

Presentation Notes: Male and Female Reproductive Systems

Female Fertility

When we talk about the menstrual cycle, we are really talking about fertility. For a woman, fertility means two things: the ability to get pregnant and the ability to sustain that pregnancy through delivery. Understanding the menstrual cycle really means understanding when a woman can and cannot get pregnant. Many people focus on understanding the period, and for good reason. That is the part of the cycle that can be seen and experienced directly. But when talking about the menstrual cycle, in many ways the period is the least important aspect of the process. The most important part is the time that a woman is releasing an egg (also called an ovum), a period called ovulation.

There are four main parts of woman's cycle:

- Preparing the body to get pregnant
- Releasing an egg
- Protecting a possible pregnancy
- Getting ready to start the process again (the period)

A quick note about hormones

There are many important hormones that are a part of this process. Hormones are chemical messengers from one part of the body telling the rest of the body that something is going on. When you hear people talk about the menstrual cycle, you might hear them talk about luteinizing hormones, follicular stimulating hormones, and others. For the sake of understanding the female body on a basic level, you really only need to know about two: estrogen and progesterone.

Ovary development

Before a female is born, cells in her developing ovaries begin meiosis but stop at the first phase, called prophase I. These cells are called oocytes.

The cells remain unchanged until a female begins puberty, usually between the ages of 9-13. During puberty, the female begins producing chemicals that cause oocytes to continue meiosis. The meiosis stops again at a second stage, called metaphase II. These cells are secondary oocytes also known as the egg cells. An egg cell does not complete meiosis until fertilization occurs.

Preparing the body to get pregnant

Before a woman releases an egg, her body needs to prepare to accept the egg and to help the man's sperm to meet the egg. Inside her ovaries are her eggs. Around the eggs is a structure called a follicle. In every cycle, many follicles activate and start maturing the egg inside of them. The egg grows and gets ready to be released. Usually, only one egg is released per cycle, but sometime more than one is released. To let the body know that it is about to release an egg, the follicle releases the hormone estrogen. The estrogen causes the uterus to start filling up with blood and nutrients to host a possible pregnancy. It also causes the cervix to open a little more, to help sperm enter, and to produce a fluid that is thin and stretchy. This fluid helps to keep sperm alive in her body and to transport sperm to the waiting egg. A woman can start producing this fluid, called fertile mucus, up to 5 or more days before ovulation. A man's sperm can live in her body up to 5 days if she is producing fertile mucus.

Releasing an egg

Eventually, one of the many eggs that are maturing is released by the follicle. The egg travels from the ovary and then rests in the fallopian tube. It will wait there for up to 24 hours. If the egg is not fertilized by sperm within 24 hours of being released, the egg will dissolve and be absorbed through the fallopian tube.

Sometimes a woman releases more than one egg during her cycle. If she does, the second egg will be released within 24 hours of the first egg. This means that she might have 2 days in her cycle that an egg exists and could be fertilized. The time before the release of an egg that she is making fertile mucus and that sperm can survive in her body (5 days) plus the day or two that an egg might be present to be fertilized by the man's sperm is called her **fertile time**. A woman can only get pregnant for 7 days out of her entire cycle. Most women, however, do not have an accurate understanding of this process and do not know how to tell which 7 days in their cycle are their fertile time. If one is having sex and is trying to prevent a pregnancy, but has not had proper training in fertility awareness, it is wise to assume that a woman can get pregnant at any time in her cycle and always use another method of birth control.

Protecting a possible pregnancy

The follicle's job is not done after it releases an egg. Once the egg is released, the follicle becomes a new structure called the corpus luteum (Latin for "yellow body"). The corpus luteum sends out two hormones; the first is estrogen, which continues to tell the body to produce blood and nutrients in the uterus for a possible pregnancy. The second is progesterone. Progesterone is important because it causes the body to hold the endometrium in place. The endometrium is the lining of the uterus that fills up with blood and nutrients to support a possible pregnancy.

If an egg is fertilized, it will take 7 or 8 days to travel down into the uterus and attach to the endometrium. This is called implantation. The medical definition of a pregnancy is a fertilized egg that has implanted in the uterus. The progesterone from the corpus luteum also causes the body to close the cervix to keep out more sperm and bacteria. Both the holding of the endometrium in place and the closing of the cervix protect a possible pregnancy.

Getting ready to start the process again (the period)

The corpus luteum will produce progesterone for about 2 weeks. If the corpus luteum does not receive a signal that there is an actual pregnancy, it will stop making progesterone. Without progesterone, the body will stop holding the endometrium in place, and all the blood and nutrients stored in the uterus are shed, or let go. This is the menstrual blood, also called a period. And now the process can begin again.

If the corpus luteum does receive a signal that there is an actual pregnancy, it will continue to make progesterone. The body will hold the endometrium in place and support the pregnancy. There is no release of the blood and nutrients in the body because they are nourishing the pregnancy. In other words, there is no period.

- Each milliliter of semen contains millions of sperm, but the majority of the volume consists of secretions of the glands in the male reproductive organs.¹
- During each normal menstrual cycle, one egg (ovum) is usually released from one of the ovaries about 14 days before the next menstrual period. Release of the egg is called ovulation. The egg is swept into the funnel-shaped end of one of the fallopian tubes.

At ovulation, the mucus in the cervix becomes more fluid and more elastic, allowing sperm to enter the uterus rapidly. Within 5 minutes, sperm may move from the vagina, through the cervix into the uterus, and to the funnel-shaped end of a fallopian tube—the usual site of fertilization. The cells lining the fallopian tube facilitate fertilization.

Sperm Development

The development of sperm, also known as spermatogenesis, is a process of cell division. First the germ cells, spermatogonia divide and produce spermatocytes. These re-divide twice to form young sperm cells called spermatids. The spermatids mature and transform into

spermatozoa, or sperm cells. They lose excess cytoplasm from the head and grow a tail. Each sperm uses the mitochondria it contains to power its tail during the journey to fertilize an egg. Each mature sperm has several parts that help it reach and penetrate an egg: acrosome, mitochondria, tail, and head (including the nucleus). If a sperm penetrates the egg, fertilization results.

Tiny hair-like cilia lining the fallopian tube propel the fertilized egg (zygote) through the tube toward the uterus. The cells of the zygote divide repeatedly as the zygote moves down the fallopian tube. The zygote enters the uterus in 3 to 5 days. In the uterus, the cells continue to divide, becoming a hollow ball of cells called a blastocyst. If fertilization does not occur, the egg degenerates and passes through the uterus with the next menstrual period.

If more than one egg is released and fertilized, the pregnancy involves more than one fetus, usually two (twins). Such twins are fraternal. Identical twins result when one fertilized egg separates into two embryos after it has begun to divide.

Development of the Blastocyst

Between 5 and 8 days after fertilization, the blastocyst attaches to the lining of the uterus, usually near the top. This process, called implantation, is completed by day 9 or 10. ²