CHAPTER 26
The Reproductive System

Reproductive System Components
- Gonads
  - Testes & Ovaries
- Gametes
  - Sex Cells - Sperm & Ova
- Ducts
  - Transport and store gametes
- Accessory sex glands
  - Produce material that support and protect gametes
- Supporting structures
  - Facilitate delivery and joining of gametes

Male Reproductive System
- Scrotum
  - Sac that encloses & supports the testes
- Raphe
- Scrotal septum
- Dartos muscle
- Spermatic cord
  - Cremaster muscle
- Vas deferens
- Artery & vein

Temperature Regulation
- Sperm production
  - Temperature sensitive
  - 3 degrees below normal body temperature
- Dartos & cremaster muscles
  - Cold external temperatures
  - Sexual arousal

Male Reproductive System
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Testes
- Lobules
  - 200-300/testicle
- Contain seminiferous tubules
  - Sertoli cells (nurse cells)
    - Protect & nourish developing sperm cells
- Leydig cells (interstitial endocrinocytes)
  - Secrete testosterone

TABLE 27.2
Summary of Homologous Structures of the Female and Male Reproductive Systems

<table>
<thead>
<tr>
<th>Female Structures</th>
<th>Male Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovaries</td>
<td>Testes</td>
</tr>
<tr>
<td>Ovum</td>
<td>Sperm cell</td>
</tr>
<tr>
<td>Labia majora</td>
<td>Scrotum</td>
</tr>
<tr>
<td>Labia minora</td>
<td>Spongy (penile)</td>
</tr>
<tr>
<td>Vestebule</td>
<td>Membranous urethra</td>
</tr>
<tr>
<td>Bulb of vestibule</td>
<td>Corpus spongiosum penis and bulb of penis</td>
</tr>
<tr>
<td>Clitoris</td>
<td>Glans penis and corpora cavernosa</td>
</tr>
<tr>
<td>Paraurethral glands</td>
<td>Prostate</td>
</tr>
<tr>
<td>Greater vestibular glands</td>
<td>Bulbourethral (Cowper’s) glands</td>
</tr>
</tbody>
</table>
Spermatogenesis

- Process of spermatogonia developing into mature sperm
- Meiosis
  - Chromosome # halves to 23 (1N)
- Spermeogenesis
  - Spermatid develops a head and tail
  - Acrosome contains enzymes
  - ~ 300 million produced/day
  - Survive ~ 48 hours or up to 5 days inside female

Ducts

- Seminiferous tubules
- Straight tubules
- Rete testis
- Efferent ducts
- Epididymis
  - ~ 20 feet long
  - Where sperm mature ~ 12 days
  - Stored for up to a month
- Ductus deferens
- Vas deferens
Accessory Sex Glands
- Seminal Vesicles
  - ~ 2 inches long
  - Secrete alkaline fluid
  - 60-70% of semen
  - Fructose
  - Prostaglandins
  - Combine with ampulla of vas deferens to form the ejaculatory ducts

Accessory Sex Glands
- Prostate gland
  - Secretes milky fluid
  - 20-30% of semen
- Prostate cancer
  - Similar prevalence as breast cancer in women
  - PSA test
  - Digital exam
  - 90% recover if caught early
- BPH – benign prostatic hyperplasia - Flomax

Normal prostate
- Enlarged prostate

Accessory Sex Glands
- Cowper’s gland
  - Bulbourethral gland
  - Pea-sized gland
  - Secretes clear alkaline substance
  - Precum
  - Neutralizes acids from urine in urethra

Semen
- Mixture of sperm & seminal fluid
- Secretions from:
  - Seminiferous tubules – sperm ~ 1%
  - Seminal vesicles ~ 70%
  - Prostate ~ 30%
  - Bulbourethral glands
  - 2.5 - 5 ml = 0.5 - 1 tsp
  - ~ 50 - 150 million sperm/ml (~ 300 mil/ejac)
  - < 20 million sperm/ml – sterile
  - 2-5 days in female tract

