Memmler’s
The Human Body in Health and Disease
11th edition

Chapter 23
The Male and Female Reproductive Systems
Reproduction

Asexual (nonsexual)
- One-celled organisms
- Divide themselves

Sexual
- Males and females
- Specialized sex cells (germ cells or gametes)
  - Male are spermatozoa (sperm cells)
  - Female are ova (egg cells)
Male reproductive system. Organs of the urinary system are also shown.

Zooming In: What four glands empty secretions into the urethra?
Meiosis

Cell division process

- Halves the number of chromosomes in cell
- Produces gametes
- Human gametes have 23 chromosomes
The Male Reproductive System

Two groups of organs

- Primary
  - Gonads (testes)

- Accessory
  - Ducts
  - Exocrine glands
The Testes

Located outside the body proper

- Scrotum
- Inguinal canal
- Spermatic cord
Internal Structure

Specialized tissue in testis

- Seminiferous tubules: coiled primitive cells that hold immature sperm
- Sustentacular cells: nurse cells
- Interstitial cells: secrete testosterone
Testosterone

- Male sex hormone functions
- Develops and maintains reproductive structures
- Develops spermatozoa
- Develops secondary sex characteristics
  - Deeper voice
  - Broader shoulders
  - Narrower hips
  - More muscle tissue
  - More body hair
The Spermatozoa

Individual cells manufactured in seminiferous tubules

- Head
  - Nucleus
  - Acrosome: cap that helps sperm penetrate ovum
- Midpiece
  - Mitochondria
- Tail (flagellum)
Accessory Organs

System of ducts that transports spermatozoa

- Tubules
- Epididymis: 6 meters long...where sperm matures
- Ductus deferens (vas deferens): tube traveling upward
- Seminal vesicle: semen creation
- Ejaculatory duct: travel through the body of the prostate gland out through the urethra
Semen

Mixture of sperm and secretions from various organs

- **Seminal vesicles**: seminal fluid is a large part of semen’s volume
- **Prostate gland**: secretions here help neutralize the acidity of the vaginal tract, and has muscular tissue to help with ejaculation
- **Bulbourethral glands (Cowper glands)**: secrete mucus to lubricate the urethra and the tip of the penis
- **Functions**:
  - Nourish & transport spermatozoa
  - Neutralize acidity of male urethra and female vagina
  - Lubricate reproductive tract during intercourse
  - Prevent infection with antibacterial enzymes and antibodies
The Urethra and Penis

Urethra

- Carries urine from bladder
- Carries reproductive cells outside body

Penis

- Corpus spongiosum: contains the urethra
- Corpus cavernosum: on either side
- Glans penis: enlargement of CS at end of penis
- Prepuce (foreskin)
Ejaculation

- Reflex centers in spinal cord initiate process
- Smooth muscle contraction in prostate
- Skeletal muscle contraction in pelvic floor
- Forceful expulsion of semen through urethra to outside
Hormonal Control of Male Reproduction

Anterior pituitary produces hormones that control testes

- Follicle-stimulating hormone (FSH)
  - Promotes spermatozoa formation
- Luteinizing hormone (LH)
  - Stimulates testosterone development
  - Aids sperm cell development
The Effects of Aging on Male Reproduction

Decreasing

- Testosterone production
- Spermatozoa production
- Prostate secretions
- Seminal vesicle secretions
Disorders of the Male Reproductive System

- Infertility
  - Sterility
- Oligospermia (tubule damage)
  - X-rays
  - Infections
  - Toxins
  - Malnutrition
- Vasectomy
**Structural Disorders**

- Cryptorchidism: failure of the testes to descend to the scrotum
- Torsion of testis: twisting of spermatic cord, most common between 8 and 18 years
- Hernia: rupture or abnormal protrusion of an organ
- Phimosis: tightness of the foreskin so it cannot be drawn back
Infections

- Sexually transmitted infection (STI) spread through sexual contact
  - Chlamydia
  - Gonorrhea
  - Genital herpes
  - Syphilis
- Epididymitis
- Prostatitis
- Orchitis
Tumors

• Prostate tumors
  – Can be benign or malignant
  – Most common cancer of males in U.S.
• Testicular tumors
The Female Reproductive System

- Ovaries (female gonads)
- Uterus
- Passageways
  - Oviduct (fallopian tube or uterine tube)
- External genital organs
Female reproductive system. The enlargement (right) shows ovulation.

