Infectious Diseases – Part 2

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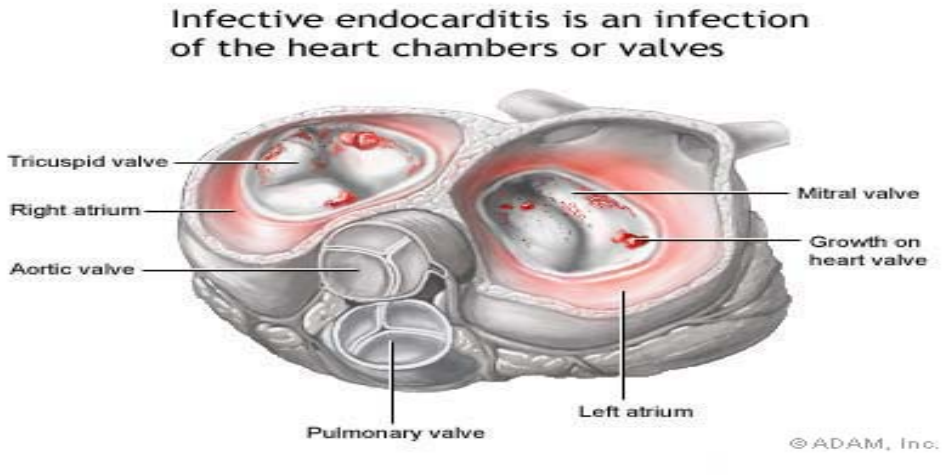
Cardiovascular Infections

Pericarditis

- Three forms of pericarditis:
  - Viral pericarditis
    - Usually self-limiting and not serious
    - Classic friction rub on auscultation
  - Bacterial pericarditis
    - Usually hematogenous in origin
  - Noninfectious autoimmune pericarditis
    - Most common form – seen in RA, SLE, or autoimmune disease
- S & S
  - Substernal friction rub usually severe
  - Heart failure can occur from fluid buildup which causes cardiac tamponade
- DX
  - Friction rub - **pathognomonic finding**
  - ECG and echocardiography changes
- TX
  - IV antibiotics
- Pericardiocentesis to remove purelent fluid

Endocarditis

- Bacterial infection of one or more heart valves
  - Damaged valves attract bacteria which is called vegetative damage
  - Dental work may cause temporary bacteremia, which can lodge on the damaged valves
  - Upper airway procedures, GI procedures and urological procedures can also cause
- S & S
  - Low grade fevers, night sweats, fatigue, malaise, weight loss
  - Back pain with fever is classic finding
- Diagnosis
  - Murmurs
  - Splinter hemorrhages under nails, retinal and conjunctival hemorrhages, petechiae
  - Mini strokes when bacteria reach the brain
  - Dx with two cultures and ECHO
- TX
  - Powerful IV antibiotics
  - Surgical debridement and abscess drainage
  - Occasional valvoplasty needed

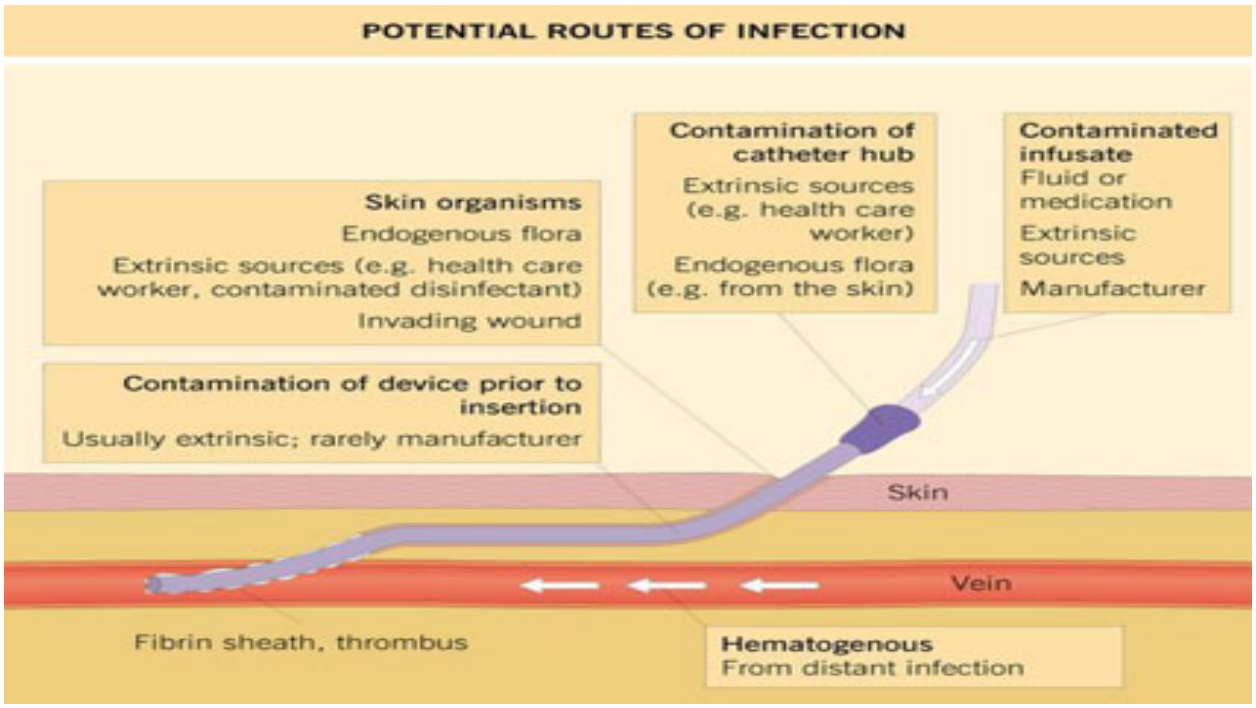


Myocarditis

- Located in the heart muscle or connective tissue
- Can be an autoimmune inflammation
- Can be an infection – which is always viral
- S & S
    - Fever, profound weakness, chest pain, tachycardia, and possible onset of heart failure
- DX
    - ECG, elevated CRP & ESR, biopsy
- TX
    - Corticosteroids and antibiotics

Catheter Infections

- More than 200,000 hospital-based blood stream infections annually occur
    - Most are due to long term catheter placement
- All are life threatening
- S & S
    - Fever, chills, malaise and purulent discharge from catheter site
- DX
    - Suspected if catheter in place with fever & tenderness
- TX
    - IV vancomycin and catheter removal



Nervous System Infections

- All nervous system infections are red flag events and are true emergencies
- Because of the confined nature of the CNS, inflammation causes significant problems
- Types of CNS infections
    - Encephalitis
    - Brain abscesses
    - Myelitis
    - Meningitis

