

Female Reproductive System

Have you ever given a thought to how a baby is born? How does it come into the real world? In order to understand all this, it is important to first gain knowledge about the female reproductive system in an elaborate manner. Let's study about this very system that makes females the 'child-bearer'

Importance of Female Reproductive System

The primary function of the female reproductive system is to produce the female egg cells which are essential for [reproduction](#). These are called as the ova or oocytes. It is important to know that, the entire system is designed for transporting the ova to the exact fertilization site. Further, the fertilization process of an egg after interaction with sperm usually happens in the fallopian tubes.

The later phase of the fertilized egg is associated with getting rooted into the uterus walls. This is counted as the beginning of the early stages of pregnancy. In case fertilization or implantation doesn't occur, then the system is aimed to menstruate. Moreover, the female

reproductive system is responsible for producing female [sex](#) hormones which maintain the reproductive cycle.

Parts of Female Reproductive System

The female reproductive system comprises of parts which are both internal and external to the body.

External Reproductive Parts

The external parts of the female reproductive system include:

- Labia majora: It protects and encloses the other outside reproductive [organs](#). The labia majora can be tagged as outsized and fleshy and is analogous to the male scrotum. It contains sweat as well as oil-secreting glands. The labia majora gets covered with hair right after [puberty](#).

- Labia minora: These are translated as ‘small lips’, and can be quite small close to 2 inches wide. Labia minora rest just in the interior of labia majora. It surrounds the primary opening of the vagina and urethra.
- Bartholin’s glands: The location of these glands rest beside the vaginal opening and is responsible to manage a fluid discharge.
- Clitoris: Both the labia minora encounter at the clitoris, which is a small and delicate protrusion that is analogous to the penis in the [male reproductive](#) system. This part of the female reproductive system is covered by a skin fold, termed as prepuce. Similar to the male penis, the clitoris is sensitive to stimulus and can turn erect.

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Internal Reproductive Parts

The internal parts of the female reproductive system include:

- Vagina: It is a canal which joins the cervix to the external portion of the body. You can even call it as the birth canal.
- Womb or Uterus: It is a pear-shaped, hollow organ which is ‘home’ for a developing fetus. Further, the uterus separates into two parts; namely, the cervix, and the corpus. The corpus easily enlarges for holding a developing baby.
- Ovaries: These are oval-shaped glands which are small and are located on both side of the uterus. Ovaries produce [hormones](#) and eggs.
- Fallopian tubes: They are narrow tubes which attach to the upper portion of the uterus. Fallopian tubes act as tunnels for the egg cells. Therefore, they transport the egg [cells](#) from the ovaries the to uterus.

Learn more about [Fertilization and Fertilization Event in human here](#).

A Solved Question for You

Q: What causes menstruation?

Ans: In the nonappearance of pregnancy, progesterone and estrogen levels drop. Hence, this causes contractions in the spiral arteries providing the endometrium. This further leads to the necrosis(localized death of living cells) of stratum **functions** and results in sloughing. Thus, the **menstrual** period initiates.

Male Reproductive System

A female bears a child. She gives birth to the child as well. So do you ever wonder what is the role of a male in this process? Why is he called the ‘Father’? Well, to understand the role of a male in human **reproduction**, we need to study the male reproductive system. Let’s study this system in detail that makes a man the ‘Father’.

Importance of Male Reproductive System

Below mentioned are some of the prime functions of the male reproductive **organs**:

- Produce, conserve, and transport sperm (male **sex** cells) as well as semen (protective fluid)
- Discharge sperm in the female reproductive tract while having sex

- Produce and discharge sex hormones (male) accountable for sustaining the male reproductive system

Unlike the female reproductive system, most of the male reproductive system is located outside of the body. These external structures include the penis, scrotum, and testicles.

Video on Human Reproduction

Parts of Male Reproductive System

1) Penis

You can call it the male organ which is upfront during [sexual](#) intercourse. The penis consists of three parts; namely, the root, the body and the glans. It is important to note that, the glans or penis head

is covered with a movable layer of skin. This is called the foreskin and is sometimes detached under a procedure termed as circumcision.

