

# HUMAN REPRODUCTION

GEC 21.3

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## Topics:

- Importance of Human Reproduction
- Reproductive Events
- Overview of Human Reproductive System
- Gametogenesis

# WHY IS REPRODUCTION IMPORTANT TO HUMAN BEINGS?

- Reproduction is important to human beings because it is essential for the continuation of human civilization and the formation of families.
- It is a fundamental biological process that is reinforced by social pressures and structures, and the inability to reproduce can cause distress and suffering.
- Successful reproduction is crucial for individuals and society, as it contributes to the health and well-being of individuals and ensures the survival of the population.
- Additionally, reproduction is a defining characteristic of living organisms, including humans, and is a key feature of life itself.

## What Is the Reproductive System?

### The **reproductive system**

is the human organ system responsible for the production and fertilization of gametes (sperm or eggs) and carrying of a fetus. Both both sexes **gonads** produce gametes.

A **gamete** is a haploid cell that combines with another haploid gamete during fertilization, forming a single diploid cell called a zygote. Besides producing gametes, the gonads also produce sex hormones.

**Sex hormones** are endocrine hormones that control the development of sex organs before birth, sexual maturation at puberty, and reproduction once sexual maturation has occurred. Other reproductive system organs have various functions, such as maturing gametes, delivering gametes to the site of fertilization, and providing an environment for the development and growth of offspring.

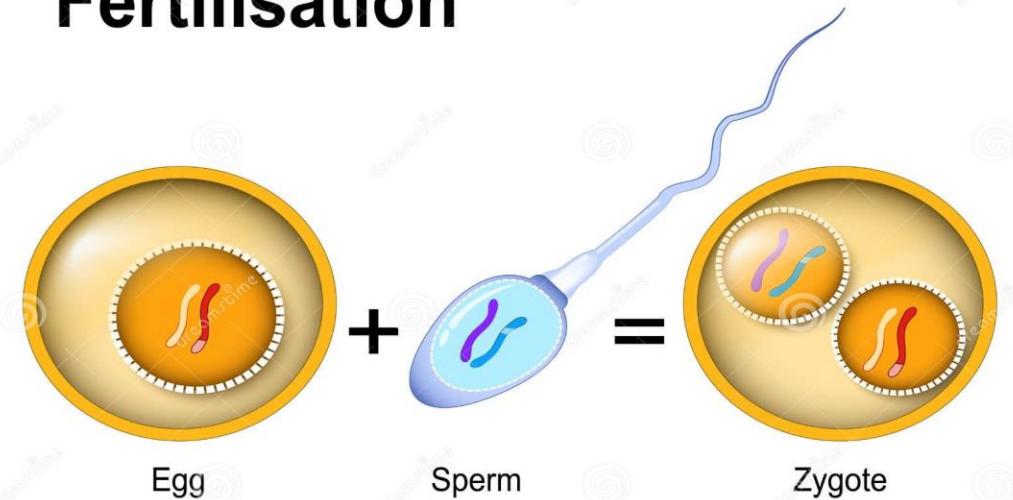
# What is human reproduction?

- Human reproduction is the coming together of two cells (gametes): an ovum produced by the female, and a sperm produced by the male.
- The fusing of the two gametes is called fertilization, and the resulting cell is called a zygote. Each gamete contributes half the genetic material present in the zygote, half the genetic material is provided by the female and half by the male.

❑ Female reproduction

❑ Male reproduction

## Fertilisation



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## REPRODUCTIVE EVENTS



- Humans sexual reproduction, viviparous, unisexual.
- Each sex has pair of gonads, reproductive duct and accessory structures.
- Sex organs – Testis( paired) male , ovaries (paired) Gamete formation, hormones
- Puberty
  1. Gametogenesis - formation of gametes (sperms/ ova)
  2. Insemination -- transfer of sperms into the female genital tract
  3. Fertilisation -- fusion of male and female gametes leading to formation of zygote
  4. Implantation -- development of blastocyst and its attachment to the uterine wall
  5. Gestation -- embryonic development ( from conception to birth )
  6. Parturition-- delivery of the baby ( child birth )



## What is Gametogenesis?

Gametogenesis is a biological process in which diploid and haploid precursor cells undergo cell division to form new organisms. They form mature haploid gametes by the meiotic division of diploid gametes. The male gametes, or as we refer to them as sperms, are produced by testes.

The male reproductive organ consists of two round globular shaped sac-like structures located below the penis. The female gametes called ova or eggs are produced by ovaries. They are two oblong orange-like structures present on each side of the uterus, in the lower abdomen.

The primitive germ cells present in female and male reproductive organs initiate gametogenesis. The germ cell consists of 46 chromosomes, which hold the DNA or the genetic information, and this genetic information influences the body structure and intellect of the new organism.



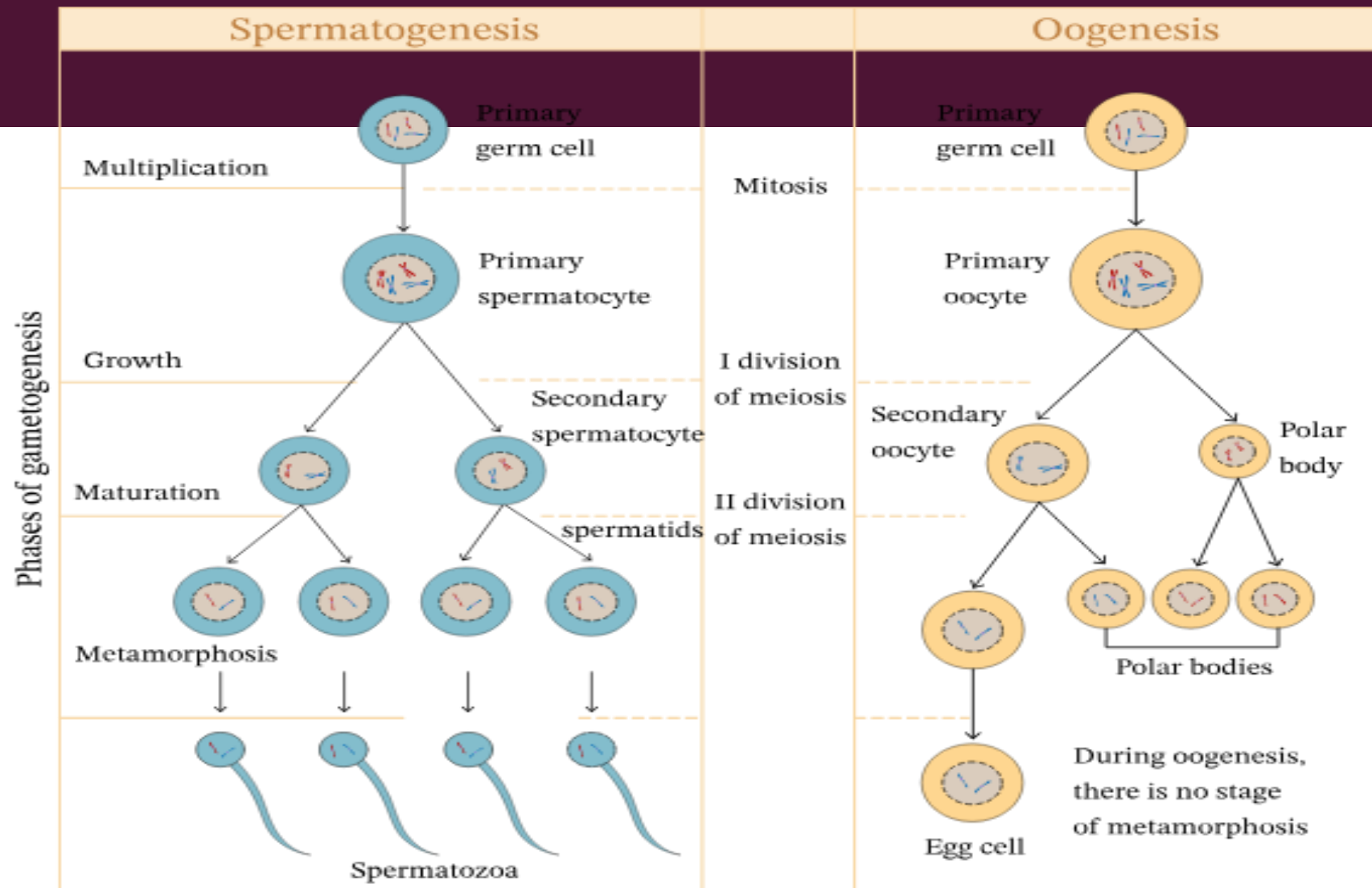
## Gametogenesis in the Human Body

Did you know that, at birth, a female human has approximately 1 million egg cells? By the time she reaches puberty, this number decreases to about 300 000. Over her reproductive lifetime, only 300–400 of these eggs will be released!