Encephalitis

- Acute brain infection with high mortality
- Three viral causes
    - Spread by mosquitoes
    - Spread from human to human
        - Mumps, measles, Epstein-Barr, herpes zoster
    - Spread from animal bite
- Signs and Symptoms
    - Severe headache, fever, ataxia, seizures cortical dysfunction, motor changes, hallucinations
- Diagnosis – usually presumptive with symptoms
    - CT, MRI, LP
- Treatment
    - No standard tx – 50-60% mortality

Epidemic Viral Encephalitis

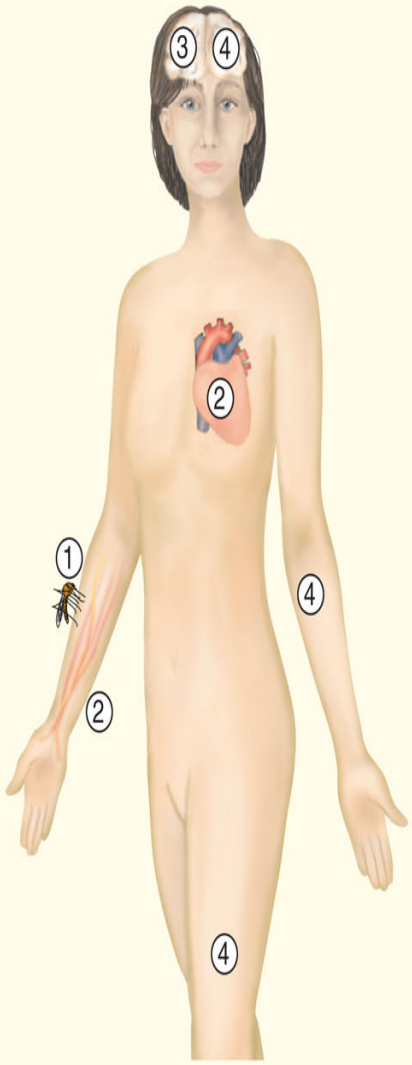
① Infected mosquito introduces encephalitis virus.

② Virus multiplies locally, establishes brief low-level viremia.

③ Virus crosses blood-brain barrier and preferentially attacks the brain.

④ Destruction of brain tissue causes death or permanent disabilities such as emotional instability, mental retardation, paralysis of face, arm, leg.

⑤ Due to brief viremia, there is no exit for the virus, thus humans are the final host.



Symptoms	Abrupt onset, fever, headache, vomiting, disorientation, paralysis, seizures, deafness, coma
Incubation period	First symptoms within a few days; encephalitic symptoms often within the first week
Causative agent	Usually caused by one of four arboviruses, LaCrosse, St. Louis, western equine, or eastern equine
Pathogenesis	Replication of virus at the site of the mosquito bite, further replication in lymph nodes, then viremia that seeds brain tissue. Nerve cells in the brain invaded, destroyed. Process halted by neutralizing antibody.
Epidemiology	Viruses transmitted to humans from birds or rodents by mosquitoes.
Prevention and treatment	Chicken sentinels to warn of arbovirus epidemics. Insecticides and other anti-mosquito preventive measures. No accepted treatment for arboviral encephalitis.

Brain Abscesses

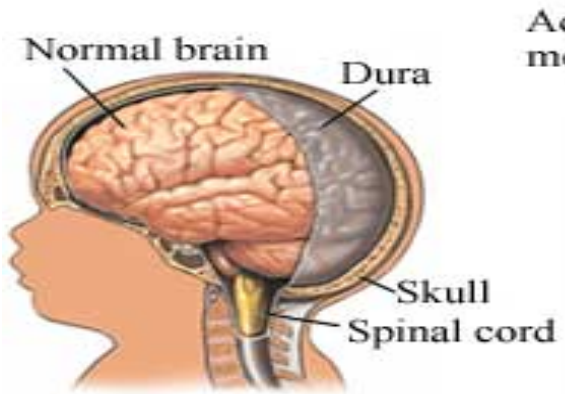
- Etiology
  - Most commonly caused by frontal sinus infections or mastoiditis
  - Can also be sequeala of brain surgery.
- Signs and symptoms
  - Fever, drowsiness, altered judgment, mutism, other neurological signs and symptoms
- Diagnosis with CT and MRI
- Treatment
  - Neurosurgical drainage and 6-8 weeks IV antibiotics

Myelitis

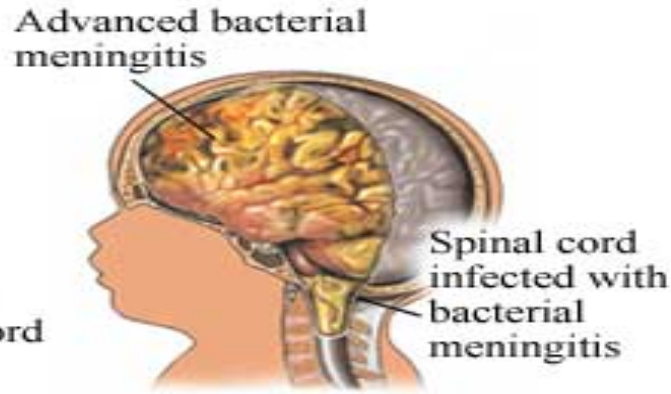
- Infection or inflammation of the spinal cord
- In the past, this was commonly caused by the polio virus and was called poliomyelitis
    - Prior to 1950 Salk and Sabine vaccine
- The cytomegalic virus can cause myelitis in AIDS patients – very rare

Bacterial Menengitis

- Etiology
    - Very dangerous infection, usually in young children – fatal in minutes to hours
    - Most caused by bacteremia – bacteria in blood
        - Bacteria from ENT infections
        - Head trauma may cause infection
- Signs and symptoms
    - Severe headache, nuchal rigidity, vomiting, high fever, loss of orientation or consciousness, rashes, bone-shaking chills
- Incidence
    - At least 1.2 million cases of bacterial meningitis are estimated to occur every year around the world, estimates 2021 research.
    - According to the World Health Organization (WHO), around 10% who get bacterial meningitis die from the infection, even with treatment.
    - Without treatment, the death rate can be as high as 70% reports the CDC.
    - 90% of the children and young adults who get meningococcal meningitis die within the first day.
    - As many as 20% of survivors have permanent sequelae, such as hearing loss, neurologic damage, cognitive loss,
    - or loss of a limb.
    -
- Treatment
    - Should start within 30 minutes – ICU IV antibiotics



