

MALE REPRODUCTIVE SYSTEM

- The male reproductive system is found in the lower part of the body called the pelvic region. It consists of two testes, additional ducts, extra glands, and the external genitalia.
- In addition to the male reproductive system, there are some other noticeable features in males during puberty, like facial and chest hairs, broad shoulders, narrow hips, an Adam's apple (which leads to a lower-pitched voice), breathing from the abdomen, and a higher metabolic rate.
- Males typically go through puberty between the ages of 13 and 16.

Resonate the Concept

The main organs responsible for reproduction are the testes in males and ovaries in females, both originating from a layer called mesoderm. These organs not only make reproductive cells (gametes) but also release hormones related to sex. The growth, maintenance, and functions of these organs are controlled by hormones called gonadotropins (FSH, LH) from the front part of the pituitary gland. Other essential organs involved in reproduction, even though they don't create gametes or release sex hormones, are known as secondary sex organs. In males, these include the prostate, seminal vesicles, vas deferens, and penis. In females, the secondary sex organs are the fallopian tubes, uterus, vagina, and mammary glands.

Testes:

- Testes, also called testicles, come in pairs and are oval-shaped structures about 4-5 cm long and 2-3 cm wide.
- They start forming on the back of the embryo's belly and usually make their way down into a pouch-like area called the scrotum around the seventh month of fetal development.
- Testosterone, a hormone, plays a role in helping them move down. That's why in adult human males, the testes are found outside the belly, in the scrotum.

Scrotum:

- The two testis are each held in a fleshy sac called the scrotum.
- The scrotum helps in maintaining the low temperature of the testes ($2 - 2.5^{\circ}\text{C}$ lower than the normal internal body temperature), which is necessary for spermatogenesis.
- The two muscles that regulate the temperature of the testes are the dartos and cremaster muscles:

Dartos Muscle:

The dartos muscle is a layer of smooth muscle fibers in the subcutaneous tissue of the scrotum (surrounding the scrotum). This muscle is responsible for wrinkling up the scrotum, in conditions of cold weather, in order to maintain the correct temperature for spermatogenesis.

Cremaster Muscle:

It is a thin strand of skeletal muscle associated with testes and spermatic cord. It is responsible for raising and lowering the testes to keep them at the correct temperature.

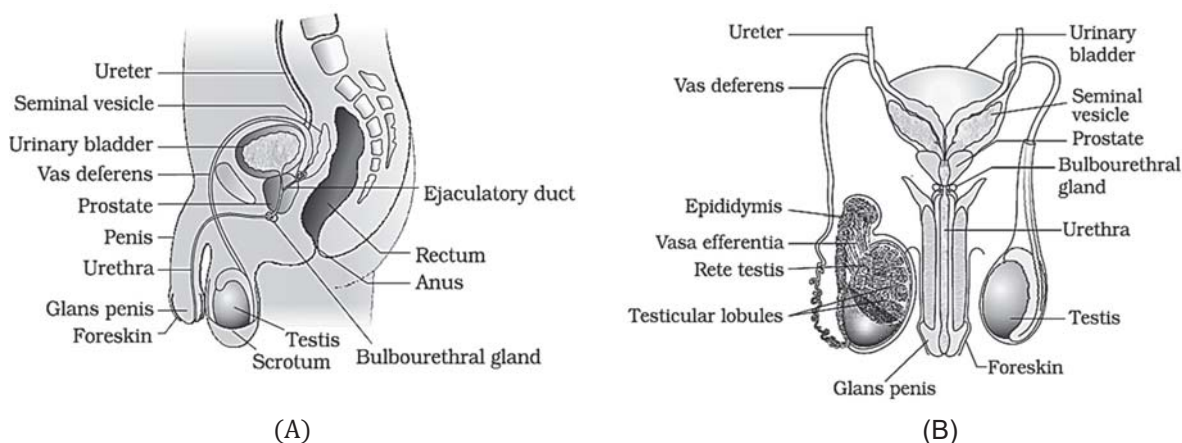


Fig. : (A) Diagrammatic sectional view of male pelvis showing reproductive system, (B) Diagrammatic view of male reproductive system (part of testis is open to show inner details)

Accessory Glands of male**Seminal Vesicles**

These are paired, twisted tubes located behind the bladder. They release a thick fluid that makes up the main part of what is ejaculated. This fluid contains fructose, inositol, and prostaglandins.

Prostate Gland

Shaped like a chestnut, the prostate gland is made up of 30-40 tubular glands. It sits at the base of the bladder and surrounds the first part of the urethra. It adds an alkaline substance to semen, although the main alkaline contribution comes from the seminal vesicles. The alkaline substances from the prostate help sperm become active and counteract any harmful effects from urine. The fluid from the prostate gives a distinct smell to the ejaculated fluid. The prostate gland also releases calcium, phosphate ions, and profibrinolysin. Inflammation of the prostate gland is known as prostatitis.

Bulbourethral Glands or Cowper's Glands

These two pea-sized structures are near the urethra's base. They release a thick mucus that acts as a lubricant.

The duct system, accessory glands, and penis are secondary male sex organs. Testosterone, produced by Leydig cells, promotes their growth, maintenance, and functions. On the other hand, the growth, maintenance, and functions of seminiferous tubules and Leydig cells are regulated by FSH and ICSH from the anterior pituitary gland.

Semen

Semen is a mix of sperm and a liquid called seminal fluid. This fluid includes secretions from different parts like the seminiferous tubules, seminal vesicles, prostate gland, and bulbourethral glands. During one release, the average amount of semen is between 2.5 to 5 milliliters, containing 200 to 300 million sperm. For good fertility, at least 60 percent of these sperm should have a normal shape and size, and at least 40 percent must move actively. If the sperm count drops below 20 million per milliliter, it may lead to infertility.

Semen has a slightly basic pH (around 7.2-7.7), thanks to the higher pH and larger fluid volume from the seminal vesicles. The prostatic secretion gives semen a milky look, while the fluids from the seminal vesicles and bulbourethral glands make it thick. Semen acts as a transportation medium and provides nutrients for sperm. It also balances the typically acidic environment of the male urethra (due to urine) and the female vagina.

Important Point:

- If one or both the testes in human male fail to descend into the scrotum, the condition is called cryptorchidism. If both the testes fail to descend, it results in sterility. Orchiopexy is surgery to correct it.
- There are certain mammals in which the testes remain permanently in the abdomen and does not cause any defect. Examples are elephant, aquatic mammals like whales, dolphins, seal and prototherians or egg laying mammals like Ornithorhynchus.
- In mammals which breed seasonally, the testes descend into scrotum only during the breeding season, example Rat, Bat and Other.