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- MATRIC. NUMBER: 18/MHS01/227

1.
Ovulation refers to the release of an egg during menstruation in females.

Part of the ovary called the ovarian follicle discharges an egg. The egg is also known as an ovum, oocyte, or female gamete. It is only released on reaching maturity.

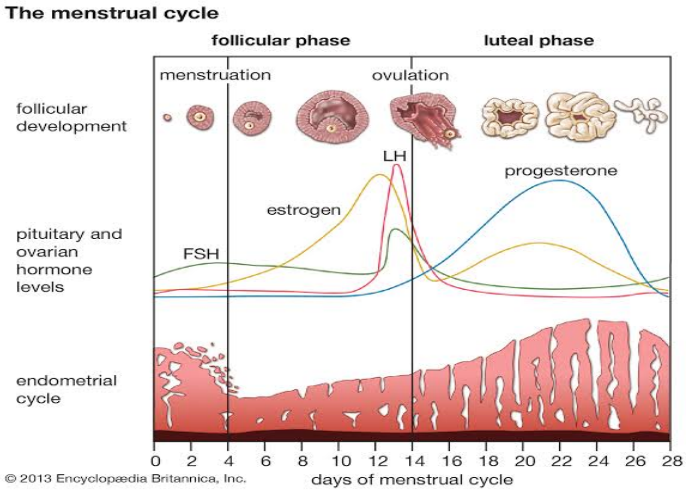
After release, the egg travels down the fallopian tube, where it may be met by a sperm and become fertilized.

Ovulation and hormonal release during the menstrual cycle are controlled by a part of the brain called the hypothalamus. It sends signals instructing the anterior lobe and pituitary gland to secrete luteinizing hormone (LH) and follicle- stimulating hormone (FSH).

It is useful to know when ovulation is likely to occur, as a woman is most fertile during this time, and more likely to conceive.

Phases

Ovulation is the release of an egg, or ovum, which may then be fertilized by a sperm cell or dissolved during menstruation.
The ovulation process is defined by a period of elevated hormones during the menstrual cycle. It can be divided into 3 phases:



.The per ovulatory or follicular phase: A layer of cells around the ovum begins to mucify, or become more like mucus, and expand. The uterus lining begins to thicken.

.The ovulatory phase: Enzymes are secreted and form a hole, or stigma. The ovum and its network of cells use the stigma to move into the fallopian tube. This is the period of fertility and usually lasts from 24 to 48 hours.

.~~The post ovulatory or luteal phase: LH is secreted. A fertilized egg will be implanted into~~

the womb, while an unfertilized egg slowly stops producing hormones and dissolves within 24 hours.
The lining of the uterus also begins to break down and prepares to exit the body during menstruation, or menses.

When does it occur?
A woman's menses lasts on average between 28 and 32 days.

The beginning of each cycle is considered to be the first day of the menses. Release of the egg generally occurs 12 to 16 days before the next period is due.

Most women begin to menstruate between the ages of 10 to 15 years. At the same time, they begin to ovulate and become able to conceive. This is a time referred to as the menarche.

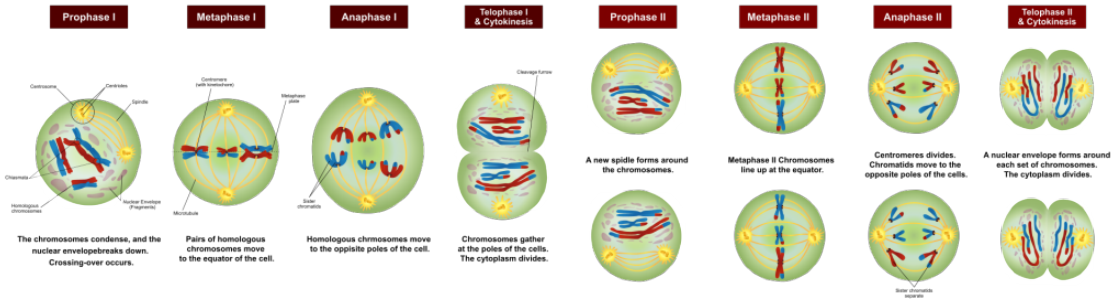
Ovulation typically stops after menopause, between the ages of around 50 to 51 years on average, but it still occurs in the time leading up to menopause. This is referred to as peri-menopause

2.