Normal anotomy of brain and spinal cord



Brain and spinal cord with bacterial meningitis

Meningococcal Meningitis

- Pathogenesis
  - Acquired by inhaling infected respiratory droplets
  - Bacteria adhere to mucous membranes
  - Invade bloodstream by passing through respiratory epithelium
    - Bloodstream carries organisms to CSF
  - Inflammation causes swelling and infarcts to brain tissue
    - Can also cause obstruction of outflow of CSF
      - Causes brain to squeeze against skull
  - Release of endotoxin causes drop in blood pressure leading to shock
- Causative agent - *Neisseria meningiti*
- Epidemiology
  - *N. meningitis* more prone to cause epidemics
  - Can spread rapidly in crowded stressed places
  - Human only source of infection
  - Transmission can occur with disease or asymptomatic carrier
    - Organism recovered from 5% - 15% of healthy individuals
- Symptoms
  - Mild cold followed by onset of throbbing headache and Fever
  - Pain and stiffness of neck and back
  - Nausea and vomiting
  - Deafness and alteration in consciousness may appear progressing to coma
    - Small hemorrhages called petechiae may appear on skin
    - Infected person may develop shock and die within 24 hours
      - Usually progression of disease is slower allowing time for treatment

Meningococcal Meningitis - continued

- Prevention and Treatment
- Vaccine is available
    - Used to control epidemics
    - Not given routinely due to ineffectiveness in children less than 2 years of age
    - Effect is not long lasting
- Mass prophylaxis with antibiotics helpful at controlling epidemics in small populations
- Can usually be cured unless brain injury or shock present
    - Mortality is less than 10% in treated populations

① *Neisseria meningitidis* inhaled, infects upper airways.

② Bacteria enter the bloodstream and are circulated throughout the body.

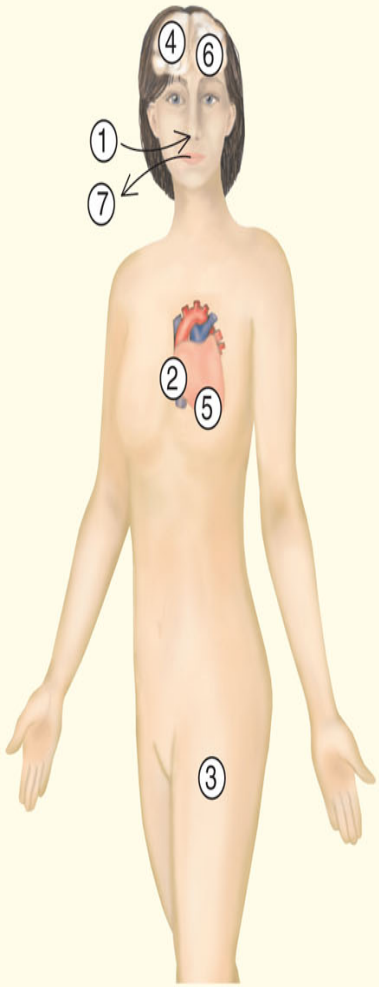
③ The bacteria lodge in the skin and cause petechiae.

④ Bacteria on the meninges causes meningitis.

⑤ Lysing bacteria in the circulation release endotoxin, producing shock.

⑥ Inflammatory response in meninges can damage nerves of hearing causing deafness and obstruct the flow of cerebrospinal fluid causing increased pressure inside the brain.

⑦ Bacteria exit with respiratory secretions.



Symptoms	Mild cold followed by headache, fever, pain, stiff neck and back, vomiting, petechiae
Incubation period	1 to 7 days
Causative agent	*Neisseria meningitidis,* the meningococcus; a Gram-negative diplococcus
Pathogenesis	Meningococci adhere by pili, colonize upper respiratory tract, enter bloodstream; carried to meninges and spinal fluid; inflammatory response obstructs normal outflow of fluid; increased pressure caused by obstructed flow impairs brain function; damage to motor nerves produces paralysis; endotoxin release causes shock.
Epidemiology	Close contact with a case or carrier; inhalation of infectious droplets; crowding and fatigue predispose to the disease.
Prevention and treatment	Conjugate vaccine against serogroups A, C, W135, and Y used to immunize ages 11–55 years; rifampin given to those exposed. Penicillin, ceftriaxone, for treatment.

Viral Meningitis

- Etiology
  - The most common form – caused by echo virus, enterovirus, Coxsackie virus, mumps virus
  - Usually in warm months
- Pathogenesis
  - Begins with infection of throat and intestinal epithelium
    - Progresses to lymphoid tissue in the bloodstream
  - Viremia results in meningeal infection
    - May also be responsible for rash and chest pain
  - Causative agent
    - Member of the enterovirus subgroup of picornavirus family
    - Responsible for at least half of viral meningitis cases
      - Most common offenders are Coxsackie virus and echovirus
- Epidemiology
  - Relatively stable in environment
    - Can survive in chlorinated water
  - Infected often eliminate virus in feces
    - Often for weeks
  - Transmission via fecal-oral route
  - Mumps virus transmitted via respiratory droplets
- Signs and symptoms
  - Severe headaches, intense photophobia, nuchal rigidity, malaise (usually no LOC)
  - Typically abrupt in onset - Characterized by
    - Fever
    - Severe headache above or behind eyes
    - Stiff neck with increased pain on forward flexion – nuchal rigidity
    - Sensitivity to light - photophobia
    - Nausea and vomiting
    - May have sore throat, chest pain, swollen parotid gland and skin rash
      - Depends on causative agent
- Treatment
  - Antibiotic within 48 hours as a preventative if the etiology is bacterial
  - Vial form is usually self limiting in 7-10 days
- Prevention
  - Hand washing and avoidance of crowded swimming pools
    - When aseptic disease present in community
  - No vaccine against Coxsackie virus and echoviruses
    - Mumps virus controlled via immunization

TABLE 27.6 Viral Meningitis

Symptoms	Abrupt onset, fever, severe headache, stiff neck, often vomiting; sometimes sore throat, large parotid glands, rash, or chest pain
Incubation period	Usually 1 to 2 weeks for enteroviruses, 2 to 4 weeks for mumps
Causative agents	Most cases: small non-enveloped RNA enteroviruses of the picornavirus family, usually coxsackie or echoviruses. Mumps virus common in unimmunized populations
Pathogenesis	Viremia from primary infection seeds the meninges. Fewer leukocytes enter cerebrospinal fluid than with bacterial infections, and many are mononuclear, usually no decrease in CSF glucose.
Epidemiology	Enteroviruses transmitted by the fecal-oral route, mumps by respiratory secretions and saliva. Enteroviruses transmission mainly summer and early fall; mumps in fall and winter.
Prevention and treatment	Handwashing, avoiding crowded swimming pools during enterovirus epidemics; mumps vaccine for mumps prevention. No specific