**Zooming In:** What is the deepest part of the uterus called?
The Ovaries

- Located in pelvic abdomen
- Held by ligaments (remember it connects bone to bone)
- Attached to uterus and body wall
The Ova and Ovulation

• Ovarian follicle (graafian follicle)
  – Holds ripening ova
  – Secretes estrogen
  – Ruptures to discharge egg cell (ovulation)

• Oviduct
  – Tube that leads to uterus
The Corpus Luteum

Formed from remains of follicle after ovum is expelled

- Secretes estrogen and progesterone
- Usually shrinks and is replaced by scar tissue
- Remains active during pregnancy
- Can become an ovarian cyst
Accessory Organs

In females

- Oviducts: tubes that transport the ova
- Uterus: where the fetus develops to maturity
- Vagina: the distal part of the birth canal that opens to the outside of the body
- Greater vestibular glands: superior and lateral to the vaginal opening, provides lubrication
- Vulva and perineum: outer part of female rep. system.
  - Vulva: made up of two labia and the clitoris, a small organ of sensitivity
The Oviducts

- Extend from near ovary to uterus
- Not connected to ovary
- Fimbriae (fringelike extensions) produce current that sweeps ova into oviduct
- Cilia in tube lining and peristalsis (wave-like movements of the wall of an organ) of tube move ova
The Uterus

- Organ where fetus develops to maturity
- Corpus
  - Body
- Cervix
  - Neck
- Fundus
- Supporting ligaments
- Myometrium
  - Muscular wall
- Endometrium
  - Specialized epithelium lining
The Vagina

Distal part of birth canal that opens to outside of body

- Fornix
  - Posterior fornix
- Cul-de-sac (rectouterine pouch or pouch of Douglas)
- Hymen
- Greater vestibular (Bartholin) glands
Female reproductive system (sagittal section). This view shows the relationship of the reproductive organs to each other and to other structures in the pelvic cavity.

*Zooming In: Which has the more anterior opening, the vagina or the urethra?*
The Vulva and the Perineum

External parts of female reproductive system

- Vulva
  - Labia
- Clitoris
- Related structures
- Obstetrical perineum
The Menstrual Cycle

- Controlled by pituitary hormones regulated by hypothalamus
- Cyclic pattern
- Regulated by hormonal feedback
- Averages 28 days (not everyone)
Beginning of the Cycle

- Several follicles in ovary begin to develop
- Increased production of estrogen
  - Thickens endometrium
  - Elongates uterine secretion glands
  - Inhibits release of FSH (follicle stimulating hormone: development of ova and spermatozoa)
  - Stimulates pituitary to release LH (luteinizing hormones)
Ovulation

- LH surge in blood
  - Causes ovulation
  - Transforms ruptured follicle into corpus luteum that produces estrogen and progesterone
- Endometrium thickens
- Glands and blood vessels increase in size
- FSH and LH are inhibited
The Menstrual Phase

• If ovum is not fertilized, corpus luteum degenerates
  - Estrogen, progesterone levels decrease
• Endometrium degenerates, produces menstrual flow
• Endometrium begins to repair itself
• FSH released from anterior pituitary
Menopause

Menstruation ceases

- Normal ovarian function declines
  - Follicles stop ripening
  - No appreciable amounts of estrogen produced

- Uterus, oviducts, vagina, vulva become somewhat atrophied (wasting or decrease in size)

- Vaginal mucosa becomes thinner, dryer, more sensitive
Hormone Replacement Therapy

Combination of estrogen with synthetic progesterone prescribed to relieve menopause discomfort

- Increases breast cancer risk
- Increases thrombosis and embolism risk
- Risks increase with duration of therapy
Birth Control

• Hormonal methods for women
  – Male contraceptive pill still under investigation

• Barrier methods

• Mifepristone (RU486) morning-after pill for emergency contraception

• Fertility awareness
Disorders of the Female Reproductive System

Disorders that can contribute to infertility

- Menstrual disturbances
- Tumors
- Infections
Menstrual Disorders

- Amenorrhea — absence of menstrual flow
- Dysmenorrhea — painful or difficult menstruation
- Abnormal uterine bleeding
- Premenstrual syndrome (PMS)
- Endometriosis
Benign and Malignant Tumors

- Fibroids: myomas, common tumors of the uterus
- Breast cancer
  - Mammogram to detect
- Endometrial cancer
- Ovarian cancer
- Cervical cancer
  - Linked with human papillomavirus
  - Papanicolaou test to detect
Infections

- STIs
  - Chlamydia
  - Gonorrhea
  - HIV and genital herpes
  - Syphilis
  - Genital warts
  - Salpingitis: inflammation of any tube
  - Pelvic inflammatory disease (PID)
Pathway of infection. Disease organisms can travel from outside to the peritoneum and into the urinary system.
Infertility

More difficult to diagnose and evaluate in female

- Infections
- Endocrine disorders: issues with glands
- Psychogenic factors: psychological issues
- Abnormal structure and function of reproductive organs