.In meiosis I, homologous chromosomes separate, while in meiosis II, sister chromatids separate.
.Meiosis II produces 4 haploid daughter cells, whereas Meiosis I produces 2 diploid daughter cells.
.Genetic recombination (crossing over) only occurs in meiosis I

Explanation:
Meiosis is a way sex cells (gametes) divide. Since sex cells determine the genetic code of offspring, meiosis attempts to create unique combinations of chromosomes in gametes.

Meiosis I is the first stage of this cell division, where pairs of chromosomes are split up. We can see how the process occurs in the following diagram:

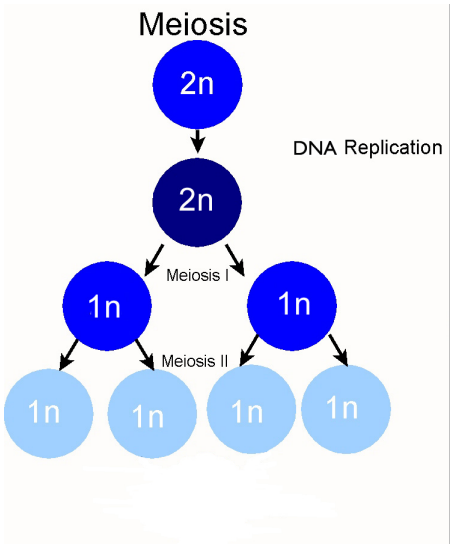


Looking at the diagram, you might notice there are a lot of differences between meiosis I and meiosis II, including:

In meiosis I, homologous chromosomes separate, while in meiosis II, sister chromatids separate. Meiosis II produces 4 haploid daughter cells, whereas meiosis I produces 2 diploid daughter cells. Genetic recombination (crossing over) only occurs in meiosis I.
If you didn't understand any of those difference or didn't notice them, it's okay, because I'm going to explain it below in detail:

Diploid Cells have two sets of chromosomes, while Haploid Cells have only one set of chromosomes. Here's how the chromatids and chromosomes split in meiosis, in terms of n.

The cell has 2 pairs of chromosomes after DNA replication, and 1 pair of chromatids is distributed to each cell during meiosis I. In meiosis II the daughter cells now have 1 chromatid each.

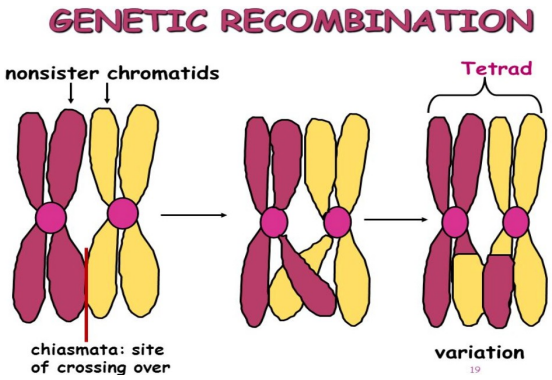


In meiosis II, there are 4 daughter cells produced, whereas in meiosis I, there are 2 daughter cells produced.

However, notice in the above image the chromosomes in each daughter cell. For meiosis II, the daughter cells have only one set of chromosomes.

However, the cells in meiosis I have two sets of chromosomes. The first stage of meiosis II splits the pair of homologous chromosomes apart, so that 2 pairs of chromosomes are left, while the second stage splits each pair of sister chromatids to have half the number of chromosomes a normal cell would have, and is therefore haploid.

Also, genetic recombination only occurs in meiosis I. Genetic recombination occurs when two chromosomes exchange certain sections of their DNA to produce genetically unique genetic combinations.



However, since the gene combinations produced in meiosis I are already genetically unique, the chromosomes in meiosis II do not undergo genetic recombination a second time.

There are other differences, like differences in the equatorial plane and convergent arms, but these three are the most important ones.

3.
Fertilization
During each normal menstrual cycle, one egg (ovum) is usually released from one of the ovaries, about 14 days after the last 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.

If fertilization does not occur, the egg moves down the fallopian tube to the uterus, where it degenerates, and passes through the uterus with the next menstrual period.

If a sperm penetrates the egg, fertilization results. Tiny hairlike 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 to the uterus. The zygote enters the uterus in 3 to 5 days.

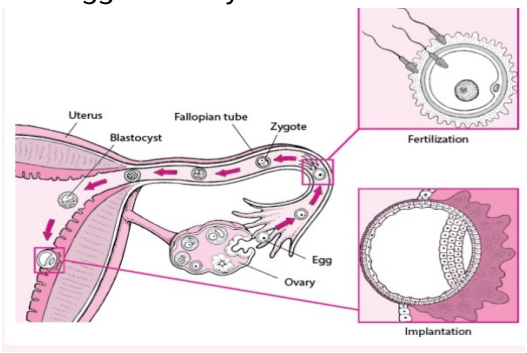
In the uterus, the cells continue to divide, becoming a hollow ball of cells called a blastocyst. The blastocyst implants in the wall of the uterus about 6 days after fertilization.