GI Tract Infections

Bacterial Diarrhea

- Leading cause of death worldwide – 2.5 million fatalities yearly
- Common in infants and small children
- With proper treatment, is rarely fatal
- Spread three ways
    - Contaminated foods
    - Unclean water
    - Person-to-person contact
- Salmonella
    - From contaminated eggs, dairy products, undercooked chicken
        - Profuse watery bloody diarrhea 25-30 times in 24 hours

Shigella

- Causes dysentery – a severe infection of the GI tract with profuse, bloody diarrhea and ulcerations of the bloody mucosa
- Spreads from anal-oral transmission
    - Day care centers, nursing homes, unclean restaurants, toilet seats
- Also spread in contaminated water

Vibrio cholerae

- Was seen in 1800s wagon trains from contaminated water holes
- Can infect a person and cause death in 24 hours
- Most recent epidemic in Peru in 1991

E. coli and Staphlococcus
- From contaminated water, milk, meat, mayonnaise
- “traveler’s diarrhea”

Viral Diarrhea
- Most common cause of infectious diarrhea
- Self-limiting with no specific treatment
- Outbreaks common on cruise ships, schools, church socials
- Symptomatic relief from BRAT diet
    - Bananas
    - Rice
    - Applesauce
    - Tea (or Gatorade, flat Sprite, flat Seven-Up

Is the diarrhea bacterial or viral?
- Mild to moderate resolving in 24 hours
    - Usually viral – Treat with BRAT diet & hydration
- Fulminating or near continual diarrhea for more than a few hours or if blood is present
    - Probably bacterial
    - Should obtain stool cultures
    - Treat with ciprofloxin or levofloxacin
    - Usually the cause in 80% of traveler’s diarrhea

Traveling in Developing Countries
- Drink only bottled water
- Avoid ice in drinks
- Avoid salads
- Avoid ice cream
- Only eat fruit that you can peel and only peel after you have washed with bottled water
- Be careful with cooked meats and eggs
- Carry Imodium and antibiotics

Parasitic Intestinal Infections
- Giardiasis – caused by *Giardia lambia*
    - In the USA, most prevalent intestinal parasite.
    - Leading infectious agent in waterborne outbreaks of diarrhea
    - Endemic in daycare centers and campers
    - Giardiasis – caused by *Giardia lambia*
    - Ventral sucking disk attaches to lining of duodenum
    - Causes a fatty foul-smelling diarrhea
    - Diarrhea causes malabsorption in duodenum and jejunum
    - Endemic in daycare centers and campers

Parasitic Intestinal Infections - continued

- Giardiasis – caused by *Giardia lambia*
    - Abdominal pain, bloating, belching, cramping, diarrhea
    - Because of pain, can mimic appendicitis, ulcerative colitis, Crohn's disease
    - Stool sample is positive in 90% of cases
    - Treatment with Flagyl
- Amebiasis – caused by *Entamoaba histolytica*
    - 500 million cases per year with 100,000 deaths
    - Found in tropics, subtropics and crowded unsanitary conditions
    - Watery bloody diarrhea, abdominal pain, fever, tenesmus (powerful rectal cramping), RUQ pain
    - Often mistaken for ulcerative colitis
        - The use of steroids to treat ulcerative colitis can lead to toxic megacolon in amebiasis - Colon completely paralyzed and dilated
    - Treatment with Flagyl for 10 days

Hepatitis A

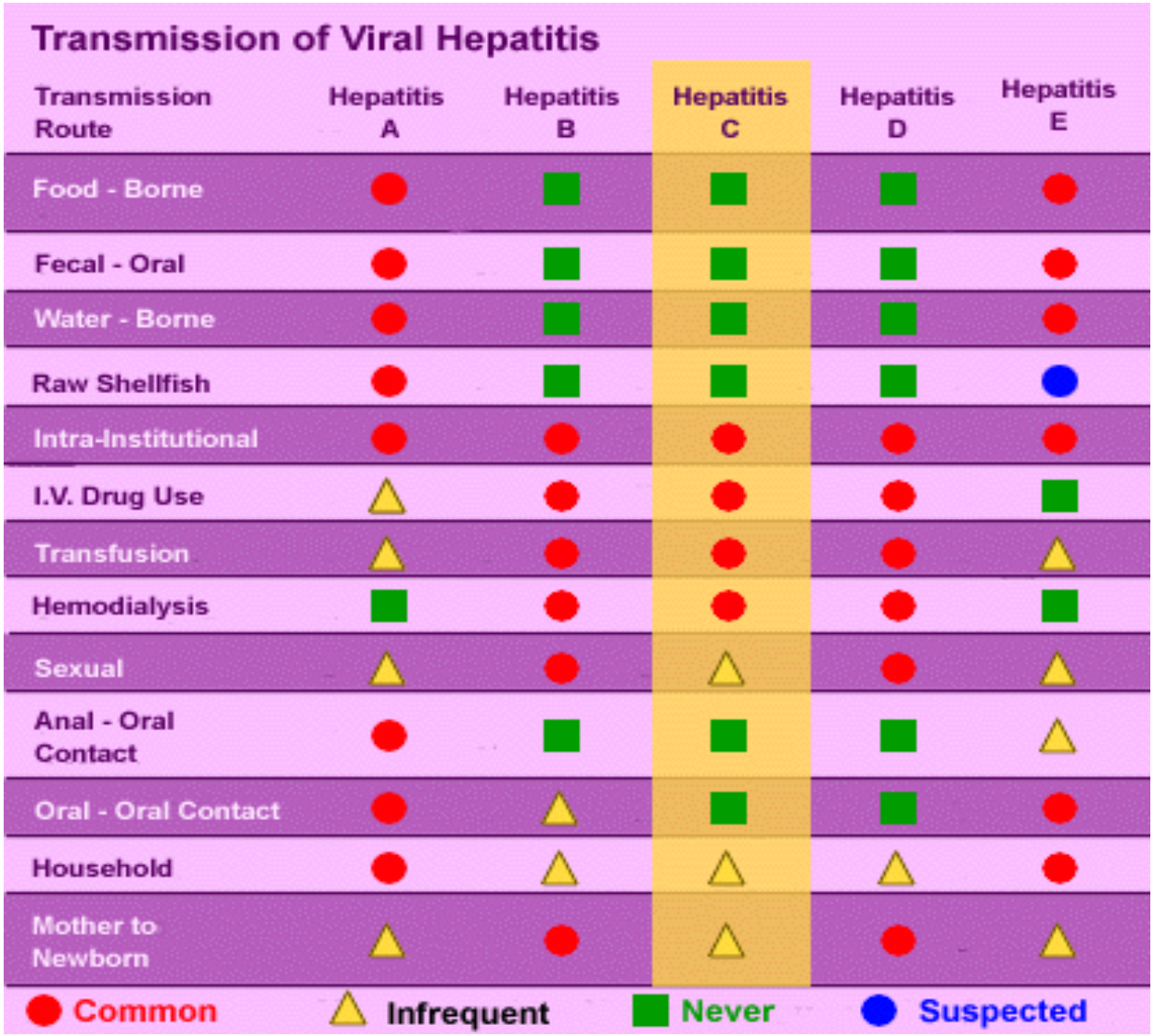
- Over 700,000 Hepatitis cases in USA per year of Hepatitis A, B, C
- Generally prolonged self-limiting lasting 2-3 months
- Outbreaks occur in crowded living conditions
- Transmission is fecal-oral from food or water
- Four-week incubation time with no symptoms followed by fatigue, malaise, anorexia, dull RUQ pain, and jaundice
- Diagnosis with high liver enzymes
- Treatment – no known treatment
- Vaccines available for those at high risk
    - Drug users, homosexual men, multiple self partners lifestyle, morticians

