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:
         • Spermatogonial cells which give rise to sperm cells
         • Supporting (nurse) cells which support and nourish the spermatogonial 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