If more than one egg is released and fertilized, the pregnancy involves more than one fetus, usually two (twins). Because the genetic material in each egg and in each sperm is slightly different, each fertilized egg is different. The resulting twins are thus fraternal twins. Identical twins result when one fertilized egg separates into two embryos after it has begun to divide. Because one egg was fertilized by one sperm, the genetic material in the two embryos is the same.

From Egg to Embryo
Once a month, an egg is released from an ovary into a fallopian tube. After sexual intercourse, sperm move from the vagina through the cervix and uterus to the fallopian tubes, where one sperm fertilizes the egg. The fertilized egg (zygote) divides repeatedly as it moves down the fallopian tube to the uterus. First, the zygote becomes a solid ball of cells. Then it becomes a hollow ball of cells called a blastocyst.

Inside the uterus, the blastocyst implants in the wall of the uterus, where it develops into an embryo attached to a placenta and surrounded by fluid- filled membranes.

From Egg to Embryo



.Development of the Blastocyst
About 6 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.

The wall of the blastocyst is one cell thick except in one area, where it is three to four cells

thick. The inner cells in the thickened area develop into the embryo, and the outer cells burrow into the wall of the uterus and develop into the placenta. The placenta produces several hormones that help maintain the pregnancy. For example, the placenta produces human chorionic gonadotropin, which prevents the ovaries from releasing eggs and

stimulates the ovaries to produce estrogen and progesterone continuously. The placenta also carries oxygen and nutrients from mother to fetus and waste materials from fetus to mother.

Some of the cells from the placenta develop into an outer layer of membranes (chorion) around the developing blastocyst. Other cells develop into an inner layer of membranes (amnion), which form the amniotic sac. When the sac is formed (by about day 10 to 12), the blastocyst is considered an embryo. The amniotic sac fills with a clear liquid (amniotic fluid) and expands to envelop the developing embryo, which floats within it.

.Development of the Embryo
The next stage in development is the embryo, which develops within the amniotic sac, under the lining of the uterus on one side. This stage is characterized by the formation of most internal organs and external body structures. Most organs begin to form about 3 weeks after fertilization, which equals 5 weeks of pregnancy (because doctors date pregnancy from the first day of the woman's last menstrual period, which is typically 2 weeks before fertilization). At this time, the embryo elongates, first suggesting a human shape. Shortly thereafter, the area that will become the brain and spinal cord (neural tube) begins to develop. The heart and major blood vessels begin to develop earlier—by about day 16. The heart begins to pump fluid through blood vessels by day 20, and the first red blood cells appear the next day. Blood vessels continue to develop in the embryo and placenta.

Almost all organs are completely formed by about 10 weeks after fertilization (which equals 12 weeks of pregnancy). The exceptions are the brain and spinal cord, which continue to form and develop throughout pregnancy. Most malformations (birth defects) occur during the period when organs are forming. During this period, the embryo is most vulnerable to the effects of drugs, radiation, and viruses. Therefore, a pregnant woman should not be given any live-virus vaccinations or take any drugs during this period unless they are considered essential to protect her health (see Drug Use During Pregnancy).

Placenta and Embryo at About 8 Weeks
At 8 weeks of pregnancy, the placenta and fetus have been developing for 6 weeks. The placenta forms tiny hairlike projections (villi) that extend into the wall of the uterus. Blood vessels from the embryo, which pass through the umbilical cord to the placenta, develop in the villi.

A thin membrane separates the embryo's blood in the villi from the mother's blood that flows through the space surrounding the villi (intervillous space). This arrangement does the following:

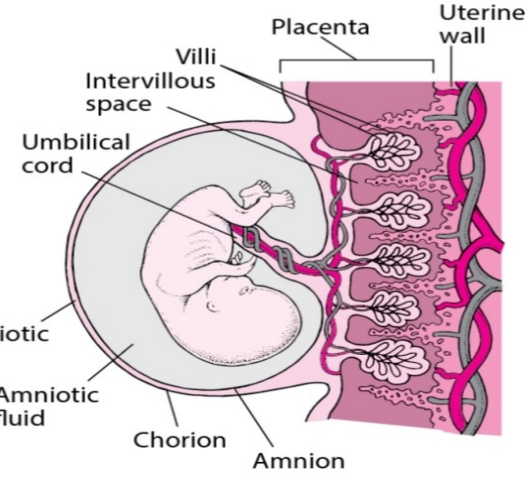
Allows materials to be exchanged between the blood of the mother and that of the embryo
Prevents the mother's immune system from attacking the embryo because the mother's antibodies are too large to pass through the membrane (antibodies are proteins produced by the immune system to help defend the body against foreign substances)
The embryo floats in fluid (amniotic fluid), which is contained in a sac