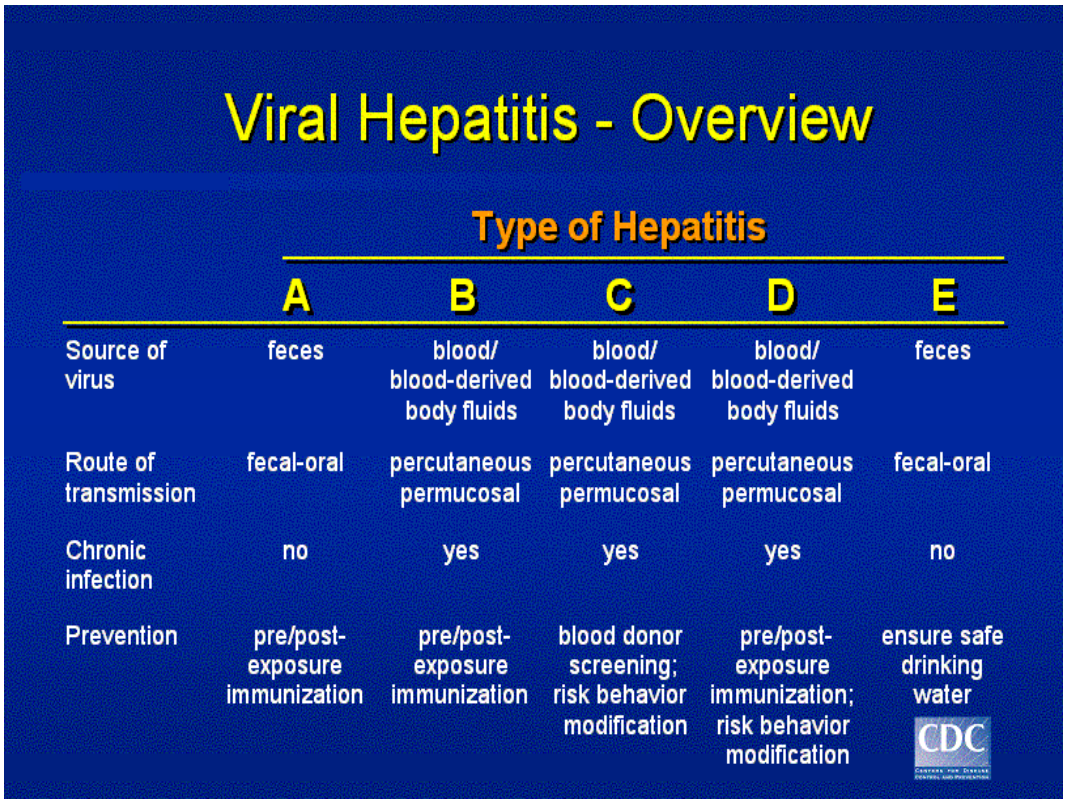
Hepatitis B

- Often spread by sexual contact with virus in body fluids
- Infants can get from infected mother
- 280,000 new cases per year in USA and 5% of world population has Hepatitis B
- Long incubation period of 3 months
- Mild to moderate jaundice, nausea, abdominal pain, fever, malaise, appetite loss, dark urine, pale stools
- After initial infection, carriers of Hepatitis B have very few symptoms
- Diagnosis with serologic tests
- Treatment with four separate meds, oral and injections for at least 4 months
- Vaccines are available for high-risk adults

Hepatitis C

- Most common form on USA
  - 150,000 new yearly cases
  - 2-4 million people in USA have chronic Hepatitis C
- Spread is by contaminated blood products
  - Sexual transmission can occur, but is rare
- Incubation is 6-10 weeks
  - 75% are asymptomatic and progress to chronic case
  - 25% of patients develop cirrhosis in 2-3 decades
- Signs and symptoms same as in Hepatitis B
- Treatment of interferon for one year which reduces liver enzyme levels in only 25% of cases
  - 50% of patients awaking liver transplants have chronic hepatitis C