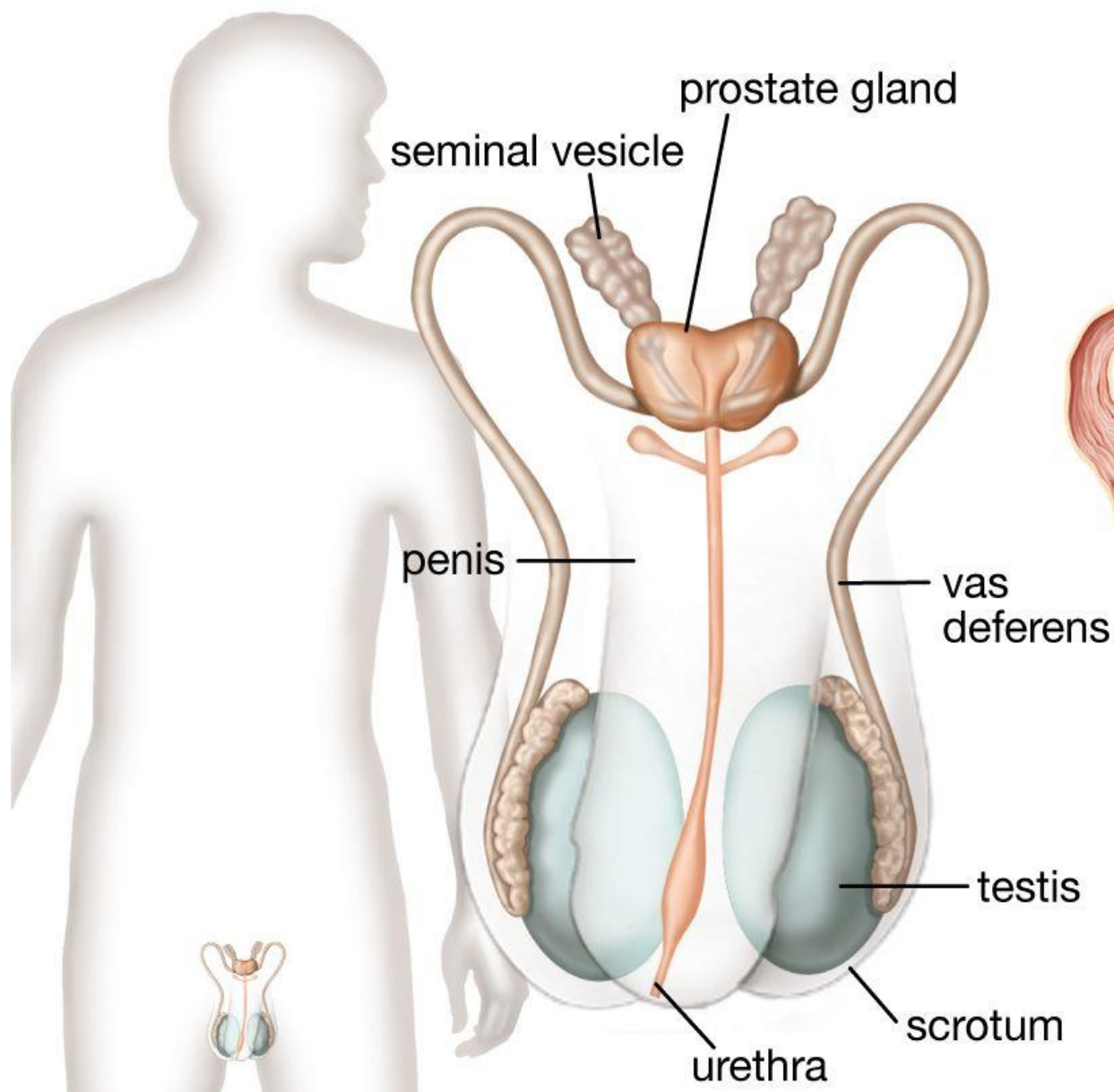
Gametogenesis consists of different phases in generating the new organism from the male and female gametes. Depending on the biological life cycle of the organism, gametogenesis occurs by meiotic division of diploid gametocytes into various gametes, or by mitosis.

Meiosis is the first cell division between four haploid cells and one diploid cell. It is different from other cell divisions like mitosis. Meiosis occurs in two distinctive phases: meiosis I and meiosis II.

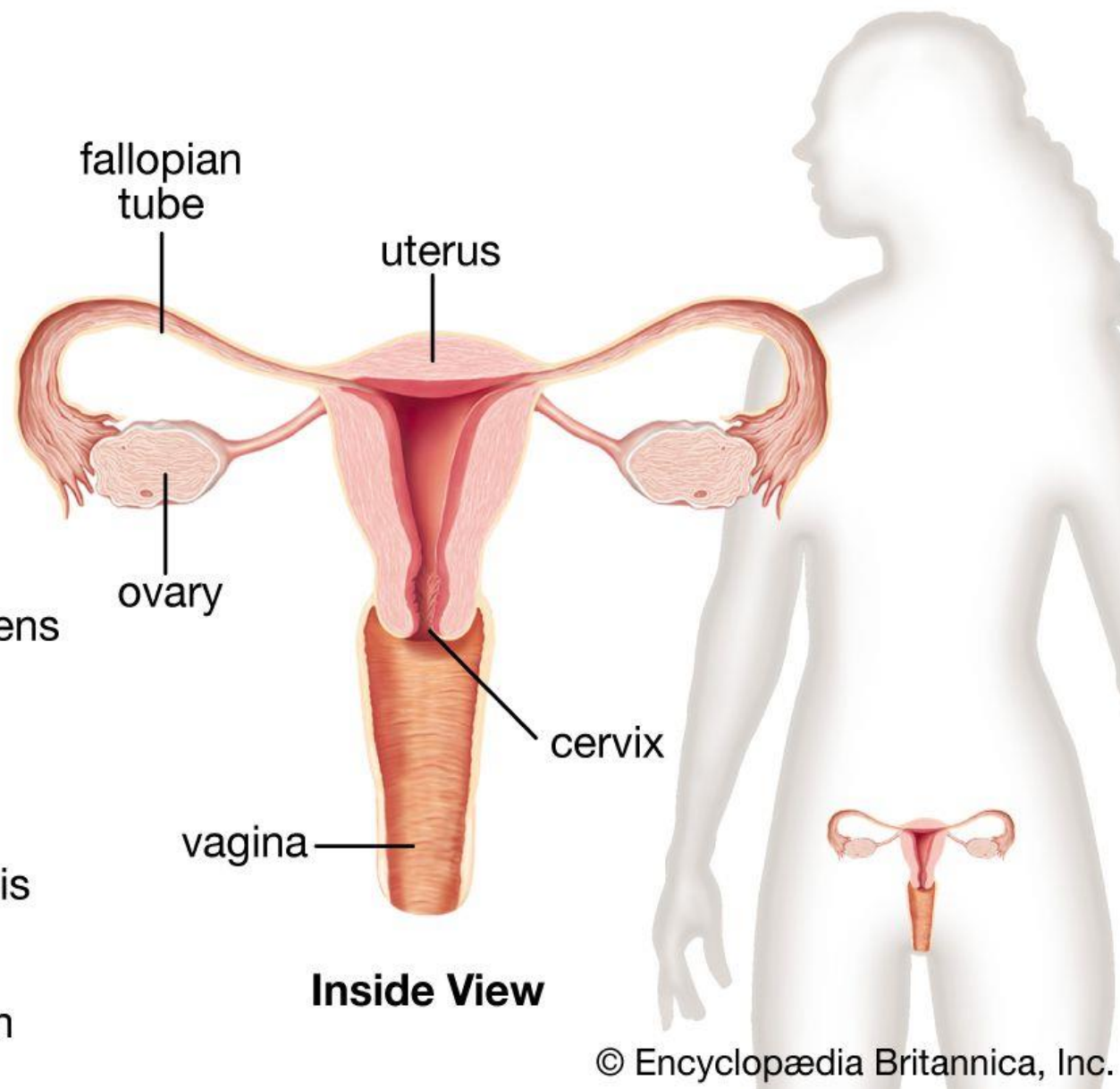




## Male Reproductive System



## Female Reproductive System



# Female Reproductive System

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- ▢ Produce sex hormones
  - Estrogen, Progesterone
- ▢ Produce egg (ova)
- ▢ Support & protect developing embryo
- ▢ Give birth to new baby

