Study Outline Chapter 26

Introduction (p. 692)

- The urinary system regulates the chemical composition of the blood and excretes nitrogenous waste.
- The reproductive system produces gametes for reproduction and, in the female, supports the growing embryo.
- Microbial diseases of these systems can result from infection from an outside source or from opportunistic infection by members of the normal microbiota.

Structure and Function of the Urinary System (p. 692)

- Urine is transported from the kidneys through ureters to the urinary bladder and is eliminated through the urethra.
- Valves prevent urine from flowing back to the urinary bladder and kidneys.
- The flushing action of urine and the acidity of normal urine have some antimicrobial value.

Structure and Function of the Reproductive System (pp. 692- 694)

- The female reproductive system consists of two ovaries, two uterine tubes, the uterus, the cervix, the vagina, and the external genitals.
- The male reproductive system consists of two testes, ducts, accessory glands, and the penis; seminal fluid leaves the male body through the urethra.

Normal Microbiota of the Urinary and Reproductive Systems (p. 694)

- The urinary bladder and upper urinary tract are sterile under normal conditions.
- Lactobacilli dominate the vaginal microbiota during the reproductive years.
- The male urethra is normally sterile.

Bacterial Diseases of the Urinary System (pp. 695- 696)

- Urethritis, cystitis, and ureteritis are terms describing inflammations of tissues of the lower urinary tract.
- Pyelonephritis can result from lower urinary tract infections or from systemic bacterial infections.
- Opportunistic gram-negative bacteria from the intestines often cause urinary tract infections.
- Nosocomial infections following catheterization occur in the urinary system. *E. coli* causes more than half of these infections.
- More than 1000 bacteria of one species per milliliter of urine, or 100 coliforms per milliliter of urine, indicates an infection.

- Treatment of urinary tract infections depends on the isolation and antibiotic sensitivity testing of the causative agents.
- Glomerulonephritis is an immune-complex disease of the kidneys.

Cystitis (p. 695)

- Inflammation of the urinary bladder, or cystitis, is common in females.
- Microorganisms at the opening of the urethra and along the length of the urethra, careless personal hygiene, and sexual intercourse contribute to the high incidence of cystitis in females.
- The most common etiologies are *E. coli* and *S. saprophyticus*.

Pyelonephritis (p. 695)

- Inflammation of the kidneys, or pyelonephritis, is usually a complication of lower urinary tract infections.
- About 75% of pyelonephritis cases are caused by *E. coli*.

Leptospirosis (pp. 695- 696)

- The spirochete *Leptospira interrogans* is the cause of leptospirosis.
- The disease is transmitted to humans by urine-contaminated water.
- Leptospirosis is characterized by chills, fever, headache, and muscle aches.
- Diagnosis is based on isolation of the bacteria and serological identification.

Diseases of the Reproductive System (pp. 696- 705)

Bacterial Diseases of the Reproductive System (pp. 696- 705)

- Most diseases of the reproductive system are sexually transmitted diseases (STDs).
- Most STDs can be prevented by the use of condoms and are treated with antibiotics.

Gonorrhea (pp. 697- 700)

- *Neisseria gonorrhoeae* causes gonorrhea.
- Gonorrhea is a common reportable communicable disease in the United States.
- *N. gonorrhoeae* attaches to mucosal cells of the oral-pharyngeal area, genitals, eyes, and rectum by means of fimbriae.
- Symptoms in males are painful urination and pus discharge. Blockage of the urethra and sterility are complications of untreated cases.
- Females might be asymptomatic unless the infection spreads to the uterus and uterine tubes (see pelvic inflammatory disease).
- Gonorrheal endocarditis, gonorrheal meningitis, and gonorrheal arthritis are complications that can affect both sexes if gonorrheal infections are untreated.
- Ophthalmia neonatorum is an eye infection acquired by infants during passage through the birth canal of an infected mother.
- Gonorrhea is diagnosed by Gram stain, ELISA, or DNA probe.

Nongonococcal Urethritis (NGU) (pp. 700- 701)

- Nongonococcal urethritis (NGU), or nonspecific urethritis (NSU), is any inflammation of the urethra not caused by *N. gonorrhoeae*.
- Most cases of NGU are caused by *Chlamydia trachomatis*.
- *C. trachomatis* infection is the most common STD.
- Symptoms of NGU are often mild or lacking, although uterine tube inflammation and sterility may occur.
- *C. trachomatis* can be transmitted to infantsÕ eyes at birth.
- Diagnosis is based on the detection of chlamydial DNA in urine.
- *Ureaplasma urealyticum* and *Mycoplasma hominis* also cause NGU.