Penis
- Passage for delivery
  - Ejaculation of semen
  - Excretion of urine
- 3 masses of erectile tissue
  - Sinuses fill w/ blood during arousal
  - 2 corpora cavernosa
  - 1 corpus spongiosum
    - Contains urethra
    - Expanded area forms the glans penis
Female Reproductive System

- Ovaries
- Uterine tubes = Oviducts = Fallopian tubes
- Uterus
- Vagina
- Vulva = Pudendum
- Mammary glands (secondary sex characteristic)

Ovaries

- Produce eggs (oogenesis)
- Begins before birth; meiosis starts during fetal development
- ~ 200,000 – 2 million oogonia & 1 oocyte per ovary
- Only 40,000 remain at puberty
- Ovulate ~ 400/lifetime
- Produce estrogen & progesterone

Ovary

- Fallopian tubes or oviducts
- Transport secondary oocytes & fertilized ova to uterus
- ~ 4 inches long
- Isthmus
- Ampulla
- Infundibulum
- Fimbriae

Uterine tubes

- Ciliated columnar epithelium
- Inner circular muscle
- Outer longitudinal muscle
- Serosa

Uterus & Oviducts

- Corpus luteum
- Corpus albicans
- Corpora cavernosa
- Corpora nigra
- Ciliated columnar epithelium
- Inner circular muscle
- Outer longitudinal muscle
- Serosa

Transverse section through uterus and Fallopian tube

- Blood vessels
- Uterus
- Oviduct
- Lumen of uterine tube
- Muscles
- Necrotic tissue
- Serosa
- Necrotic columnar cell
- Necrotic glandular
- Necrotic connective tissue
**Uterus**

- Site of menstruation
- Site of implantation
- Site of fetal development
- Cervix
- 3 layers
  - Epimetrium
  - Visceral peritoneum
  - Myometrium
- Endometrium
  - Stratum basalis
  - Stratum functionalis

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**Vagina**

- Outlet for menstrual flow
- Receives the penis during intercourse
- Passage for childbirth
- Extends from introitus to cervix
- Rugae
- Extends and elongates during intercourse
- Nonkeratinized stratified squamous epithelium
Vulva = Pudendum

- Mons pubis
- Labia majora
- Labia minora
- Clitoris
  - Sexual pleasure
- Vestibule
  - Hymen
  - Vaginal orifice = introitus
  - External urethral orifice

Mammary Glands

- Secondary sex characteristic
- Suspensory ligament – Cooper’s ligament
- Lobules
  - Contain alveoli
  - Mammary ducts
  - Lactiferous ducts
- Areola
- Nipple
Learning Objectives

- Discuss the different components of the reproductive system and give the homologous structures between the male and female.
- List the parts of the male reproductive system and give the functions of each (include the accessory sex organs).

Learning Objectives

- Define spermatogenesis and discuss sperm maturation in terms of location and anatomy. Which structures produce sperm? Which structure is responsible for sperm maturation? What are the roles for the sertoli and Leydig cells? Describe the pathway (series of ducts) that sperm have to travel to leave the body.

Learning Objectives

- Discuss the effect of temperature on spermatogenesis and give the roles for the cremaster and the dartos muscles.
- Discuss the prostate gland's function and discuss how we screen for prostate cancer.
- Which structures produce seminal fluid and what proportions are they found in the ejaculate?

Learning Objectives

- Name and describe the locations of the erectile tissue of the penis.
- Describe the following female structures: vulva, introitus, clitoris, vagina, Fallopian/uterine/ tubes/oviducts, uterus, ovary.
- In which of these structures would you find the infundibulum? What is the difference between the infundibulum and the ampulla?

Learning Objectives

- To which structure are the fimbria attached?
- Which of these structures has sexual pleasure as its only function?
- Which structure is the site of fertilization?
- Name the layers of the endometrium. Which endometrial layer is sloughed off during menstruation?
Learning Objectives

- How is the ovum moved toward the uterus?
- What structures make up the vulva/pudendum.
- Name the structures associated with the breast.