# Major Organs

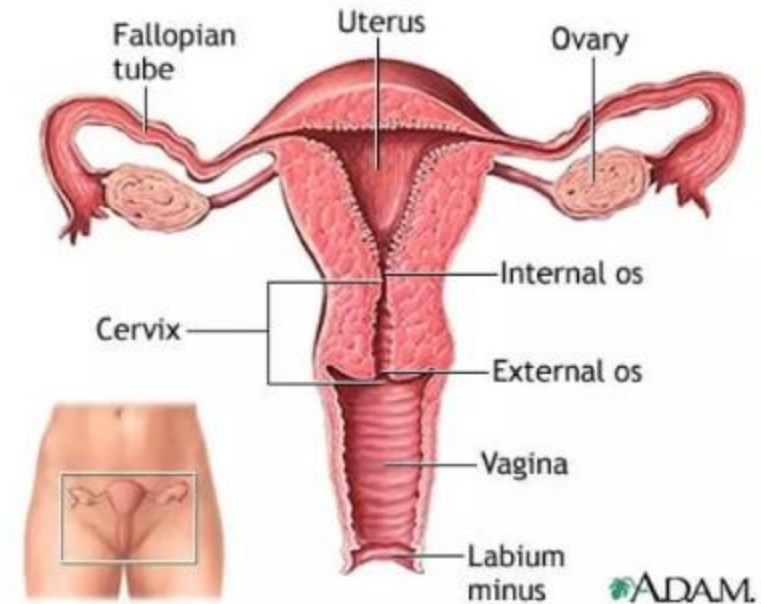
- Cervix
- Vagina
- Ovaries [gonads]
- Uterine tubes [fallopian tubes]
- Uterus





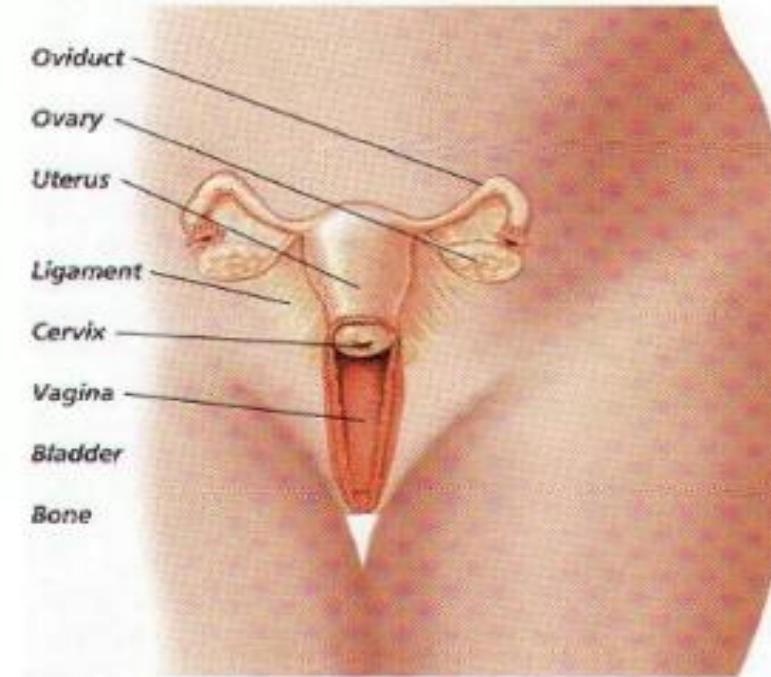
# The Cervix

- ❑ The lower portion or neck of the uterus.
- ❑ The cervix is lined with mucus, known as cervical mucus
  - Cervical mucus provides lubrication & sperm transport during sexual intercourse
  - During ovulation secretion of cervical mucus increases in response to estrogen
  - But when an egg is ready for fertilization, the mucus then becomes thin and slippery, offering a “friendly environment” to sperm



# The Vagina

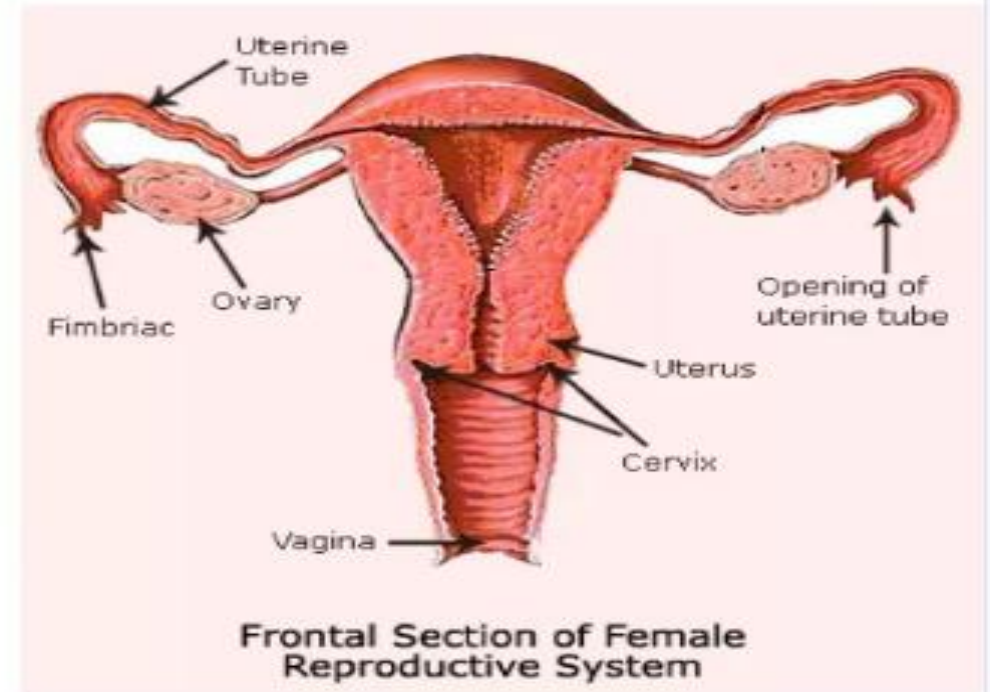
- ❑ A muscular, ridged sheath connecting the external genitals to the uterus.
- ❑ Functions as a two-way street, accepting the penis and sperm during intercourse
- ❑ Serving as the avenue of birth through which the new baby enters the world





# Ovaries

- Also known as female gonads
- They produce eggs (also called ova) every female is born with a lifetime supply of eggs
- They also produce hormones:  
**Estrogen & Progesterone**





# Uterus

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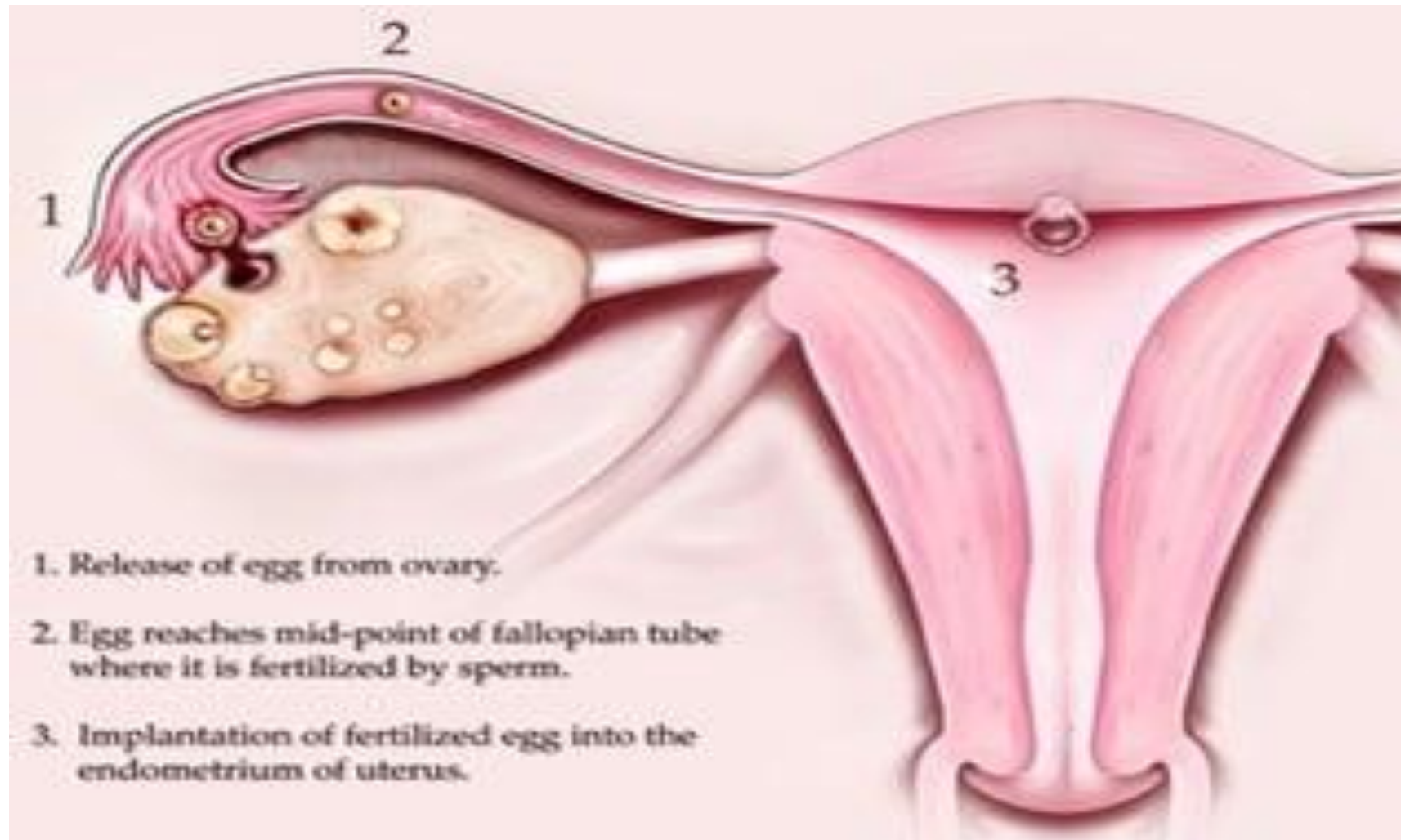