Further, the urethra opening, the semen and urine transport tube, is present at the penis tip. Also, the glans of the penis do comprise of several sensitive nerve endings.

The penis holds a cylindrical shape and includes three circular chambers. Each of these chambers is composed of distinctive, sponge-like [tissue](#). Do note that, this tissue is made up of thousands of big spaces which are filled with blood whenever the male is sexually aroused.

Once the penis gets filled with blood, it grows erect and rigid; this allows or assists penetration while having a sexual intercourse. Since the penis skin is loose, it helps to accommodate variations in penis size in the course of an erection.

The sperm or reproductive [cells](#) are contained in the semen. It is ejaculated through the penis end when the male reaches orgasm or sexual climax. It is interesting to know that, the flow of urine tends to

get blocked from the passage of urethra whenever the penis is erect. Hence, only semen is discharged at orgasm.

Learn about [Fertilization and Post Fertilization Phase in Human](#).

2) Scrotum

The scrotum is the loose sac-like skin bag which hangs below the penis. This part of the male reproductive system holds the testes or testicles, along with many [blood](#) vessels and nerves. Scrotum behaves like a temperature control system in regard to the testes. In order to achieve normal sperm development, it is necessary that the temperature of the testes should be somewhat cooler than the body temperature.

3) Testes or Testicles

Testicles are oval organs which are almost the size of bigger olives which are present within the scrotum. These are secured at all ends by a structure termed as spermatic cord. Usually, most men have two tests.

The primary [function](#) of the testes is to make testosterone (chief male sex hormone) and generate sperm. In the interior of the testes you will

find seminiferous tubules, which are coiled tube masses. The function of these tubes is to produce sperm cells.

4) Epididymis

It is a coiled tube which is long and is placed on the rear of each testicle. The function of Epididymis is to store and transport sperm cells which is created in the testes.

5) Ejaculatory Ducts

The ducts are formed due to the union of the seminal vesicles and vas deferens. Ejaculatory ducts get unfilled into the urethra.

6) Seminal Vesicles

These are sac-like pouches which are linked to the vas deferens close to the bladder base. The fluid contained in the seminal vesicles are responsible for making up the maximum volume of a male's ejaculatory fluid.

7) Prostate Gland

It is a walnut-sized assembly which is present under the urinary bladder. The function of the prostate gland is to contribute additional fluid for ejaculation.

8) Bulbourethral Gland

You can call them as pea-sized structures which are present on the edges of the urethra right beneath the prostate gland. Bulbourethral gland produces a slippery, clear fluid which empties into the urethra.

9) Urethra

It is a tube which carries urine starting from the bladder to travel outside the body. Considering males, the additional purpose of ejaculating semen at the time of orgasm is managed by urethra. Whenever the penis gets erect at the time of sex, the urine flow is blocked by the urethra.

10) Vas deferens

Vas deferens is basically a **muscular**, long tube which initiates from the epididymis and travels to the pelvic cavity. Transportation of mature sperm is managed by vas deferens that leads to the urethra.

Keep Learning: [Female Reproductive System](#).

A Solved Question for You

Q: How are sperms activated and nourished?

Ans: The semen is the primary fluid which helps in the nourishment and activation of sperm. It also transports the sperms to the female reproductive organ.

Menstrual Cycle

[Reproduction](#) is something that permits humans to grow in number, with the baby being held in the female's womb for nine months. But how does a woman get ready for pregnancy? This preparation includes a series of changes termed as the menstrual cycle. In order to understand this concept, let us try to [decode](#) its various aspects in a systematic order.

What is Menstrual Cycle?

Under the series of changes, every month the uterus expands a new lining to act ready for receiving a [fertilized egg](#). If there is no fertilized

egg to initiate a pregnancy, then the uterus discards its lining. You can call it the monthly menstrual bleeding or the menstrual cycle or the menstrual period, which women experience from early teen until menopause.

