

The Male Reproductive System





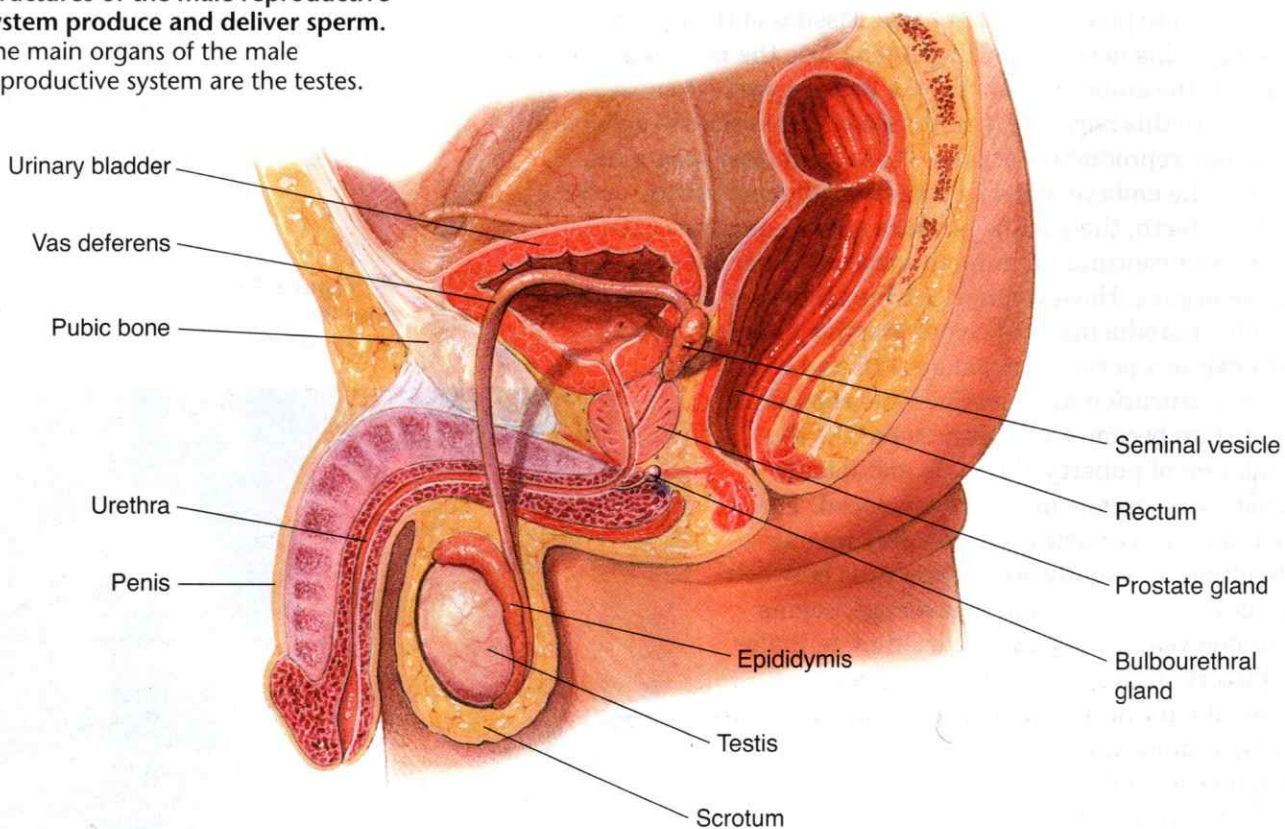
The release of FSH and LH stimulates cells in the testes to produce testosterone. FSH and testosterone stimulate the development of sperm. Once large numbers of sperm have been produced in the testes, the developmental process of puberty is completed. The reproductive system is now functional, meaning that the male can produce and release active sperm.  **The main function of the male reproductive system is to produce and deliver sperm.**

Figure 39-12 shows the structures of the male reproductive system. The primary male reproductive organs, the testes, develop within the abdominal cavity. Just before birth (and sometimes just after) the testes descend through a canal into an external sac called the **scrotum**. The testes remain in the scrotum, outside the body cavity, where the temperature is about one to three degrees lower than the normal temperature of the body (37°C). The lower temperature is important for proper sperm development. Within each testis are clusters of hundreds of tiny tubules called **seminiferous** (sem-uh-NIF-ur-us) **tubules**. The seminiferous tubules are tightly coiled and twisted together. Sperm are produced in the seminiferous tubules.

 **CHECKPOINT** What is the role of the seminiferous tubules?

 **Figure 39-12**  The main structures of the male reproductive system produce and deliver sperm. The main organs of the male reproductive system are the testes.



Sperm Development Sperm are derived from specialized cells in the testes that undergo the process of meiosis to form the haploid nuclei of mature sperm. Recall that a haploid cell contains only a single set of chromosomes.

A sperm cell is illustrated in **Figure 39–13**. A sperm cell consists of a head, which contains a highly condensed nucleus; a midpiece, which is packed with energy-releasing mitochondria; and a tail, or flagellum, which propels the cell forward. At the tip of the head is a small cap that contains an enzyme vital to the process of fertilization.