- ❑ Pear-shaped muscular organ in the female reproductive tract.
- ❑ The fundus is the upper portion of the uterus where pregnancy occurs.

## Fallopian tubes [uterine tubes]

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- ❑ Stretch from the uterus to the ovaries and measure about 8 to 13 cm in length.
- ❑ The ends of the fallopian tubes lying next to the ovaries feather into ends called fimbria
- ❑ Millions of tiny hair-like cilia line the fimbria and interior of the fallopian tubes.
- ❑ The cilia beat in waves hundreds of times a second catching the egg at ovulation and moving it through the tube to the uterine cavity.
- ❑ Fertilization typically occurs in the fallopian tube





# Endometrium

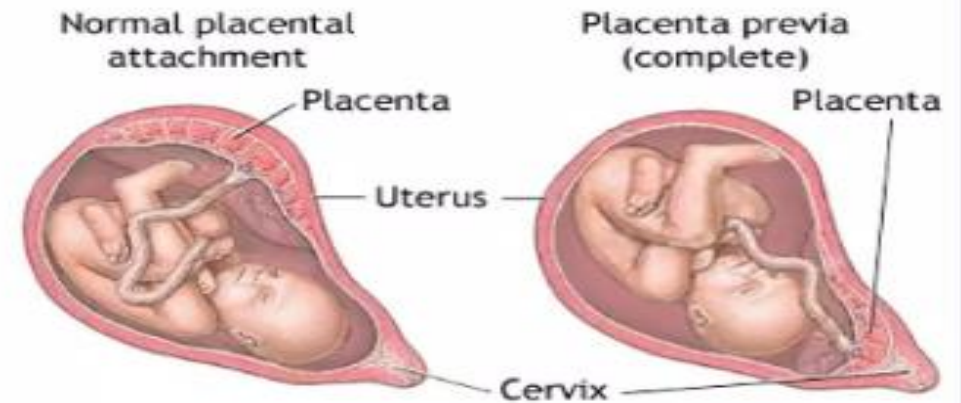
- ❑ The endometrium is the innermost layer as a lining for the uterus
- ❑ During the menstrual cycle, the endometrium grows to a thick, blood vessel-rich, glandular tissue layer.
- ❑ This represents an optimal environment for the implantation of a blastocyst upon its arrival in the uterus.

Normal endometrium



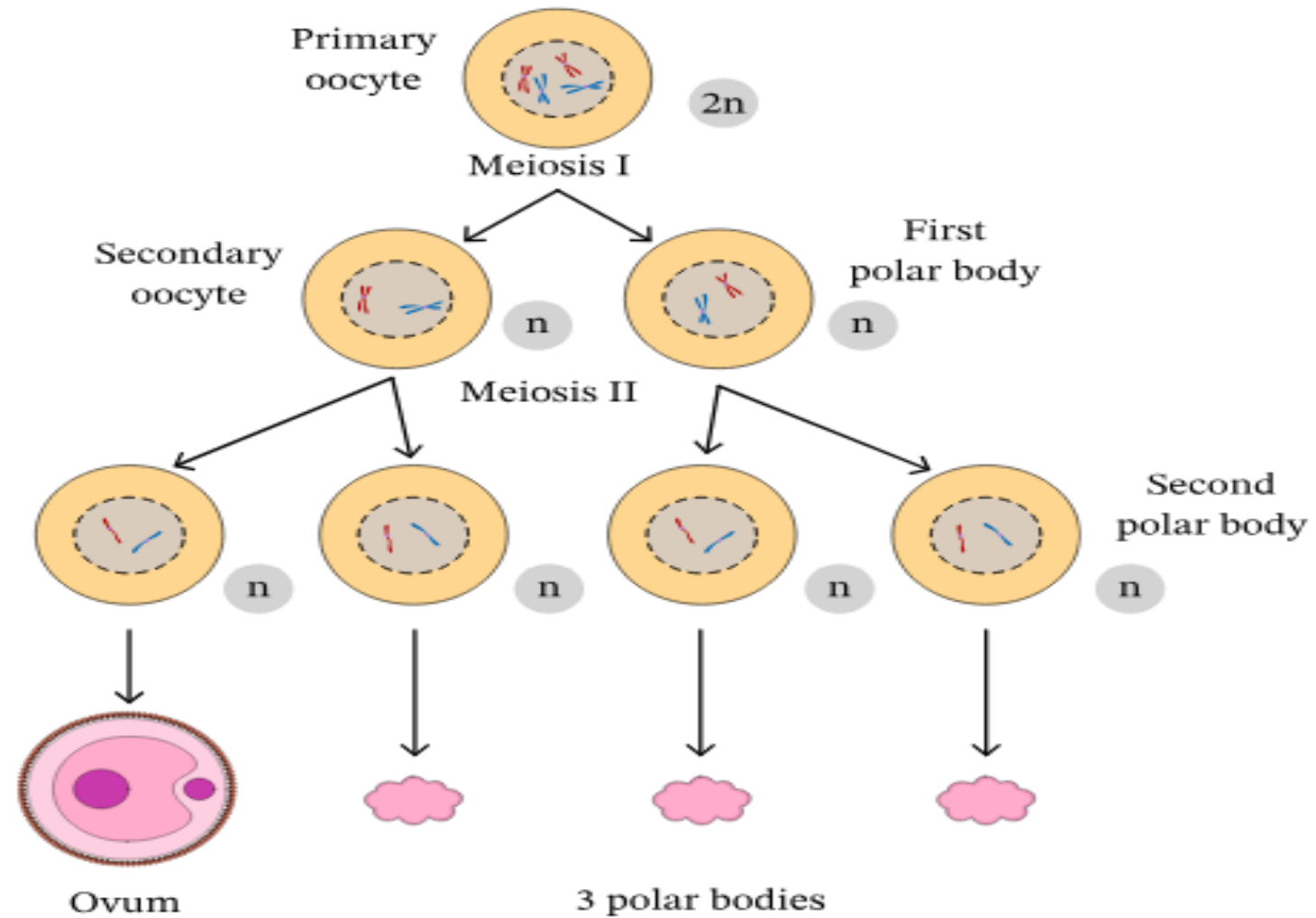
# Endometrium

- The endometrium is central, echogenic (detectable using ultrasound scanners), and has an average thickness of 6.7 mm.
- During pregnancy, the blood vessels in the endometrium further increase in size and number, forming the **placenta**,
- Placenta supplies oxygen and nutrition to the embryo & fetus.





