

Difference Between Male and Female Germ Cell

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Key Difference - Male vs Female Germ Cell

Human reproduction involves the male and female germ cells which are the sperm and the ovum respectively. Both cells fuse in a process called fertilization which then develops into a structure known as the zygote. The zygote then will develop into an embryo which then divides into the development of an organism. The male germ cells which are known as sperms are synthesized in the seminiferous tubules of the male testis, and the female germ cells which are known as ova are synthesized and developed in the female ovaries. **Male germ cells are heterozygous with X and Y chromosomes whilst the female germ cells are homozygous XX chromosomes (two X chromosomes).** This is the key difference between male and female germ cells.

What is Male Germ Cell?

In the context of male reproduction, the reproductive germ cell is known as the sperm. Male germs cells are heterozygous with the presence of X and Y chromosomes. Sperms are developed through a process known as spermatogenesis which takes place in the seminiferous tubules of the testis. Sperm cells don't have the ability of division, and their life span is short. Sperms are developed with the ability of motility in order to reach the female germ cell; ovum and penetrate it which completes the process of fertilization and then develops into a structure known as the zygote. Some sperms are nonmotile, and they are referred to as spermatium. They don't have the ability to reach the ovum and fertilize due to lack of motility.

The human sperms are haploid (n) which consist of 23 chromosomes. The human sperm consists of four distinct parts which include, head, neck, mid piece and the tail. The head region is a flat disc-shaped structure which consists of a nucleus composed of tightly packed chromatin fibers. At the tip region of the head, consists of a modified lysosome known as an acrosome. It consists of hydrolytic vesicles which involve in the degeneration of the wall of the ovum to facilitate the penetration and fusion of the sperm with the ovum. Even though millions of sperms are released, only one sperm will fuse with the ovum. The neck region and the mid piece of the sperm consist of two centrioles, one distal and one proximal.

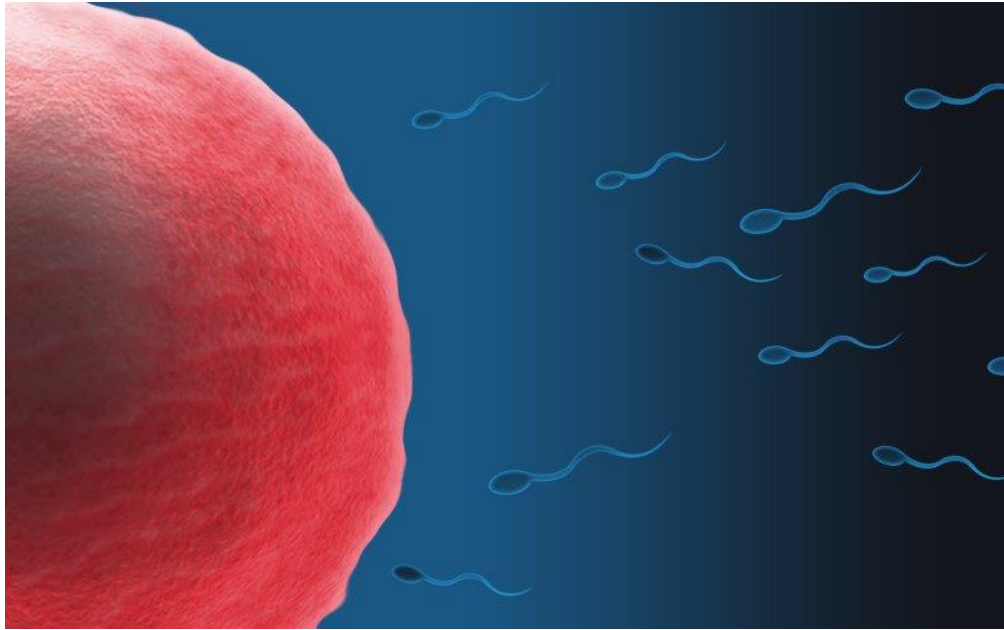


Figure 01: Sperm cells

The proximal centriole involves in the cleavage of the ovum. The distal centriole gives rise to an axial filament 9+2 ultra structure that develops a long flagellum with 9+2 ultra structure; the tail. The neck region of the sperm which is the starting point of the flagellum largely consists of mitochondria which provide the required energy (ATP) for the movement of the sperm through the female genital tract and to reach the sperm successfully. The human sperm consist of s long flagellum; the tail. It propels the sperm forward which allows it to reach the female ovum. Approximately, 2/3 of the total length of the sperm is covered by the tail region. It is covered by a plasma membrane and is surrounded by cytoplasm.

What is Female Germ Cell?

In the context of female reproduction, the ovum is considered as the female germ cell which acts as the female reproductive cell. The ovum is haploid (n) with 23 chromosomes and homozygous with the presence of XX chromosomes. Once the male sperm unites with the ovum, it develops into a diving structure known as the zygote which completes the process of fertilization.