The menstrual cycle is counted from Day 1 of bleeding and ranges until Day 1 of the next bleeding phase. Even though the usual cycle is 28 days, it can be shorter or longer without any major concern. The whole duration of a menstrual cycle is segmented into four prominent phases:

- From day 1 to 5: Menstrual phase
- From day 1 to 13: Follicular phase
- Day 14: Ovulation phase
- From day 15 to 28: Luteal phase

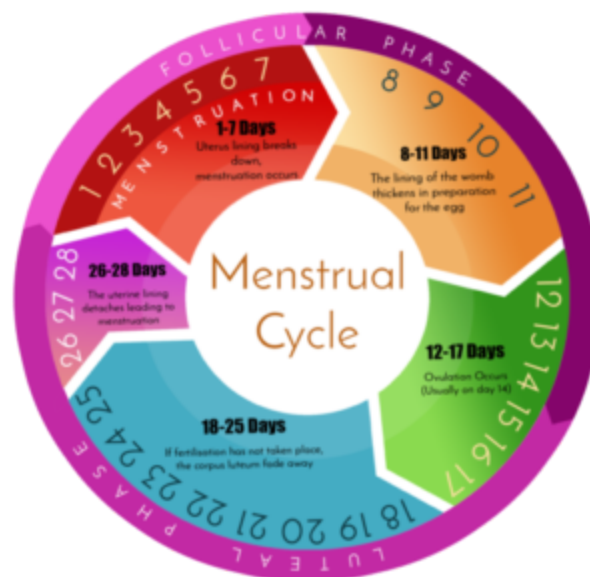
Girls typically start experiencing menstrual periods when they are 11-14 years old. On the other hand, [women](#) usually experience fewer periods when they are in the age group 39-51 years. Interestingly,

women who are in their 40s and teens can have cycles which are longer or vary a lot.

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Management of Menstrual Cycle



The menstrual cycle is primarily managed by hormones in the female body. For each cycle, the hypothalamus, as well as the pituitary gland, deliver hormone signals backwards and forward with the ovaries. It is these signals which permit the ovaries and uterus to get ready for pregnancy.

Learn more about [Human Endocrine System](#) to have a better understanding of this concept.

Furthermore, the hormones progesterone and estrogen play vital roles associated with the uterus and its changes during a particular cycle. Estrogen is responsible for building the lining of the uterus.

Also, progesterone enhances after an ovary discards an egg sometime in the middle of a particular cycle. Hence, this allows the estrogen to maintain a thick lining and stay prepared for a fertilized egg. When the progesterone drops, this causes the lining to break and the period starts.

Typical Symptoms Associated with Menstrual Cycle

According to an analysis, some women do not experience any pain or issues during the menstrual period. However, other women showcase symptoms right before and during the period cycle. Almost a week before the period starts, a number of women experience premenstrual symptoms. Females might appear angry and tense in this phase. Increase in water weight and bloating are common during this time.

Learn more about [Reproduction System in Human Beings here in detail](#).

Further, breasts might feel tender and acne might also appear as a visible symptom. Cramps in your back, belly or legs, start one or two days before the period actually starts. However, these symptoms fade away after the first days of the menstrual period.

Question for You

Q: At which point during the menstrual cycle, a female is the most fertile?

Ans: It should be known that five days before the ovulation to two days after, a female is most fertile. This knowledge is used by couples to increase the likelihood of conception.

Fertilization and Post Fertilization Events in Humans

Nature works in amazing ways by holding the secret to new life! It is worthy to imagine how something as intricate and complex as a human, can form in this world. Fertilization in humans starts with something so minuscule that it is hard to comprehend how the entire process takes place.

In human beings, there are certain [events](#) that take place before and after the fertilization. It casts an impact on the entire process. The entire process of fertilization in humans gives rise to new life, which is essential to carry forward the human race. So let's learn about this essential process.

Pre-fertilization Phase in Humans

Before fertilization in humans can take place, certain conditions need to exist, in order to support the process. In females and males, the process of **gametes** formation is the process of gametogenesis.

Gametes are generally haploid cells. Some of the organisms that have a haploid type of parental body. Some examples of such organisms are monerans, **algae**, **fungi**, and **bryophytes**.