## Oogenesis



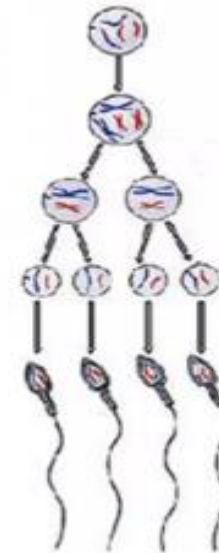


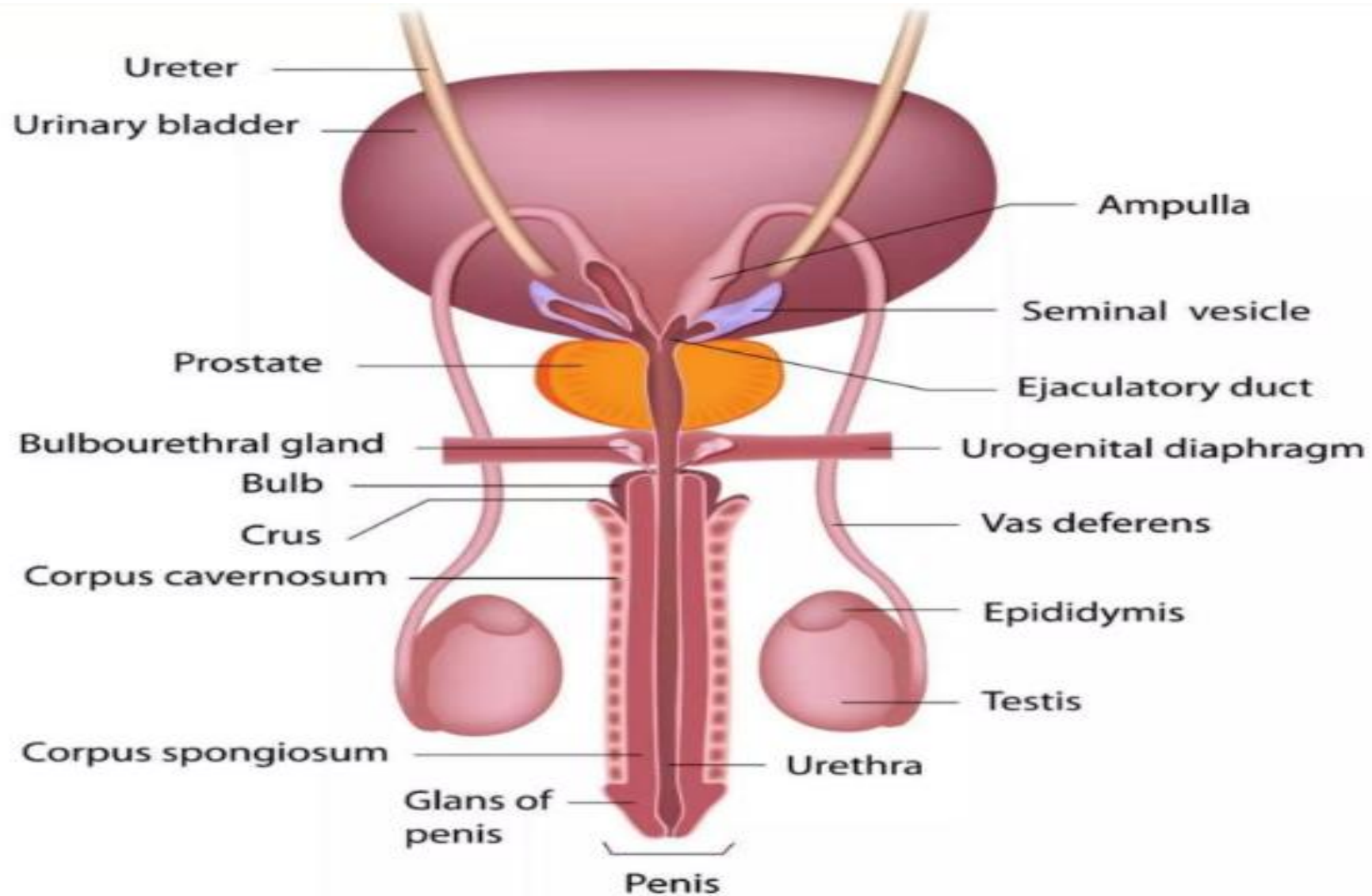
# **Male Reproductive System**

The **male reproductive system** has only one function, and all the organs of this system function together to complete this one task. This task is to produce the male half of the genetic code and deliver it into the female.



**Spermatogenesis**, the production of the male half of the genetic code, the sperm, will be the main focus of the physiology, but first we must look at the *anatomy* of the male reproductive system and the function of each organ.