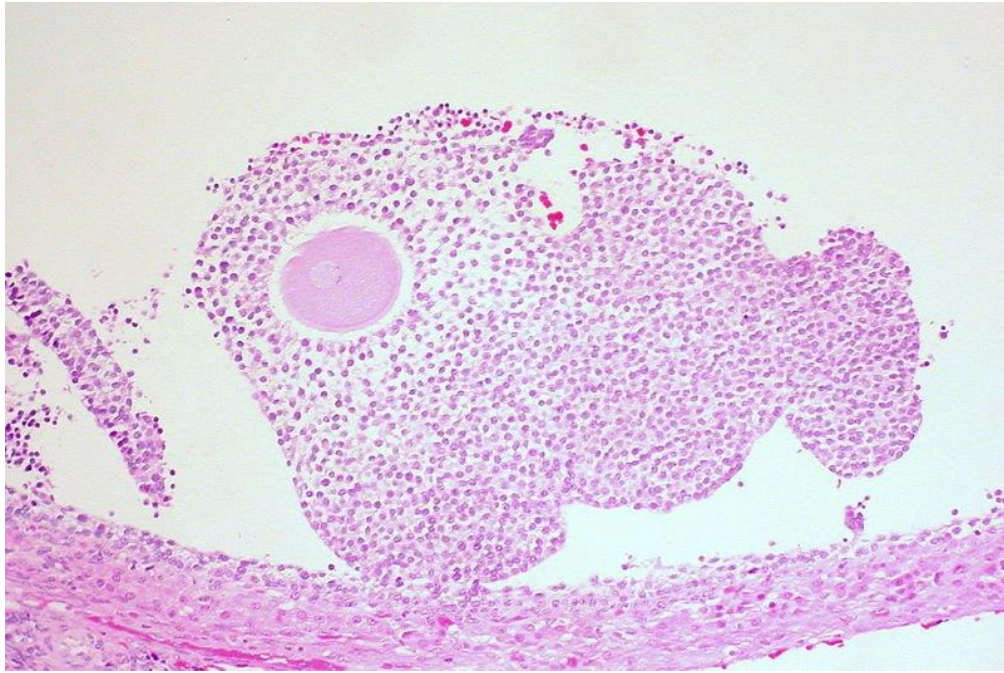


Figure 02: The structure of the ovum

The ovum is comparatively much larger in size when compared with the human sperm. It is nonmotile. The ovum is surrounded by different layers of cells. The innermost transparent layer is known as the vitelline membrane which is developed by the ovum. Outer to the vitelline membrane is the zona pellucida, which is a thick non cellular membrane. Similar to the vitelline membrane, the zona pellucida is transparent. In between the two cell layers, vitelline membrane and zona pellucida, a narrow space are present which is referred to as the perivitelline space. Outer to the zona pellucida, a thick radially elongated cell layer is present known as corona radiata. It is composed of granulosa cells or follicular cells. The action of the acrosome will initiate the penetration through the granulosa cells first which then digest into the rest of the cell layers.

The nucleus of the ovum is located centrally to the cell. It is embedded within a cytoplasm which contains a special substance known as the yolk. It is also referred to as the vitellus. It provides the required nourishment to the ovum and the developing embryo once the fertilization process is completed. According to the amount of yolk present in the egg cells in different organisms, they are of three types; microlecithal, less amount of yolk in small-sized ovum; mesolecithal, ovum present with a moderate amount of yolk and macrolecithal with a larger amount of yolk. Human ovum is microlecithal. Due to the eccentric positioning of the nucleus, the human ovum, it develops polarity.

What are the Similarities Between Male and Female Germ Cell?

- Both involved in the process of reproduction where the sperm cell unites with the ovum that develops into a dividing structure known as the zygote through fertilization.
- Both cells are haploid (n) with 23 chromosomes.

What is the Difference Between Male and Female Germ Cell?

Male Germ Cell vs Female Germ Cell	
A male germ cell is also known as sperm is a male gamete involves in sexual reproduction.	A female germ cell is also known as ovum is a female gamete involves in sexual reproduction.
Chromosomes	
A male germ cell is heterozygous with X and Y chromosomes (XY).	A female germ cell is homozygous with two X chromosomes (XX).
Location of Synthesis	
Male germ cells are developed in seminiferous tubules of the male testis.	Female germ cells are developed in the female ovaries.
Structure	
Sperm is a small cell with the presence of distinct structures; disc-shaped flattened head, neck, mid piece and tail.	Ovum is a comparatively larger cell with a spherical structure that consists of a centrally located nucleus. The cytoplasm is thick due to the presence of yolk.
Motility	
Male germ cells are usually motile.	Ovum are nonmotile.

Summary - Male vs Female Germ Cell

Male and female germ cells unite to form a zygote through a process known as fertilization. This is a key step in human reproduction. The sperm, male germ cell is composed of four (04) distinct structures including disc-shaped flattened head, neck, mid piece and tail. At the tip region of the head, consists of a modified lysosome known as acrosome which consists of hydrolytic vesicles which involve in the degeneration of the wall of the ovum. The ovum is a spherical structure with different layers of cell linings which covers the ovum. The nucleus is located eccentrically. Both cells are haploid (n) with 23 chromosomes. The key difference between the male and female germ cells is Male germ cells are heterozygous with X and Y chromosomes whereas the female germ cells are homozygous with two X chromosomes.

Reference:

1.The Editors of Encyclopædia Britannica. "Ovum." Encyclopædia Britannica, Encyclopædia Britannica, inc., 22 Nov. 2010. [Available here](#)

2.The Editors of Encyclopædia Britannica. “Sperm.” Encyclopædia Britannica, Encyclopædia Britannica, inc., 5 Sept. 2016. [Available here](#)

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- 1.'Egg Sperm'by Zappys Technology Solutions ([CC BY 2.0](#)) via [Flickr](#)
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