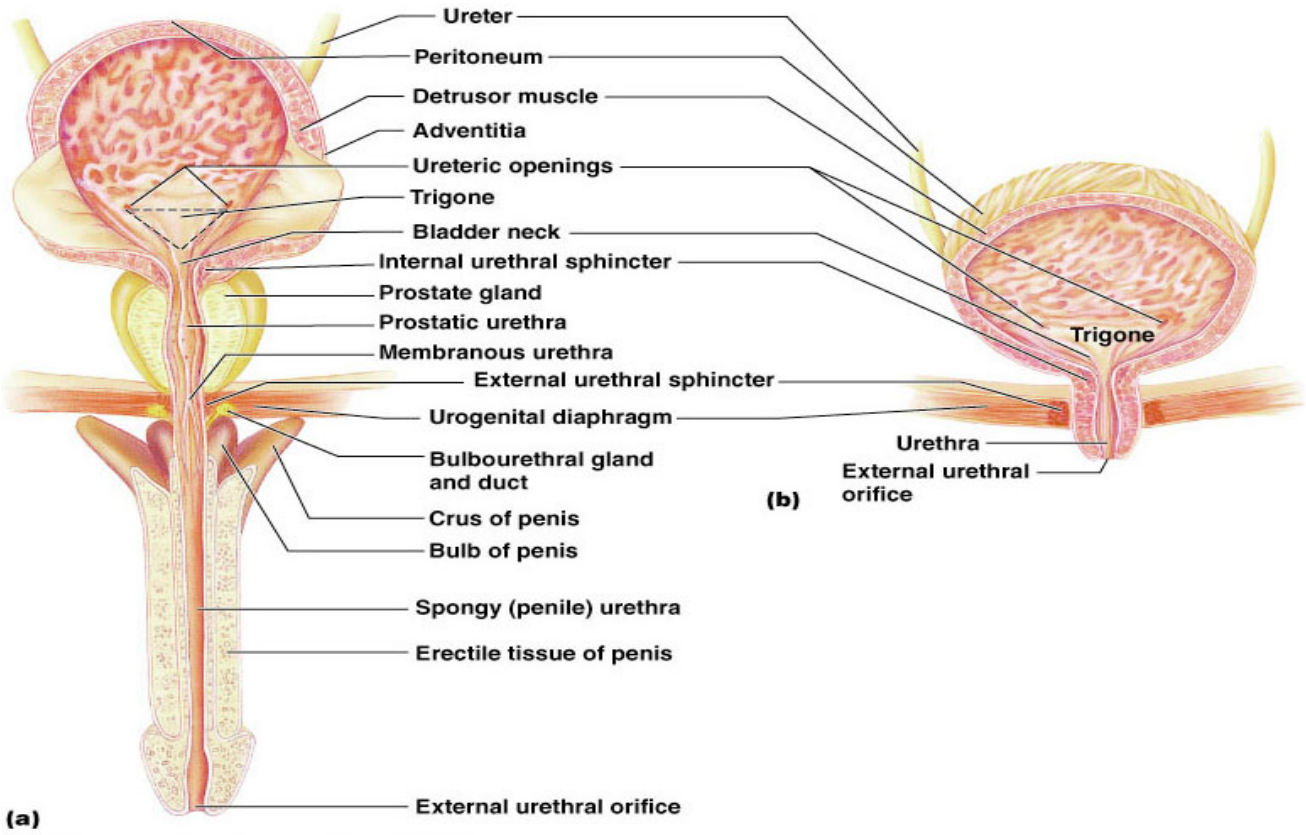


Cholecystitis & Cholangitis

- Infection of gallbladder and bile ducts
- Occur from gallstone obstruction
- Cholelithiasis presents with RUQ pain (especially after ingestion of fatty foods), fever, nausea, vomiting and prostration
- Diagnosis with abdominal ultrasound
- Treatment requires prompt surgery of gall bladder removal and treatment with broad spectrum antibiotics

Pancreatitis

- Serious and often life-threatening
- Two main causes
    - Impacted gallstone which spreads to the pancreas
    - Heavy alcohol intake
- Also seen in trauma or with viral (as in mumps)
- Epigastric pain radiating to back, tachycardia, increased sweating and shock
- Diagnosis with pancreatic enzymes, CT, MRI
- Treatment with nasogastric suction to place gut at rest, then IV hydration and Demerol for pain
- May require TPN, total perenteral nutrition, for several weeks
- Fatality reduced to 10% with long term treatment and long-term recovery



UTI & STD

UTI

- Can range from common cystitis to life-threatening pyelonephritis with renal failure, septic shock and death
- *E. coli* is most common organism from anorectal cross contamination
- Most common in females, because of anatomy
- Symptoms of UTI
    - Characterized by urgent desire to empty the bladder
    - Frequent and painful urination
    - Urine is strong, unpleasant and cloudy
    - May have hematuria (blood in the urine)
    - While UTI is usually more of an annoyance then a serious health risk, it has the potential to lead to serious kidney infections
- Risk Factors of UTI
    - Any change in the normal perineal flora
        - Antibiotics, genital infections
        - Feminine hygiene products, tampons, soaps
        - Sexual intercourse, spermicidal use, diaphragms
    - Pregnancy
    - Obstructions of foreign bodies
    - Prostatic hypertrophy

UTI - continued

- Risk Factors of UTI
  - Neurogenic bladder dysfunction
  - Vesicourethral reflux – Facilitates reflux of bacteria
  - Genetics
- Preventative Measures to Avoid UTI
  - Increased fluids
  - Cranberry juice inhibits bacteria and acidifies urine
  - Avoid spermacides which predispose to UTIs
  - Proper personal hygiene
  - Overall body cleanliness and hygiene
  - Different cultures and different countries have different hygiene standards
  - Care with hands and genitals before, during and after sex

Cystitis

- Two kinds – interstitial and bacterial
  - Both cause burning urination, urgency and frequency often with back pain and pubic pain
  - Interstitial cystitis (painful bladder syndrome)
    - Symptoms as above, may worsen in menstruation, may also have dysparunia (painful intercourse)
    - Diagnosis by history and symptoms
      - May also use UA, cytoscopy to R/O other diseases
    - No effective treatment – adequate hydration
  - Bacterial cystitis
    - Pus in urine
    - Treated with Keflex or Ciprofloxin for 7 days