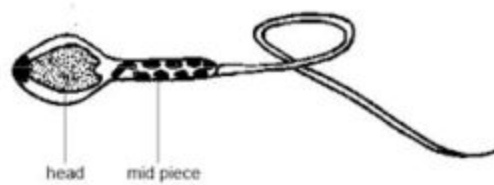
It is known that these organisms produce gamete **cells** by the division of the body through mitosis. In case the body of the parent is diploid, the same gametes form through a process of meiosis.

Male and Female Gametes

Sometimes the **male** and female gametes are similar in appearance. It becomes impossible to point out the difference between them as male and female gametes. Therefore, they are homogametic or isogametes.

In case the male and female gametes look dissimilar, they come to be called heterogametes. Among the heterogametes, the male reproductive unit is called sperm and the female reproductive unit is known as the ovum. Specialised cells, present in the diploid parent

body are responsible for taking part in the **production** process of gametes. This is known as meiosis.



Male gamete

Female Gamete

At the instance of gamete formation, such meiosis undergo division. As a result of this meiotic division, the number of chromosomes in the gametes reduces to a half and form the haploid gametes.

In case of humans, the male gametes are motile while the female gametes are stationary in action. After the formation of gametes, the male and female gametes ideally come in physical bond, so that they

can be fused with each other for fertilization. During such transfer, a large number of gametes do not reach the female gametes.

To fulfil the loss, the **ratio** of male gametes produced is several thousand in number to the quantum of female gametes. After this, the male gametes are carried to the point of fertilization through a special tube that ensures that the male gametes can pass through without undergoing any damage.

Fertilization in Humans

When male gametes fuse with the female gametes, the entire process is fertilization in humans. This process results in the formation of a diploid zygote. In most animals, external fertilization takes place in an **environment** that is like their natural surroundings.



External fertilization in humans helps in allowing the male gametes to reach the female gametes. During the process of **development**, the resulting cells tend to divide and specialise. A sperm cell comes to fertilise the ovum. If fertilised, the resulting zygote will further undergo mitotic division and growth.

Ultimately, a multicellular embryo will form, which will grow and develop over time. After the fertilization in humans, the major events which will take place include early embryonic development, establishing multicellularity, the formation of the blastula, and formation of embryonic germ layer. One process after the other will lead to the establishment of several germ layers, which will help the **tissues** to form and interact with each other.

Post-fertilization Events

Gastrulation is the process of highly coordinated cell and tissue movements whereby the cells of the blastula undergo dramatic rearrangement. During gastrulation, the cells get specified new positions and the multi-layered body plan of the organism is specified. At the early stages of development, the embryo acquires a disc which consists of three layers. These layers are the ectoderm, mesoderm and endoderm.

A Solved Question for You

Q: Describe the significance of fertilization in humans

Answer: From the point of view of evolution, fertilization in humans brings about a whole new range of genes in the world. The process of

reproduction results in the combination of genes of the humans involved in the process of fertilization.

This combination of genes is necessary to help humans to adapt to the changes in their environment. The constant shuffling of the human genes in the gamete cells increases the typical variations in the offsprings of the humans. The combination of different chromosomes from different parents is also important to allow the offspring to receive variations in the due course of time.

History has shown us that **evolution** is necessary to allow future progenies to thrive and function in the new world, as per the needs of the changing environment around them. Thus, fertilization in humans is highly significant to the human race.

Gametogenesis in Humans

If you have ever wondered how a baby is born, then it is important to know the process of **reproduction** in-depth. The **biological DNA** contained in the sperm are formed using the process called gametogenesis. It consists of different phases after which the male and

female sex cells are formed. This [article](#) would carefully enlighten you about gametogenesis and oogenesis features.

Introduction to Gametogenesis

We can simply call it the procedure by which sperms and ova (male and female sex cells) are designed in the male testes and female ovaries respectively. These gametes vary from all the other cells present in the body. This is because their nuclei contain only half the count of chromosomes present in nuclei of somatic cells.

