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Ovulation Primer

Background

Up to half of all infertile women have ovulatory problems. Sometimes the ovary cannot produce a mature egg to release. This can happen even if the woman has regular cyclic periods. This condition is called *anovulation*. Just because a woman has regular cycles does not mean she is ovulating. Ovulation drugs or “fertility drugs” work to increase the chance that a follicle matures and allows an egg to be released. Ovulation drugs can control the time of ovulation, produce multiple eggs, and improve hormone production to allow a successful implantation of the egg if it is fertilized. They may also make a woman’s cycles more regular and predictable. This then increases a woman’s chance of getting pregnant. These drugs only work when taken during that particular cycle.

What is ovulation?

Ovulation is when one or more eggs are released by the ovary resulting in the fertile time of the menstrual cycle. This typically occurs once a month. Many eggs attempt to mature inside the ovary each month and the dominant follicle (cystic structure), usually the largest, grows and ruptures to expel an egg into the pelvic cavity. The fallopian tube with its finger-like ends called the fimbria then sweeps the egg inside of it to travel towards the uterus. Which ovary releases the egg varies and is unpredictable. There is no set rotation of the ovaries.

Normal Ovulation

To ovulate one must have a normally functioning reproductive system able to communicate well with the brain. At least one functioning ovary is needed and preferably two. The ovaries are two small glands the size of dried apricots. They are located in a woman’s pelvic cavity below your pubic bone and towards the sides. They are attached to the uterus that sits in the middle of the pelvis also below the pubic bone and under the bladder. The uterus has two tunnels, one per side that connects the inside of the uterus to the outside of the uterus. This canal connects the pelvic cavity to the uterine cavity. These tunnels are called fallopian tubes. At the end of the fallopian tubes away from the uterus are finger-like projections called fimbria. They sweep the pelvis to find and pick up eggs released by the ovarian follicle. An egg released by the left ovary may be picked

up by the right fallopian tube and vice versa. As the egg travels down the fallopian tube it may meet sperm and become fertilized. This usually occurs in the tube and results in the formation of an embryo, or fertilized egg. This embryo starts its division and may take four to five more days for it to reach the uterine cavity and implant in the endometrium (uterine lining). The endometrium becomes the conduit for the nourishment of the embryo. If there is no fertilization then the egg is absorbed by the woman's body.

Hormone Production

The ovaries produce hormones as well as eggs. Hormones are substances secreted from organs such as ovaries, pituitary glands, thyroid, which are carried by blood or other fluids to other tissues or organs to exert an effect or action.

Follicular Phase is the first phase when an egg matures inside the ovary. A layer of hormone-producing cells and fluid surrounds the egg. This complex of egg and fluid is called a *follicle*. This follicle grows on the surface of the ovary and looks like a one-inch sac of fluid that then ruptures to release the egg and fluid. In natural cycles many follicles may develop but only one follicle reaches maturity each month to release its egg. This dominant follicle secretes a female hormone called estradiol into the bloodstream. This estrogen stimulates the uterus to thicken its lining in preparation for a possible pregnancy. This thickening of the endometrium can be seen on an ultrasound study.

Luteal Phase follows when ovulation occurs typically at day 14 of a 28-day cycle. The ruptured follicle involutes and collapses, turns yellowish and is called the *corpus luteum*. The corpus luteum secretes estrogen and large quantities of progesterone throughout the second half of the cycle and lasts about two weeks. The secreted estrogen and progesterone helps stimulate the maturing of endometrial cells to support a potential embryo. If no pregnancy occurs then the endometrium is shed as a menstrual flow. The first day of bleeding is known as Day 1 of a cycle. The length of a menstrual cycle is from Day 1 of one cycle to Day 1 of the next cycle. The average is 28 days. Both follicular and luteal phase can vary in length. A luteal phase should last 11 to 16 days. If the length is too short then inadequate progesterone is made and fertility may be compromised. Ovulation usually precedes menstruation by two weeks. Therefore, to find the most likely time of ovulation, you make a best guess of when your next period will start and count back 14 days. For example, if a woman has a 32-day cycle the most likely day to ovulate is Day 18.

The Brain

The hypothalamus and pituitary gland control the events of ovulation. Hormones produced by these glands travel the bloodstream to reach the ovaries and direct its actions. The hypothalamus is the size of a dried apricot like the ovary. It sits in the base of the brain and controls many functions. It also controls the pituitary

gland. The pituitary gland is a pea size gland sitting right under the hypothalamus. The hypothalamus releases the hormone gonadotropin-releasing hormone (GnRH), a messenger that tells the pituitary to release follicle stimulating hormone (FSH) and luteinizing hormone (LH). Both FSH and LH are involved in maturing the follicle. FSH makes the follicle grow and produce increasing amounts of estrogen. Increasing estrogen then signals the pituitary to shut down the FSH production. Near mid-cycle, an LH surge triggers ovulation. After ovulation, the former follicle involutes and turns into the corpus luteum, which produces progesterone that prepares the endometrium for implantation of a possible embryo.

How does ovulation predict pregnancy chances?