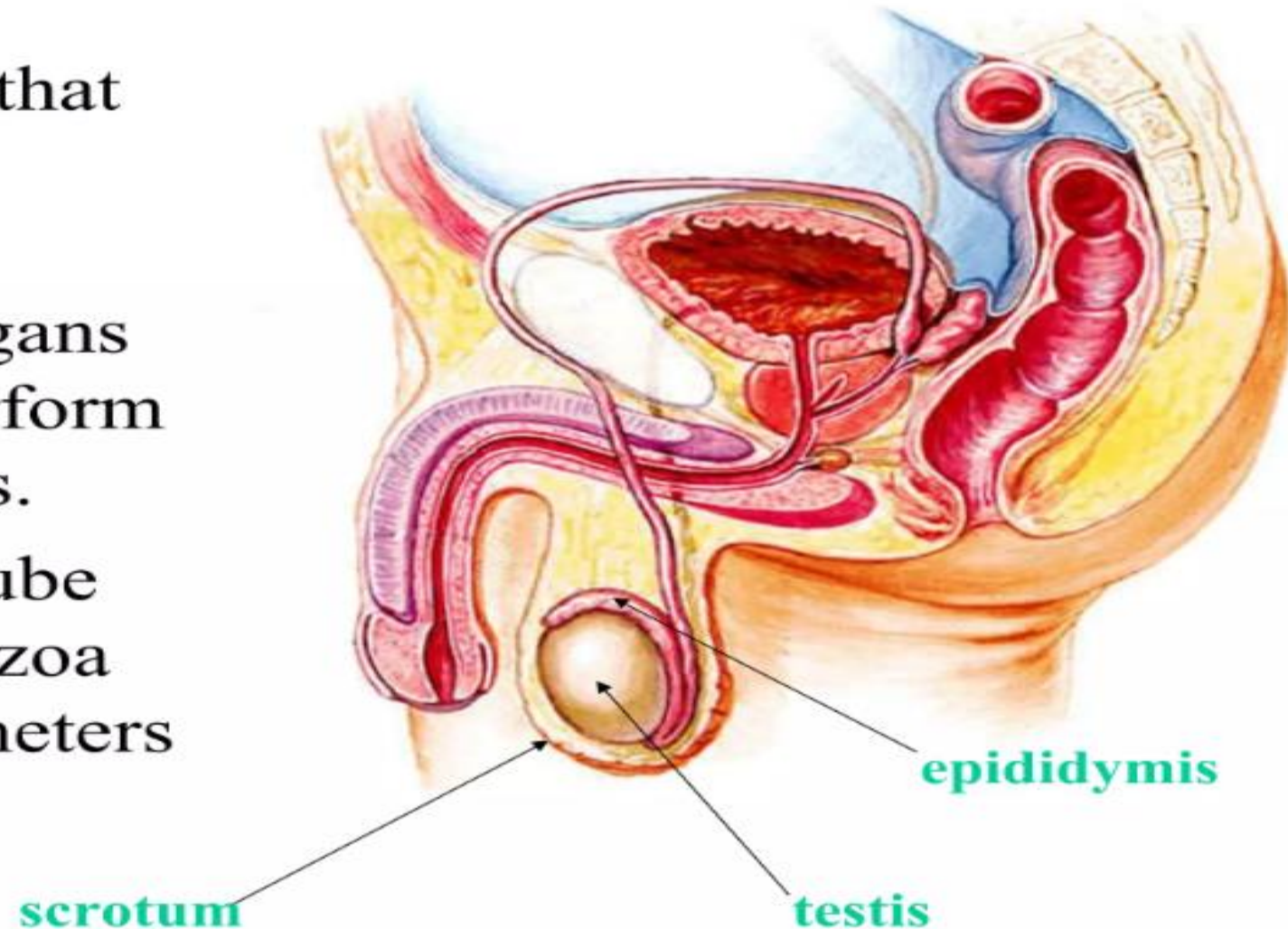


## Male anatomy terms:

**Scrotum** – Sac that holds testes.

**Testes** – Male reproductive organs that actually perform spermatogenesis.

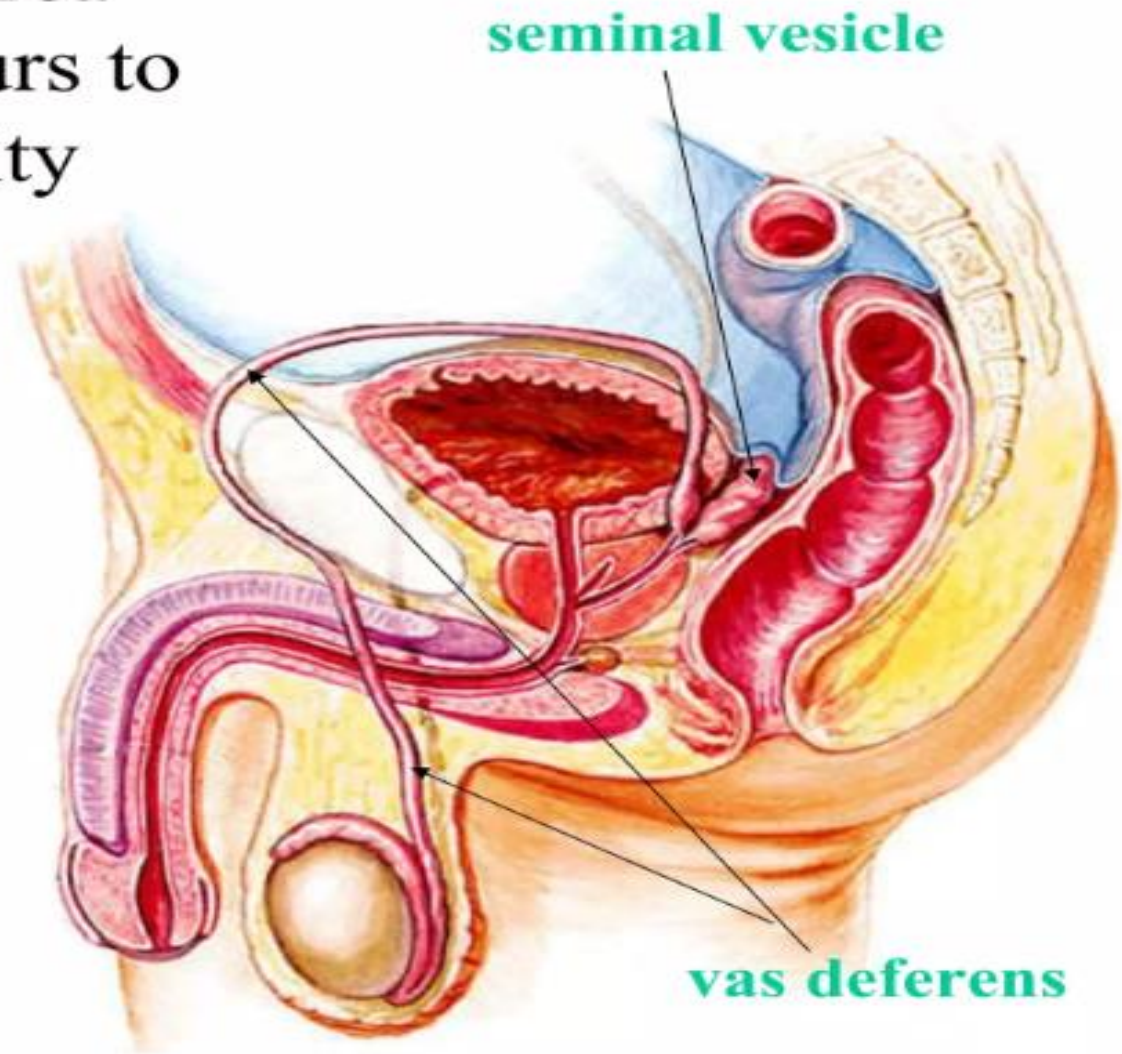
**Epididymis** – tube where spermatozoa mature: 4 to 5 meters long.





**Vas deferens** – storage area for sperm from a few hours to 42 days. No loss of fertility during storage.

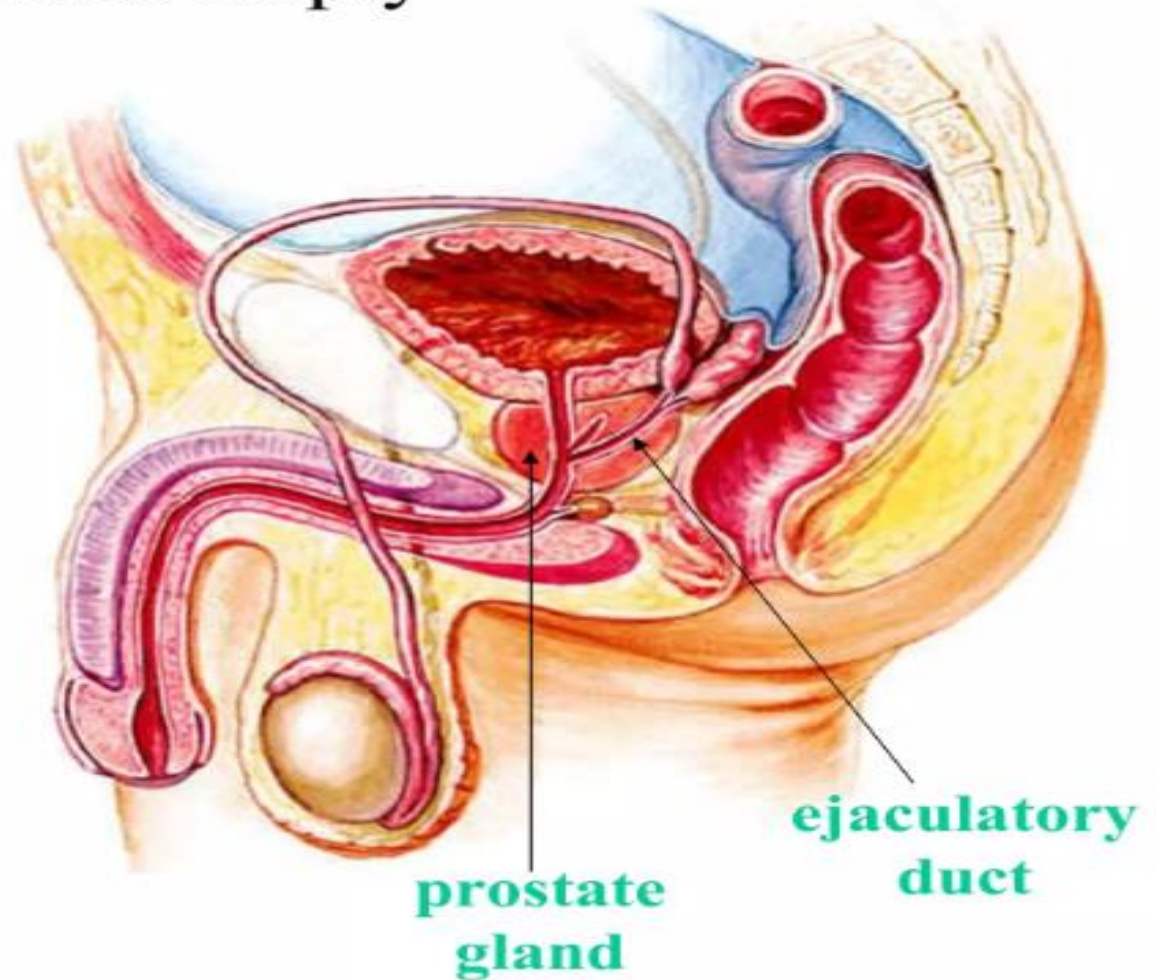
**Seminal vesicle** – secretes a slightly alkaline mucus which contains fructose (food source for the sperm) and prostaglandin (a hormone that produces uterine contractions).





**Ejaculatory duct** – area where vas deferens and seminal vesicles empty during ejaculation.

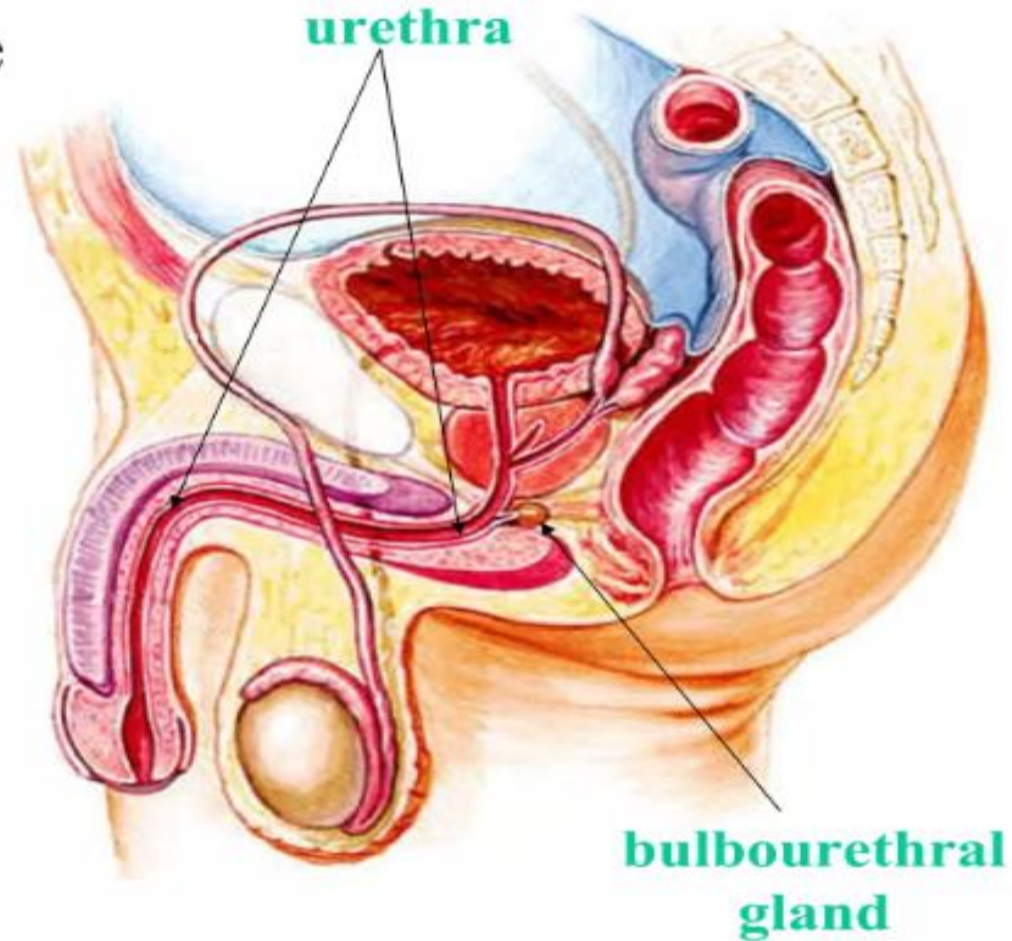
**Prostate gland** – where the ejaculatory duct passes through and meets the urethra. Contracts during ejaculation to empty secretions to the mix. Highly alkaline, mucus secretion.



