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 Write short note on the following:

* **SPERMATOGENESIS**

Spermatogenesis is the process by which [haploid](https://en.wikipedia.org/wiki/Haploid) [spermatozoa](https://en.wikipedia.org/wiki/Spermatozoa) develop from [germ cells](https://en.wikipedia.org/wiki/Germ_cell) in the [seminiferous tubules](https://en.wikipedia.org/wiki/Seminiferous_tubules) of the [testis](https://en.wikipedia.org/wiki/Testis). This process starts with the [mitotic division](https://en.wikipedia.org/wiki/Mitosis) of the [stem cells](https://en.wikipedia.org/wiki/Stem_cell) located close to the basement membrane of the tubules. These cells are called [spermatogonial stem cells](https://en.wikipedia.org/wiki/Spermatogonial_Stem_Cells). The mitotic division of these produces two types of cells. Type A cells replenish the stem cells, and type B cells differentiate into primary [spermatocytes](https://en.wikipedia.org/wiki/Spermatocyte). The primary spermatocyte divides meiotically ([Meiosis](https://en.wikipedia.org/wiki/Meiosis) I) into two secondary spermatocytes; each secondary spermatocyte divides into two equal haploid [spermatids](https://en.wikipedia.org/wiki/Spermatids) by Meiosis II. The spermatids are transformed into spermatozoa (sperm) by the process of [spermiogenesis](https://en.wikipedia.org/wiki/Spermiogenesis). These develop into mature spermatozoa, also known as [sperm cells](https://en.wikipedia.org/wiki/Sperm). Thus, the primary spermatocyte gives rise to two cells, the secondary spermatocytes, and the two secondary spermatocytes by their subdivision produce four spermatozoa and four haploid cells.

Spermatozoa are the mature male [gametes](https://en.wikipedia.org/wiki/Gamete) in many sexually reproducing organisms. Thus, spermatogenesis is the male version of [gametogenesis](https://en.wikipedia.org/wiki/Gametogenesis), of which the female equivalent is [oogenesis](https://en.wikipedia.org/wiki/Oogenesis). In [mammals](https://en.wikipedia.org/wiki/Mammal) it occurs in the [seminiferous tubules](https://en.wikipedia.org/wiki/Seminiferous_tubules) of the male [testes](https://en.wikipedia.org/wiki/Testes) in a stepwise fashion. Spermatogenesis is highly dependent upon optimal conditions for the process to occur correctly, and is essential for [sexual reproduction](https://en.wikipedia.org/wiki/Sexual_reproduction). [DNA methylation](https://en.wikipedia.org/wiki/DNA_methylation) and [histone modification](https://en.wikipedia.org/wiki/Histone_modification) have been implicated in the regulation of this process.[[4]](https://en.wikipedia.org/wiki/Spermatogenesis#cite_note-4) It starts at [puberty](https://en.wikipedia.org/wiki/Puberty) and usually continues uninterrupted until death, although a slight decrease can be discerned in the quantity of produced sperm with increase in age.

Spermatogenesis starts in the bottom part of seminiferous tubes and, progressively, cells go deeper into tubes and moving along it until mature spermatozoa reaches the lumen, where mature spermatozoa are deposited. The division happens asynchronically; if the tube is cut transversally one could observe different maturation states. A group of cells with different maturation states that are being generated at the same time is called a spermatogenic wave.

* **MALE INFERTILITY**

Male infertility refers to a male's inability to cause [pregnancy](https://en.wikipedia.org/wiki/Pregnancy) in a fertile female. In humans it accounts for 40–50% of [infertility](https://en.wikipedia.org/wiki/Infertility). It affects approximately 7% of all men. Male infertility is commonly due to deficiencies in the [semen](https://en.wikipedia.org/wiki/Semen), and [semen quality](https://en.wikipedia.org/wiki/Semen_quality) is used as a surrogate measure of male fecundity.

Problems can stop cells from growing into sperm. Problems can keep the sperm from reaching the egg. Even the temperature of the scrotum may affect fertility. These are the main causes of male infertility:

**Sperm Disorders**

The most common problems are with making and growing sperm. Sperm may:

* not grow fully
* be oddly shaped
* not move the right way
* be made in very low numbers (oligospermia)
* not be made at all (azoospermia)

Sperm problems can be from traits you're born with. Lifestyle choices can lower sperm numbers. Smoking, drinking alcohol, and taking certain medications can lower sperm numbers. Other causes of low sperm numbers include long-term sickness (such as kidney failure), childhood infections (such as mumps), and chromosome or hormone problems (such as low testosterone).

Damage to the reproductive system can cause low or no sperm. About 4 out of every 10 men with total lack of sperm (azoospermia) have an obstruction (blockage). A birth defect or a problem such as an infection can cause a blockage.

**Varicoceles**

Varicoceles are swollen veins in the scrotum. They're found in 16 out of 100 of all men. They are more common in infertile men (40 out of 100). They harm sperm growth by blocking proper blood drainage. It may be that Varicoceles cause blood to flow back into your scrotum from your belly. The testicles are then too warm for making sperm. This can cause low sperm numbers.

**Retrograde Ejaculation**

Retrograde ejaculation is when semen goes backwards in the body. They go into your bladder instead of out the penis. This happens when nerves and muscles in your bladder don't close during orgasm (climax). Semen may have normal sperm, but the semen cannot reach the vagina.

Retrograde ejaculation can be caused by surgery, medications or health problems of the nervous system. Signs are cloudy urine after ejaculation and less fluid or "dry" ejaculation.

**Immunologic Infertility**

Sometimes a man's body makes antibodies that attack his own sperm. Antibodies are most often made because of injury, surgery or infection. They keep sperm from moving and working normally. We don't know yet exactly how antibodies lower fertility. We do know they can make it hard for sperm to swim to the fallopian tube and enter an egg. This is not a common cause of male infertility.

**Obstruction**

Sometimes sperm can be blocked. Repeated infections, surgery (such as vasectomy), swelling or developmental defects can cause blockage. Any part of the male reproductive tract can be blocked. With a blockage, sperm from the testicles can't leave the body during ejaculation.

**Hormones**

Hormones made by the pituitary gland tell the testicles to make sperm. Very low hormone levels cause poor sperm growth.

**Chromosomes**

Sperm carry half of the DNA to the egg. Changes in the number and structure of chromosomes can affect fertility. For example, the male Y chromosome may be missing parts.

**Medication**

Certain medications can change sperm production, function and delivery. These medications are most often given to treat health problems like:

* arthritis
* depression
* digestive problems
* infections
* high blood pressure
* cancer