There is a very brief period of time when a woman can get pregnant. Sperm can live for two to three days but an egg survives for only about 24 hours after ovulation. Hence, the one to two day period before ovulation to about 24 hour after ovulation is the time period sexual intercourse should occur. Sex near the time of ovulation obviously increases the chances of getting pregnant. Most normal couples have a 15 to 25 percent chance of getting pregnant each cycle if no contraception is used. Within one year the chance of getting pregnant is about 85 percent in these women.

How can I tell when I'm ovulating?

First, purchase a calendar that you can use to record your symptoms and times of menstrual bleeding. Find the date when your next period is due to start and count back 12 to 16 days. This will give you the range of when you most probably will ovulate. The average woman has a 28-day cycle and day 14 is the most common date of ovulation. When physicians say "Day 3" or "Day 14" or "Day 24" it simply means you count your first day of bleeding as Day 1 and go from there. It does not mean the third day of the month or the 14th day of the month or the 24th day of the month. Physicians do not use the day of the month. They use the day of the cycle itself.

You will need to be attuned to your body and learn the signs that ovulation is coming.

Cervical Mucus increases in volume and texture. As estrogen rises towards the middle of the cycle the cervical mucus becomes clear, thin, slippery, and stretchy. The texture of raw egg whites enables you to stretch the filmy mucus between your fingers to 8 centimeters or more. This mucus protects and feeds the sperm it its path through the cervix, to the uterus, and up the tube where it meets the egg. Sperm can live for 3-5 days in suitable cervical mucus. Birth control pills are largely successful because they make the cervical mucus thick and inhospitable to sperm.

Body temperature rises after ovulation by 0.5 to 1.6 degrees. You will not feel this temperature change but you can detect this rise using a

thermometer and plotting it on a chart. This is called a BBT chart, or Basal Body Temperature chart. This temperature is taken the first thing in the morning before any activity occurs. A thermometer and BBT chart are placed right beside the bed and the first activity of the day is put the thermometer in the mouth and records this temperature. The temperature spike is due to an increase in progesterone that occurs when an egg is released.

Low abdominal pain occurs in 20% of women who ovulate. This pain can be a mild twinge of pain on one side of the lower abdomen to a very distinct sharp stabbing pain caused by the physical rupture of the cystic follicle containing the egg and the irritating fluid released. The pain can last several minutes to a few hours. The condition is called *Mittelschmerz*.

The window of fertility is two or three days before the BBT hits its high. You may have an additional 24 hours of fertility after you notice the creep-up in temperature but it may also be too late. It can take one to two days after ovulation for progesterone to achieve levels that raise body temperature. However, an egg survives only 24 hours and it may be too late to achieve pregnancy if sex occurs at the peak temperature. Experts recommend that temperature charting be done for several months to detect a pattern. Then if pregnancy is desired sex is planned during the two to three days before the anticipated day the temperature normally rises.

Ovulation Predictor Kits

Many kits are now available that predict the surge in LH (luteinizing hormone) just before ovulation. They range in price from \$20 to \$50. The kits give you a negative or positive response. They are easier and more convenient to use than the BBT method and can predict ovulation 24 to 36 hours in advance in the first month of use. They are also more costly and can have false LH surges detected. A surge in LH does not necessarily mean you will ovulate even if the kit turns positive. LH surges can occur without ovulation. For example, an LH surge occurs but the follicle does not rupture to release the egg. This is still interpreted as a positive LH surge although there is no chance of pregnancy since no egg was released.

Kits function mostly in similar manners. These tests typically are started on day 11 of a 28-day cycle and earlier if the cycles are shorter and later if the cycles are longer. For example, if your cycle is 35 days apart then start on day 14 and test for nine days. The kits are usually used for about six days on average. Many recommend using the second urine catch of the morning instead of the first one since urine can become concentrated overnight and may give false-positive results. If your cycles are irregular it can be very challenging and costly to use kits. A physician will need to get your cycles regular before kits are typically used.

Common Questions

Q. When does ovulations start?

A. Young girls typically start having menses at about age 13. However, this does not mean they are ovulating. It may take many more years of maturing of the hypothalamic-pituitary-ovarian axis before a young lady is ovulating on a regular basis.

Q. When does ovulation end?

A. The average age of menopause is 51.4 years. The normal range when ovulations stops are between ages 35 to 65.

Q. Can multiple follicles release more than one egg?

A. Yes. Fraternal twins occur when more than one egg is fertilized. They are distinctly different eggs that have been released by multiple follicles. This occurs more with ovarian stimulation with medications. Identical twins occur when the same fertilized egg splits into two.

Q. What do ovulation drugs do?

A. Ovulation drugs can help increase the production of progesterone to support the formation of adequate endometrial lining for implantation. Ovulation drugs also may stimulate the ovaries to produce more follicles able to provide an egg(s). Some types of drugs can help mature the follicle just at the right time and enable the release of the egg at the most opportune or convenient times.

Q. When should I see a specialist if I want to get pregnant.

A. A general rule of thumb is to see a reproductive endocrinologist after a year of unprotected intercourse without achieving pregnancy. This assumes you are having regular and cyclic periods. If you are not regular in your menstrual cycles you should see the specialist sooner. You should also see the specialist sooner if you are starting your family late.