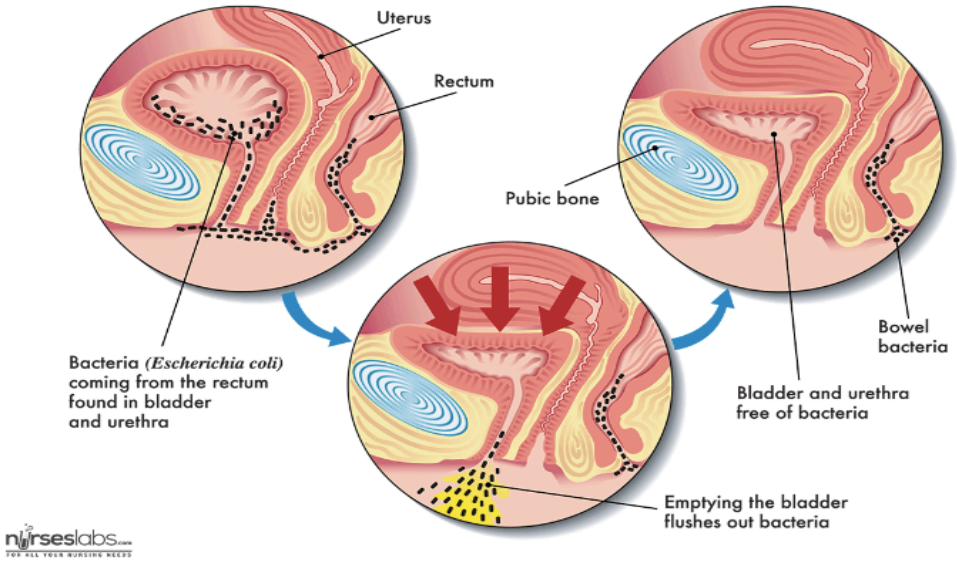


TABLE 26.1 Bacterial Cystitis

Symptoms	Abrupt onset, burning pain on urination, urgency, frequency, foul smell, red-colored urine; with pyelonephritis, fever, chills, back pain, and vomiting
Incubation period	Usually 1 to 3 days
Causative agents	Most due to *Escherichia coli;* other enterobacteria, *Staphylococcus saprophyticus* cause some cases; nosocomial infections with antibiotic-resistant strains of *Pseudomonas, Serratia,* and *Enterococcus* genera
Pathogenesis	Usually, bacteria ascend the urethra, enter the bladder, and attach by pili to receptors on urinary tract epithelium. Sloughing of cells and an inflammatory response ensue. Spread to the kidneys can occur via the ureters, causing pyelonephritis and potential kidney failure.
Epidemiology	Bacterial cystitis is common in women, promoted by a relatively short urethra, use of a diaphragm, and sexual intercourse. Middle-aged men are prone to infection because enlargement of the prostate gland partially obstructs their urethra. Placement of a bladder catheter commonly results in infection.
Prevention and treatment	Taking sufficient fluid to void urine at least four to five times daily, wiping from front to back. Single dose of antimicrobial medication with sexual intercourse may help prevent bacterial cystitis in women. Short-term antimicrobial therapy usually sufficient. Longer treatment for

TABLE 26.3 Bacterial Vaginosis

Symptoms	Gray-white vaginal discharge and unpleasant fishy odor
Incubation period	Unknown
Causative agent	Unknown
Pathogenesis	Uncertain. Marked distortion of the normal microbiota. Increased sloughing of vaginal epithelium in the absence of inflammation. Odor due to metabolic products of anaerobic bacteria. Association with complications of pregnancy, including premature births.
Epidemiology	Associated with many sexual partners or a new partner, but can occur in the absence of sexual intercourse. Probably not a sexually transmitted disease.
Prevention and	No proven preventive measures. Treatment with

Pyelonephritis

- *E. coli* in 90% of cases – very serious infection
- Pregnant women will have low birth weight births
- Symptoms as in cystitis with the addition of rib angle pain, tenderness, fever, chills, nausea and vomiting
- Diagnosis with history, blood tests, UA, ultrasound
- Treatment must be aggressive to prevent renal failure
    - Patients hospitalized with IV Cipro for two weeks

TABLE 26.4 Vulvovaginal Candidiasis

Symptoms	Itching, burning, thick white vaginal discharge, redness and swelling
Incubation period	Usually unknown. Generally 3 to 10 days when associated with antibacterial medications
Causative agent	*Candida albicans,* a yeast
Pathogenesis	Inflammatory response to overgrowth of the yeast, which is often present among the normal microbiota. Associated with antibacterial therapy, use of oral contraceptives, pregnancy, and uncontrolled diabetes, but most cases have no identifiable predisposing factor.
Epidemiology	Not contagious. Usually not sexually transmitted.
Prevention and treatment	No proven preventive measures. Intravaginal antifungal medications such as clotrimazole

TABLE 26.5 Staphylococcal Toxic Shock Syndrome

Symptoms	Fever, vomiting, diarrhea, muscle aches, low blood pressure, and a rash that peels
Incubation period	3 to 7 days
Causative agent	*Staphylococcus aureus,* certain toxin-producing strains
Pathogenesis	Toxin (TSST-1 and others) produced by certain strains of *S. aureus;* toxins are superantigens, causing cytokine release and drop in blood pressure.
Epidemiology	Associated with certain high-absorbency tampons, leaving tampons in place for long periods of time, and abrasion of the vagina from tampon use. Also as a result of infection by certain toxin-producing *S. aureus* strains in other parts of the body.
Prevention and treatment	Awareness of symptoms. Prompt treatment of *S. aureus* infections; frequent change of tampons by menstruating women. Antimicrobial medication effective against the causative

TABLE 26.7 Common Sexually Transmitted Diseases

Disease	Cause	Comment
Bacterial		
Gonorrhea ("clap")	*Neisseria gonorrhoeae*	Average reported cases per year—340,000. True incidence much higher.
Chlamydial infections	*Chlamydia trachomatis*	Average reported cases per year—800,000. True incidence much higher.
Syphilis	*Treponema pallidum*	Average reported cases (primary and secondary) per year—6,600.
Chancroid	*Haemophilis ducreyi*	Average reported cases per year—50. True incidence much higher.
Viral		
Genital herpes simplex	Herpes simplex virus (HSV)	Not reportable. Estimated 45 million Americans infected; about 85% HSV, type 2.
Papillomavirus infections	Human papillomavirus (HPV)	Not reportable. Estimated 40 million Americans infected.
AIDS	Human immunodeficiency virus (HIV)	Average reported cases per year—40,000.
Protozoal		
Trichomoniasis ("trich")	*Trichomonas vaginalis*	Not reportable. Estimated 5 million Americans infected per year.

TABLE 26.6 Symptoms that Suggest STD

1. Abnormal discharge from the vagina or penis
2. Pain or burning sensation with urination
3. Sore or blister, painful or not, on the genitals or nearby; swellings in the groin
4. Abnormal vaginal bleeding or unusually severe menstrual cramps
5. Itching in the vaginal or rectal area
6. Pain in the lower abdomen in women; pain during sexual intercourse
7. Skin rash or mouth lesions

TABLE 26.13 Genital Herpes Simplex

Symptoms	Itching, burning pain at the site of infection, painful urination, tiny blisters with underlying redness. The blisters break, leaving a painful superficial ulcer, which heals without scarring. Recurrences are common.
Incubation period	Usually 1 week (range, 2 to 20 days)
Causative agent	Usually herpes simplex virus, type 2. The cold sore virus, herpes simplex type 1, can also be responsible. Herpesviruses are enveloped and contain double-stranded DNA.
Pathogenesis	Lysis of infected epithelial cells results in fluid-filled blisters containing infectious virions. Rupture of these vesicles causes a painful ulceration. The acute infection is controlled by body defenses; genome persists within nerve cells in a non-infectious form beyond the reach of body defenses. Replication of infectious virions can occur and cause recurrent symptoms in the area supplied by the nerve. Newborn infants can contract fatal generalized herpetic infection if their mother has a primary infection at the time of delivery.
Epidemiology	No animal reservoirs. Transmission by sexual intercourse, oral-genital contact. Transmission risk greatest first few days of active disease. Transmission can occur in the absence of symptoms. Herpes simplex increases the risk of contracting HIV.
Prevention and treatment	Abstinence, monogamy, and condoms help prevent transmission. Medications help prevent recurrences, shorten duration of symptoms. No

