left to dry it shows a crystal pattern which is maximal about ovulation; at other times of the cycle, in pregnancy or after the menopause, crystallization is reduced or absent. This crystallization has been described as resembling fern or palm leaves. Progesterone exerts an inhibitory effect on the crystals as on the mucus itself.

It was observed that mucus was a more sensitive indicator of estrogen activity than the vagina epithelium.

STUDY OF CERVICAL MUCUS IN THE NORMAL CYCLE.

In order to study more closely the relationship between ovarian activity and changes in the cervical mucus, and to record the normal fern pattern through the menstrual cycle, samples of mucus were taken from 300 normal women. A vagina cytology smear and an endometrial biopsy were taken at the same time for comparison and the day of the cycle was already noted. In this way a series of representative specimen was obtained covering each phase of the cycle.

THE MENSTRUAL CYCLE

What's 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. If ovulation takes place and the egg isn't fertilized, the lining of the uterus sheds through the vagina. This is a menstrual period.

What's normal?

The menstrual cycle, which is counted from the first day of one period to the first day of the next, isn't the same for every woman. Menstrual flow might occur every 21 to

35 days and last two to seven days. For the first few years after menstruation begins, long cycles are common. However, menstrual cycles tend to shorten and become more regular as you age.

Your menstrual cycle might be regular — about the same length every month — or somewhat irregular, and your period might be light or heavy, painful or pain-free, long or short, and still be considered normal. Within a broad range, "normal" is what's normal for you.

Keep in mind that use of certain types of contraception, such as extended-cycle birth control pills and intrauterine devices (IUDs), will alter your menstrual cycle. Talk to your health care provider about what to expect.

When you get close to menopause, your cycle might become irregular again. However, because the risk of uterine cancer increases as you age, discuss any irregular bleeding around menopause with your health care provider.

How can I track my menstrual cycle?

To find out what's normal for you, start keeping a record of your menstrual cycle on a calendar. Begin by tracking your start date every month for several months in a row to identify the regularity of your periods.

If you're concerned about your periods, then also make note of the following every month:

- **End date.** How long does your period typically last? Is it longer or shorter than usual?

- **Flow.** Record the heaviness of your flow. Does it seem lighter or heavier than usual? How often do you need to change your sanitary protection? Have you passed any blood clots?

- **Abnormal bleeding.** Are you bleeding in between periods?

- **Pain.** Describe any pain associated with your period. Does the pain feel worse than usual?

- **Other changes.** Have you experienced any changes in mood or behavior?

Did anything new happen around the time of change in your periods?

What causes menstrual cycle irregularities?

Menstrual cycle irregularities can have many different causes, including:

- **Pregnancy or breast-feeding.** A missed period can be an early sign of pregnancy. Breast-feeding typically delays the return of menstruation after pregnancy.

- **Eating disorders, extreme weight loss or excessive exercising.** Eating disorders — such as anorexia nervosa — extreme weight loss and increased physical activity can disrupt menstruation.

- **Polycystic ovary syndrome (PCOS).** Women with this common endocrine system disorder may have irregular periods as well as enlarged ovaries that contain small collections of fluid — called follicles — located in each ovary as seen during an ultrasound exam.

- **Premature ovarian failure.** Premature ovarian failure refers to the loss of normal ovarian function before age 40. Women who have premature ovarian failure — also known as primary ovarian insufficiency — might have irregular or occasional periods for years.

- **Pelvic inflammatory disease (PID).** This infection of the reproductive organs can cause irregular menstrual bleeding.

- **Uterine fibroids.** Uterine fibroids are noncancerous growths of the uterus. They can cause heavy menstrual periods and prolonged menstrual periods.

What can I do to prevent menstrual irregularities?

For some women, use of birth control pills can help regulate menstrual cycles.

Treatment for any underlying problems, such as an eating disorder, also might help.

However, some menstrual irregularities can't be prevented.

In addition, consult your health care provider if:

- Your periods suddenly stop for more than 90 days — and you're not pregnant
- Your periods become erratic after having been regular

- You bleed for more than seven days
- You bleed more heavily than usual or soak through more than one pad or tampon every hour or two
- Your periods are less than 21 days or more than 35 days apart
- You bleed between periods
- You develop severe pain during your period
- You suddenly get a fever and feel sick after using tampons