

The Reproductive System: Male

I. ORGANS OF THE MALE REPRODUCTIVE SYSTEM

A. **Testes** = the primary male sex organs which produce sperm and male sex hormones.

1. Ovoid structures held within the **scrotum** (outside the male body)
2. Internal structure of testis:
 - a. Each testis is divided into lobules
 - b. Each lobule contains:
 - **Seminiferous tubules** (producing sperm cells under the influence of what hormone?), which are separated by:
 - **Interstitial cells** (produce male sex hormones under the influence of what hormone?)
 - c. The seminiferous tubules unite and give rise to the **epididymis** on the outer surface of the testes.
3. **Germinal epithelium**
 - a. The seminiferous tubules are lined by **stratified epithelium**
 - b. This germinal epithelium consists of two types of cells:
 - **Spermatogenic cells** which give rise to sperm cells
 - **Supporting (nurse) cells** which support and nourish the spermatogenic cells
4. **Spermatogenesis:**
 - a. Males produce sperm from puberty and then throughout life.
 - b. The sperm is produced in the germinal epithelium of the seminiferous tubules
 - c. Sperm cells are produced from **spermatogonia cells**, which contain **23 pairs or 46 chromosomes**
 - d. Meiosis reduces this number by one half, so that the number of chromosomes in mature sperm cells is 23 chromosomes
 - e. Overall sequence:
 - One **spermatogonium** (23 pairs of chromosomes) duplicates its DNA. This gives rise to:
 - One **primary spermatocyte** (23 duplicated pairs of chromosomes) which undergoes meiosis I. This gives rise to:
 - Two **secondary spermatocytes** (each with 23 duplicated chromosomes), which undergo meiosis II. This gives rise to:
 - Four **spermatids** (each with 23 chromosomes). These cells mature into:
 - Four **sperm cells** (each with 23 chromosomes). The sperm cells collect in the lumen of the seminiferous tubules.
 - f. The sperm travel to, mature, and are stored in the epididymis.
5. **Sperm structure:** The structure of a mature sperm consists of a head, a body, and a tail:
 - a. The **Head**
 - Contains 23 chromosomes and
 - Is covered by a helmet like structure called an **acrosome**, which contains enzymes to help penetrate the oocyte.

- b. The **Body** (mid-piece)
 - Contains many mitochondria needed to produce ATP for energy for the sperm cell to complete its long journey.
- c. The **Tail**
 - Is a flagellum
 - Provides locomotion for the sperm cell
 - See box insert concerning toxic chemicals that affect a sperm's ability to swim.

6. **Hormonal Control** of the testes:

- a. At puberty, the **hypothalamus** secretes a releasing hormone that targets the male's anterior pituitary gland.
- b. The **anterior pituitary gland** then secretes two gonadotropins:
 - **Follicle Stimulating Hormone (FSH)**, which stimulates spermatogenesis in the germinal epithelium of seminiferous tubules. And
 - **Luteinizing Hormone (LH)**, which stimulates the interstitial cells between the seminiferous tubules to produce male sex hormones.
- c. Male sex hormones (**Androgens**)
 - **Testosterone** is the major androgen whose production begins at puberty.
 - Testosterone targets the secondary sex organs of the male:
 - Facial, axillary, and inguinal hair follicles.
 - Bone and muscle.
 - Vocal cords of larynx
 - Actions include development of male **secondary sexual characteristics** at puberty and then maintenance throughout life
 - Increased growth of body hair
 - Lower pitched voice
 - Increased muscular growth
 - Strengthening of bones