It is vital to note that, meiosis shapes the most major part of the development of gametogenesis. Further, gametogenesis associated with the formation of sperms is called as spermatogenesis. Whereas, the formation of ova is termed as oogenesis. In addition, both

oogenesis and spermatogenesis include similar stages of sequential changes; that includes:

- Multiplication phase
- [Growth phase](#)
- [Maturation](#) phase

Insights about Spermatogenesis

The formation procedure of sperms is known as spermatogenesis. This occurs primarily in the seminiferous tubules present in the testes.

These seminiferous tubules are creased by germinal epithelium.

Further, the germinal epithelium largely comprises of primordial germ cells or PGCs. In addition, tall somatic cells termed as Sertoli cells (nurse cells) are also present. Spermatogenesis refers to the formation of spermatids and spermatozoa.

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Creation of Spermatids

This procedure covers three stages; namely:

- Multiplication Phase: During sexual maturity, the division of undistinguishable primordial germ cells occurs several times due to mitosis. This is majorly to produce a large count of spermatogonia. These are of two kinds: type A and type B. Type A spermatogonia act as the stem cells that divide to create additional spermatogonia. On the other hand, Type B spermatogonia can be thought as the prototypes of male sex cells.
- Growth Phase: Do remember that, every type B spermatogonium dynamically grows to form a superior primary spermatocyte through nourishment received from the nursing cells. This phase further concludes in the maturation stage.
- Maturation Phase: Under this, primary spermatocyte experiences two successive divisions. These are termed as maturation divisions, and meiotic is the first maturation disunion. Therefore, the primary spermatocyte segregates into

two haploid daughter cells known as secondary spermatocytes. Further, both the secondary spermatocytes suffer second maturation separation that is a regular mitotic division. It leads to the creation of four haploid spermatids.

Creation of Spermatozoa

In simple words, the conversion of spermatids to spermatozoa is termed as spermateliosis or spermiogenesis. Further, spermatozoa are later called as sperms. Hence, four sperms are developed from a single spermatogonium. Once spermiogenesis happens, the sperm heads are fixed in the Sertoli cells, which are finally let loose from the seminiferous tubules through a process termed as spermiation.

Sperms are motile and microscopic cells that remain alive and recollect their capability to fertilize an egg (ovum) from 24 -48 hours right after being free in the female genital tract. For a typical mammalian sperm, the head, neck, together with middle piece and tail are the prime sections.

Oogenesis

The effect of gametogenesis in females is associated with the mature female gamete. This is created through a process called oogenesis.

This happens in the ovaries or female gonads. There are three phases to oogenesis; namely, multiplication phase, growth phase and maturation phase. Let us try to understand these **phases** in a precise manner.

- **Multiplication Phase:** During foetal development, it should be noticed that certain cells present in the germinal epithelium of the female ovary are bigger than others. Hence, these cells split by mitosis, creating a couple of million oogonia or mother egg cells in each ovary present in the foetus. There are no more oogonia which are formed or augmented after birth.
- **Growth Phase:** This particular procedure of the primary oocyte tends to be very long. In this, the oogonium nurtures into

bigger primary oocytes. After this, each primary oocyte gets surrounded by a granulosa cells layer to create primary follicle. Later, a large number of follicles get debased during the duration from birth to puberty. Therefore, at puberty around 60,000 to 80,000 primary follicles can be found in each ovary.

- **Maturation Phase:** Similar to a primary spermatocyte, every primary oocyte experiences two maturation divisions. However, the outcomes of maturation divisions under oogenesis are quite different to those which occur in spermatogenesis. Considering the first meiotic division, the primary oocyte segregates into two uneven haploid daughter cells. These are known as the large secondary oocyte and a small polocyte.

Later, considering the second maturation separation, the initial polar body might split to create two, second polar bodies. Here, the secondary oocyte once again divides to form unfit daughter cells.

Ovum

A Solved Question for You

Q: What is the name of the particular cells that are capable to form gametes?

Ans: The cells which form gametes are known as germ cells (contrasting to somatic [cells](#)).