## **Bulbourethral gland**

(Cowper's gland) – secretes a viscid, alkaline secretion that cleanses urethra and lubricates penis.

**Urethra** – common tube from bladder and reproductive organs. Carries ejaculate out of the body.

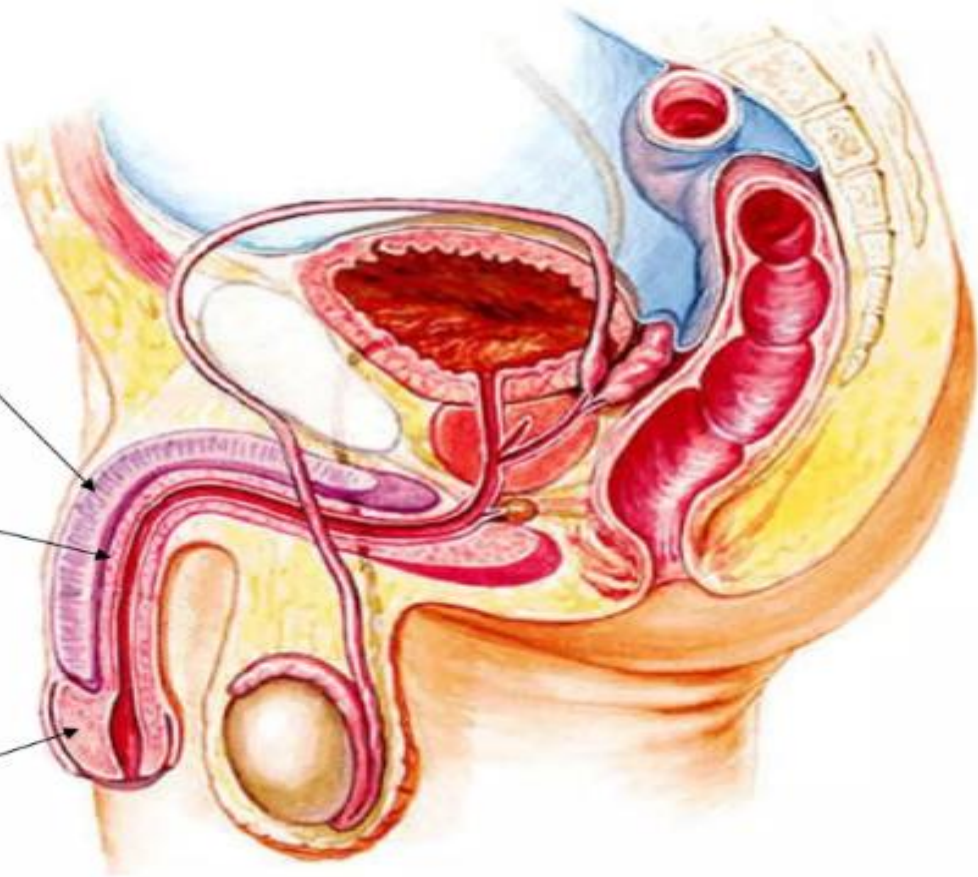




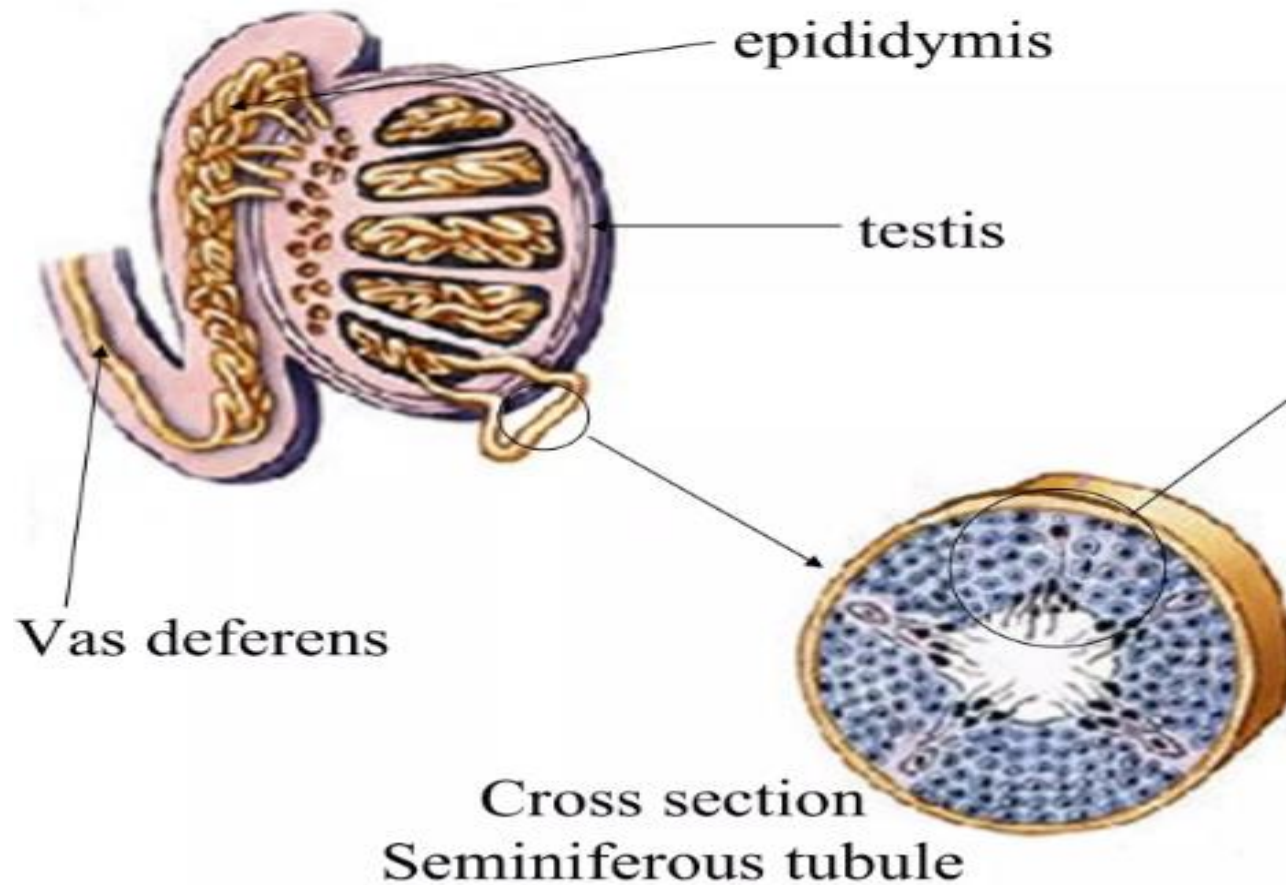
**Penis** – organ of ejaculate delivery.

The shaft of the penis is composed of two types of “*erectile tissue*” called the *corpus cavernosa* and the *corpus spongiosum*.