(amniotic sac). The amniotic fluid does the following:

Provides a space in which the embryo can grow freely Helps protect the embryo from injury
The amniotic sac is strong and

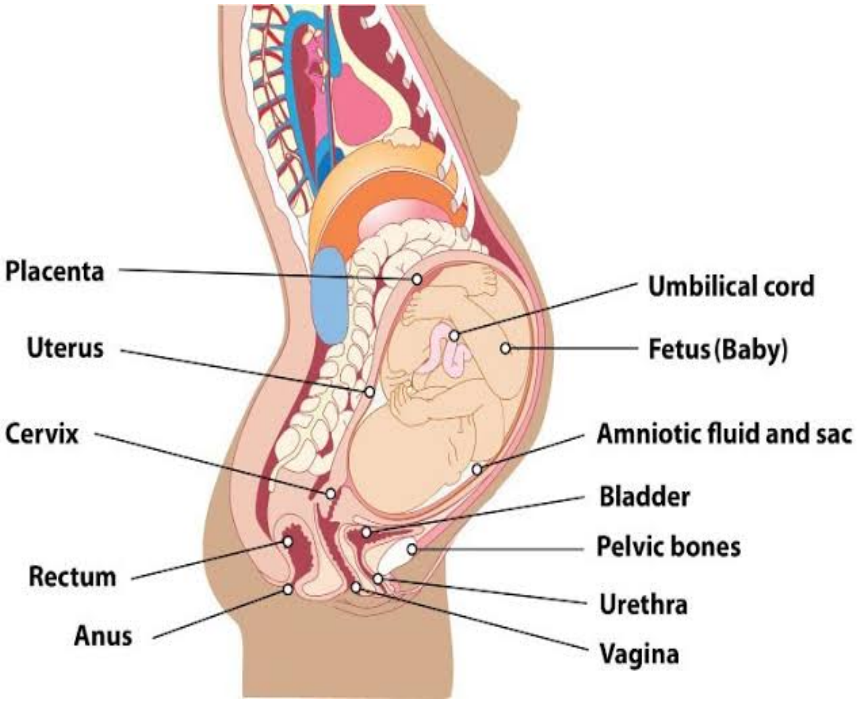
resilient. Placenta and Embryo

at About 8 Weeks



.Development of the Fetus and Placenta
At the end of the 8th week after fertilization (10 weeks of pregnancy), the embryo is considered a fetus. During this stage, the structures that have already formed grow and develop. The following are markers during pregnancy:

By 12 weeks of pregnancy: The fetus fills the entire uterus. By about 14 weeks: The sex can be identified.
By about 16 to 20 weeks: Typically, the pregnant woman can feel the fetus moving. Women who have been pregnant before typically feel movements about 2 weeks earlier than women who are pregnant for the first time. By about 24 weeks: The fetus has a chance of survival outside the uterus.
The lungs continue to mature until near the time of delivery. The brain accumulates new cells throughout pregnancy and the first year of life after birth.



As the placenta develops, it extends tiny hair like projections (villi) into the wall of the uterus. The projections branch and rebranch in a complicated treelike arrangement. This arrangement greatly increases the area of contact between the wall of the uterus and the placenta, so that more nutrients and waste materials can be exchanged. The placenta is fully formed by 18 to 20 weeks but continues to grow throughout pregnancy. At delivery, it weighs about 1 pound.

4.

Twins are two offspring produced by the same pregnancy. Twins can be either monozygotic ("identical"), meaning that they develop from one zygote, which splits and forms two embryos, or dizygotic ("fraternal"), meaning that each twin develops from a separate egg and each egg is fertilized by its own sperm cell. This is because fraternal, or dizygotic, twins are 2 separate fertilized eggs, they usually develop 2 separate amniotic sacs, placentas, and supporting structures. Identical, or monozygotic, twins may or may not share the same amniotic sac, depending on how early the single fertilized egg divides into 2. Monozygotic twins have exactly identical DNA while dizygotic twins do not have identical DNA.