Pelvic Inflammatory Disease (PID) (p. 701)

- Extensive bacterial infection of the female pelvic organs, especially of the reproductive system, is called pelvic inflammatory disease (PID).
- PID is caused by *N. gonorrhoeae, Chlamydia trachomatis,* and other bacteria that gain access to the uterine tubes. Infection of the uterine tubes is called salpingitis.
- PID can result in blockage of the uterine tubes and sterility.

Syphilis (pp. 701- 704)

- Syphilis is caused by *Treponema pallidum*, a spirochete that has not been cultured in vitro. Laboratory cultures are grown in cell cultures.
- *T. pallidum* is transmitted by direct contact and can invade intact mucous membranes or penetrate through breaks in the skin.
- The primary lesion is a small, hard-based chancre at the site of infection. The bacteria then invade the blood and lymphatic system, and the chancre spontaneously heals.
- The appearance of a widely disseminated rash on the skin and mucous membranes marks the secondary stage. Spirochetes are present in the lesions of the rash.
- The patient enters a latent period after the secondary lesions spontaneously heal.
- At least 10 years after the secondary lesion, tertiary lesions called gummas can appear on many organs.
- Congenital syphilis, resulting from *T. pallidum* crossing the placenta during the latent period, can cause neurological damage in the newborn.
- *T. pallidum* is identifiable through darkfield microscopy of fluid from primary and secondary lesions.
- Many serological tests, such as VDRL, RPR, and FTA-ABS, can be used to detect the presence of antibodies against *T. pallidum* during any stage of the disease.

Lymphogranuloma Venereum (LGV) (p. 704)

- *C. trachomatis* primarily a disease of tropical and subtropical regions.
- The initial lesion appears on the genitals and heals without scarring.
- The bacteria are spread in the lymph system and cause enlargement of the lymph nodes, obstruction of lymph vessels, and swelling of the external genitals.

- The bacteria are isolated and identified from pus taken from infected lymph nodes.

Chancroid (Soft Chancre) (p. 704)

- Chancroid, a swollen, painful ulcer on the mucous membranes of the genitals or mouth, is caused by *Hemophilus ducreyi*.

Gardnerella Vaginosis (pp. 704- 705)

- Vaginitis can be caused by *Candida albicans, Trichomonas vaginalis*, or *Gardnerella vaginalis*. Vaginosis is infection without inflammation.
- Diagnosis of *G. vaginalis* is based on increased vaginal pH, fishy odor, and the presence of clue cells.

Viral Diseases of the Reproductive System (pp. 705- 706)

Genital Herpes (pp. 705- 706)

- Herpes simplex virus type 2 (HSV-2) causes genital herpes.
- Symptoms of the infection are painful urination, genital irritation, and fluid-filled vesicles.
- Neonatal herpes is contracted during fetal development or birth. It can result in neurological damage or infant fatalities.
- The virus might enter a latent stage in nerve cells. Vesicles reappear following trauma and hormonal changes.
- Genital herpes is associated with cervical cancer.
- The drug acyclovir has proven effective in treating the symptoms, but it does not cure the disease.

Genital Warts (p. 706)

- Papillomaviruses cause warts.
- The papillomaviruses that cause genital warts have been associated with cancer of the cervix or penis.

AIDS (p. 706)

- AIDS is a sexually transmitted disease of the immune system (see Chapter 19, pp. 519-522).

Fungal Disease of the Reproductive Sysytem (pp. 706- 707)

Candidiasis (p. 707)

- *Candida albicans* causes NGU in males and vulvovaginal candidiasis, or yeast infection, in females.
- Vulvovaginal candidiasis is characterized by lesions that produce itching and irritation.
- Predisposing factors are pregnancy, diabetes, tumors, and broad-spectrum antibacterial chemotherapy.
- Diagnosis is based on observation of the fungus and its isolation from lesions.

Protozoan Disease of the Reproductive System (p. 707)

Trichomoniasis (p. 707)

- *Trichomonas vaginalis* causes trichomoniasis when the pH of the vagina increases.
- The scolex attaches to the intestinal mucosa of humans (the definitive host) and matures into an adult tapeworm.
- Diagnosis is based on observation of the protozoa in purulent discharges from the site of infection.