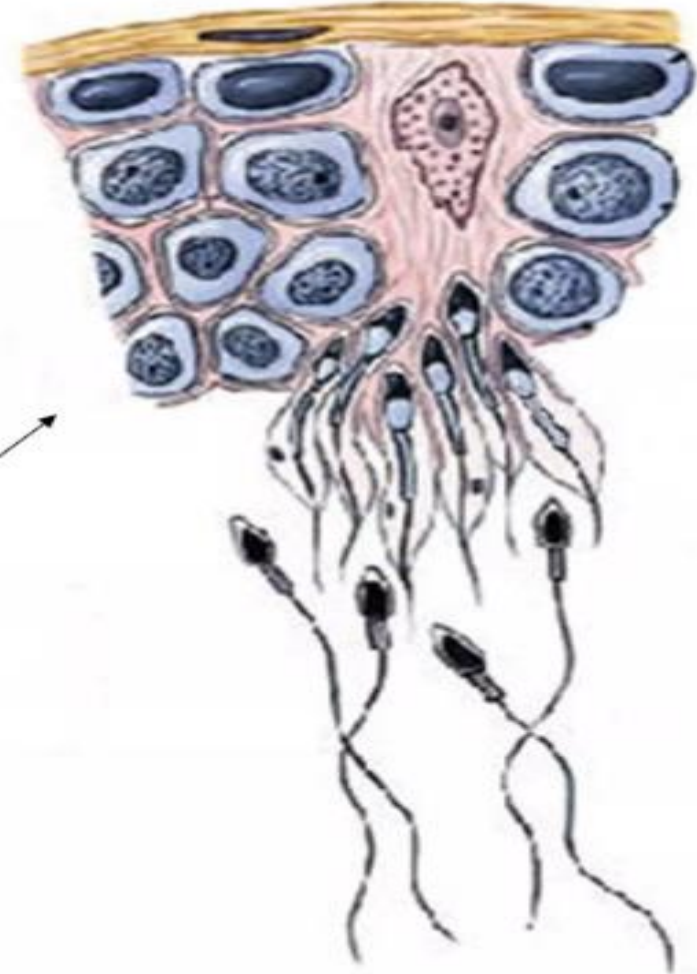
The corpus spongiosum enlarges at the distal end to form the *glans penis*.



**Seminiferous tubules** – tubes in testes where sperm are formed and begin maturation.

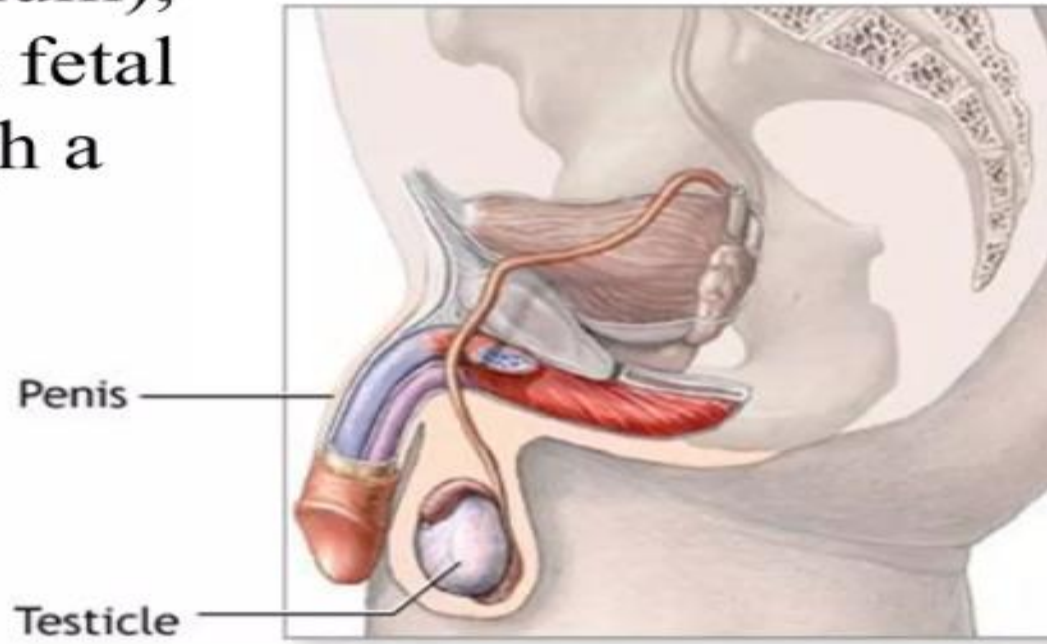


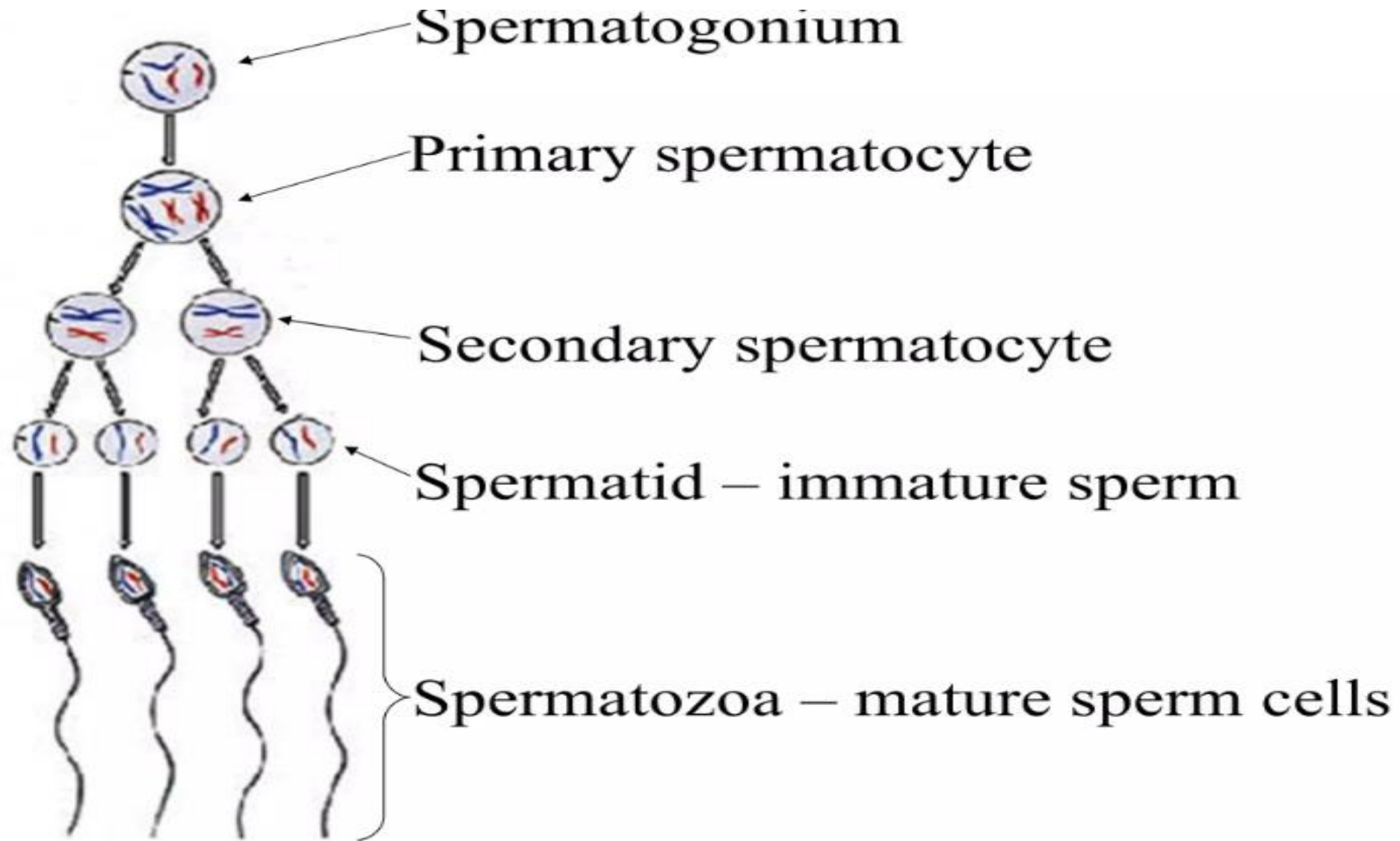
spermatogenesis





The *testicles or testes* are the male reproductive organs responsible for the production of sperm cells through the process of *spermatogenesis*. This process starts at the age of about 13 and continues throughout a man's life. Cells called *spermatogonia* (singular = spermatogonium), which are formed during fetal life, begin to pass through a sequence of stages that produce *spermatozoa* or mature sperm cells. The process of *spermatogenesis* is as follows:







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The process of division with chromosomal reduction is called meiosis. This process helps to reduce the normal complement of 23 pairs or 46 chromosomes to a simple complement of 23 chromosomes (**diploid** to **haploid**). This process of development takes about 74 days. The process also must occur at a body temperature about 3 to 5 degrees below that of normal body temperature. This is why the testes are located external to the body. Normal sperm production will produce about 120 million sperm per ml of semen. If the number drops below 20 million then functional infertility has occurred.

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**Factors that can dramatically reduce  
sperm production:**

High temperature

Alcohol – excessive

X- Rays and chemotherapy

Drugs – of various types



Thank you for listening!