Sperm produced in the seminiferous tubules are moved into the **epididymis** (ep-uh-DID-ih-mis). This is the structure in which sperm fully mature and are stored. From the epididymis, some sperm are moved into a tube called the **vas deferens**. The vas deferens extends upward from the scrotum into the abdominal cavity. Eventually, the vas deferens merges with the **urethra**, the tube that leads to the outside of the body through the **penis**.

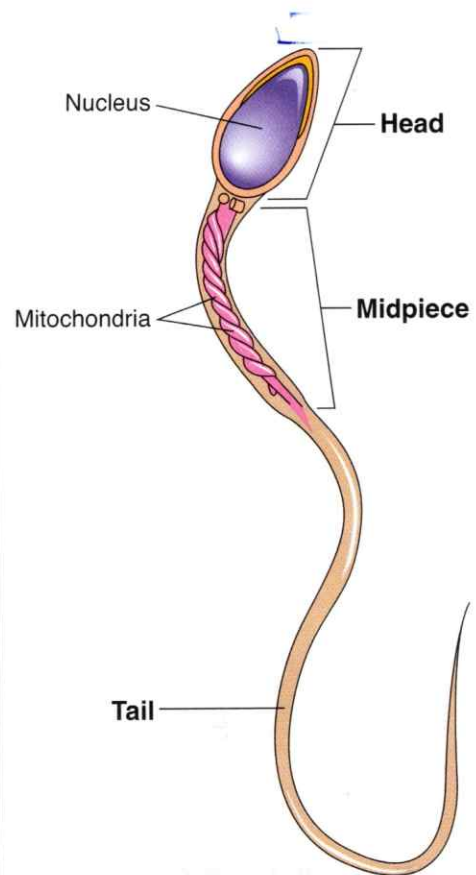
Glands lining the reproductive tract—including the seminal vesicles, the prostate, and the bulbourethral (bul-boh-yoo-REE-thrul) glands—produce a nutrient-rich fluid called seminal fluid. The seminal fluid nourishes the sperm and protects them from the acidity of the female reproductive tract. The combination of sperm and seminal fluid is known as semen. The number of sperm present in even a few drops of semen is astonishing. Between 50 and 130 million sperm are present in 1 milliliter of semen. That's about 2.5 million sperm per drop!

Sperm Release When the male is sexually aroused, the autonomic nervous system prepares the male organs to deliver sperm. Sperm are ejected from the penis by the contractions of smooth muscles lining the glands in the reproductive tract. This process is called ejaculation. Because ejaculation is regulated by the autonomic nervous system, it is not completely voluntary. About 2 to 6 milliliters of semen are released in an average ejaculation. If these sperm are released in the reproductive tract of a female, the chances of a single sperm fertilizing an egg, if one is available, are quite good.

The Female Reproductive System

The primary reproductive organs in the female are the ovaries. The ovaries are located in the abdominal cavity. As in males, puberty in females starts when the hypothalamus signals the pituitary gland to release FSH and LH. FSH stimulates cells within the ovaries to produce estrogen.

 **The main function of the female reproductive system is to produce ova. In addition, the female reproductive system prepares the female's body to nourish a developing embryo.** In contrast to the millions of sperm produced each day in the male reproductive system, the ovaries usually produce only one mature ovum (plural: ova), or egg, each month.



▲ **Figure 39–13** The sperm is the male gamete, or sex cell.
Interpreting Graphics What are the three sections of a sperm cell?

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Egg Development Each ovary contains about 400,000 primary **follicles**, which are clusters of cells surrounding a single egg. The function of a follicle is to help an egg mature for release into the reproductive tract, where it can be fertilized. Eggs develop within their follicles.

Although a female is born with thousands of immature eggs (primary follicles), only about 400 eggs will actually be released. Approximately every 28 days, under the influence of FSH, a follicle gets larger and completes the first meiotic cell division. When meiosis is complete, a single large haploid egg and three smaller cells called polar bodies are produced. The polar bodies have very little cytoplasm and soon disintegrate.

Egg Release When a follicle has completely matured, its egg is released in a process called **ovulation**. The follicle breaks open, and the egg is swept from the surface of the ovary into the opening of one of the two **Fallopian tubes**. The egg moves through the fluid-filled Fallopian tube, pushed along by microscopic cilia lining the walls of the tube. During its journey through the Fallopian tube, an egg can be fertilized. After a few days, the egg passes from the Fallopian tube into the cavity of an organ known as the **uterus**. The lining of the uterus is ready to receive a fertilized egg, if fertilization has occurred. The outer end of the uterus is called the **cervix**. Beyond the cervix is a canal—the **vagina**—that leads to the outside of the body. The structures of the female reproductive system are shown in **Figure 39-14**.

▼ **Figure 39-14** 🔄 The main function of the female reproductive system is to produce ova. The ovaries are the main organs of the female reproductive system.

