MALE REPRODUCTIVE ANATOMY

Basic components of the male reproductive system are the: scrotum, testis, spermatic cord, excurrent duct system (epididymis, ductus deferens, urethra), accessory sex glands, and penis and associated muscles (Figures 3-1, 3-2 to 3-4)

I. SCROTUM (Fig. 3-11, 3-15)

A. Function
   1. Thermoregulation/radiation
   2. Protection and support of testis
B. Thermoregulation Mechanism (Figure 3-11)
   Sweat glands and thermosensitive nerves are involved
C. Scrotum layers (Figure 3-2 & 3-15)
   1. Skin
   2. Tunica dartos (dartos muscle)
      - Smooth muscle
      - Elevate the testes for a sustained period of time in response to temperature or stress
II. Spermatic Cord (Figure 3-4; Bull)

A. Function

1. Suspends the testis in the scrotum
2. Provides pathway to and from the body for the testicular vasculature, lymphatics, and nerves
3. Thermoregulation Mechanism (Figures 3-9, 3-10)
   - **Pampiniform plexus**: Provides a countercurrent heat exchange mechanism and act as a pulse pressure eliminator
4. Houses the **cremaster muscle** (see Figure 3-2)
   - Primary muscle supporting the testis
   - Coursing the length of spermatic cords
   - Involves with testicular temperature regulation
   - Striated muscle, short-term elevation of testes (NOT capable of sustained contraction like the tunica dartos in the scrotum)
5. Houses the **ductus deferens**
   - Responsible for sperm transport from epididymis to the urethra

III. TESTIS (Fig. 3-14, 3-15)

A. Functions

1. Produce male germ cells (spermatozoa)
2. Produce male steroid hormone (testosterone)
3. Produce inhibin and estrogen, and other proteins
B. Structures (Figure 3-14)

**Testicular Capsule: (Two layers)**

1. Tunica vaginalis
   - a. Thin membrane
   - b. Provides support
   - c. From peritoneum
2. Tunica albuginea
   - a. Connective tissue
   - b. Provides structure

**Mediastinum:**
- a. Connective tissue
- b. Provides internal support

**TesticularParenchyma (Figure 3-15):**

1. **Seminiferous tubule**
   - a. Site of sperm production
   - b. Consists of 2 cell types (Figure 3-16)
     i. **Germ cells** (eventual sperm cells)
     ii. **Sertoli or nurse** cells

   - Produce variety of substances
   - including *androgen binding protein, sulfated glycoprotein, transferrin, and inhibin*
   - Surround developing germ cells
   - Providing structural and metabolic support to the developing spermatogenic cells

**Blood-testis Barrier (Figure 3-16):**
- Cells surrounding the seminiferous tubules
- Prevent autoimmune reaction from destroying the developing germ cells

**Interstitium: (Leydig cells)**
- a. Located between seminiferous tubules
- b. Produce **androgens (testosterone)**
6. Rete testis
- a. Collect sperm from seminiferous tubules
7. Vasa efferentia (efferent ductules)
   - a. Collect sperm from rete testis
   - b. Carry sperm out of testis proper
IV. EPIDIDYMIS (Figure 3-18)

A. Morphology
   1. Three parts:
      a. Head (caput)
      b. Body (corpus)
      c. Tail (cauda)

B. Functions
   In the epididymis spermatozoa gain the ability to fertilize an oocyte
   1. **Sperm transport:**
      a. Transport time varies with species
         (1) boars: 9-14 days
         (2) rams: 12 days
         (3) bulls: 14 days
   2. **Sperm maturation**
   3. **Sperm motility**
   4. **Sperm concentration**
   5. **Storage** (Bull = 50-75 billion sperm)
   6. **Production of compounds** (e.g. Glycerol phosphocholine (GPC))

V. VAS DEFERENS/DUCTUS DEFERENS (Figures 3-14, 3-15, 3-19 & 3-20)

A. Paired Ducts
B. Turns into **ampullae** (wide end of the vas deferens) *Not present in boars
C. Function = sperm transport from epididymis to pelvic urethra
D. Ligation = vasectomy

VI. ACCESSORY SEX GLANDS

Accessory glands contain variety of components and ions including citric acid, inositol, and prostaglandins

A. Vesicular glands (Seminal Vesicles) *(Figure 3-15)*
   1. Paired glands
   2. Located at junction of urethra & vas deferens

Adapted from Senger ©
3. Have rough structure
4. Contribute **largest volume** of seminal fluid
5. Add the following
   a. Fructose & sorbitol -- energy sources
   b. Phosphate & bicarbonate -- buffers

**B. Prostate Gland** *(Figure 3-15)*
1. Located caudal to seminal vesicles and close proximity to pelvic urethra
   a. Bi-lobulated in bull & boar
   b. Diffuse in ram (scattered around pelvic urethra)
   c. Surrounds urethra in dogs & humans
2. Only accessory gland found in dogs*
3. Functions to cleanse & lubricate
4. Secretes just prior to & during ejaculation

**C. Bulbourethral Glands** *(Cowper's gland)* *(Figure 3-19 & 20)*
1. Paired glands
2. Usually buried under **bulbospongiosus muscle**
3. Small & round in bull, ram, stallion, and man
4. Larger & longer in boar
5. Function:
   a. Bull: cleanse urethra prior to ejaculation
   b. Boar: produces gel fraction and adds considerable volume to ejaculate

**D. Colliculus Seminalis**
1. Region of urethra where sperm mixes with seminal vesicle secretions
2. Mixing incomplete in stallion, boar
   a. Sperm-free fraction & Sperm-rich fraction

**VII. PENIS** *(Figures 3-3 to 3-21 & 3-22)*
A. Definition: male copulatory organ consists of a base, a shaft, the glans penis, and crus penis
B. Anatomy
1. **Two erectile tissues:**
   a. **Corpus spongiosum** -- surrounds urethra and involves in erection by allowing rushing of blood into it
   b. **Corpus cavernosum** -- involves in erection by allowing rushing of blood into it
2. **Retractor penis muscle** *(bull, boar, stallion, ram, and buck)*
   - Pair of smooth muscles
   - Dorsally attached to tail vertebrae and it holds the penis inside the sheath in the
3. Three parts:
   a. **Base/root**
   b. **Shaft**
   c. **Glans penis** - Specialized distal end, contains sensory nerves

4. **Crus penis** – posterior portion of

5. **Sheath**: covers penis

C. **Two Classifications**

1. **Fibroelastic** (Bull, boar, buck, ram)
   a. Tunica albuginea – dense connective tissue
   b. Sigmoid flexure – S-shaped configuration along shaft of penis that allows penis to be retracted inside sheath until erection occurs
   c. Relies on muscle contractions/sigmoid flexure for erection

2. **Musculovascular** (Stallions, humans)
   a. Erection relies on blood engorgement within corpus spongiosum and cavernosum

D. **Glans Penis Modifications**

1. Bull: No modification
2. Ram & Buck: filiform appendage/ urethral process
3. Stallion: bell
4. Boar: corkscrew
5. Dog: bulbus glandis
6. Tomcat: spines