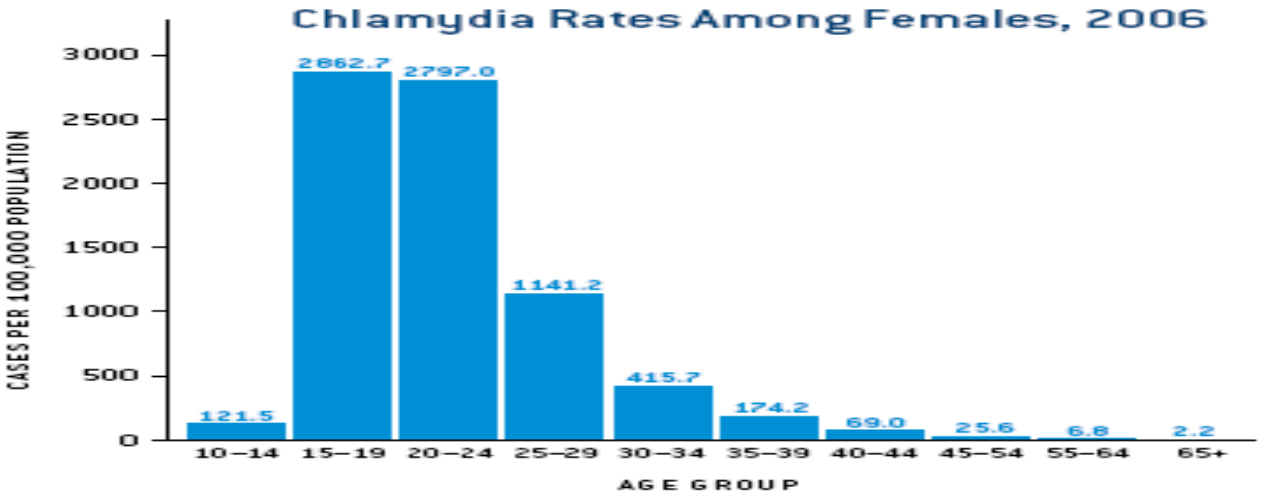
TABLE 26.14 Papillomavirus STDs

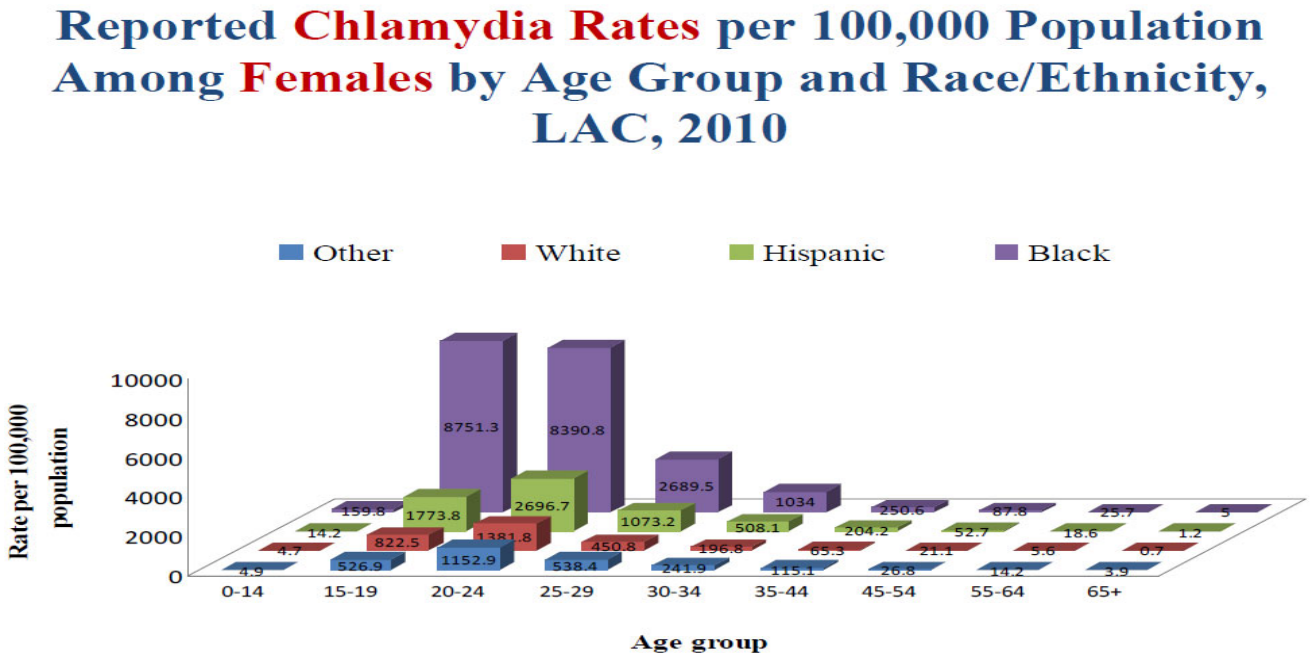
Symptoms	Many have no symptoms. Warts of the external and internal genitalia the most common symptom.
Incubation period	Usually 3 months (range, 3 weeks to 8 months)
Causative agents	Human papillomaviruses, many types, small, non-enveloped, double-stranded DNA viruses of the papovavirus family. Different types infect different tissues and produce different lesions.
Pathogenesis	Virus enters epithelium through abrasions, infects deep layer of epithelium; establishes latency; cycles of replication occur when host cell begins maturation; cancer-associated viral types can integrate into the host cell chromosome and can cause precancerous lesions.
Epidemiology	Asymptomatic individuals can transmit the disease; 60% transmission with a single sexual contact; multiple sex partners the greatest risk factor; warts can be transmitted to the mouth with oral sex, and to newborn babies.
Prevention and treatment	Latex condoms advised to minimize transmission and avoidance of sexual contact with those having multiple sex partners. Pap tests at least yearly for sexually active women. Wart removal by multiple techniques, does not cure the infection. Imiquimod useful in treating multiple

Genital warts:
Found on shaft of penis (male), vagina, vulva, cervix (female) and around anus

STD - Urethritis

- Results in purulent discharge with pyuria that can progress into PID
- Has severe pelvic pain and tenderness, with fever
- Diagnosis – gram stain from urethral discharge
    - *Chlamydia trachomatis and Neisseria gonorrheae*
- Treatment with ciprofloxin for gonorrhea and azithromycin for Chlamydia
- Incidence of Chlamydia in USA
    - One in four – most are asymptomatic





Note: Exclude cases in Long Beach and Pasadena

STD – Genital Ulcers

- Most common cause in *Herpes genitalis* virus
    - Essentially cold sore form of herpes in genitals
- More than 25% of adults in USA carry virus
- Painful ulcers on labia or mons or meatus
- Very tender inguinal nodes
- First attack is usually the worse and subsequent attacks are often brought about by stress
- Diagnosis with blood tests and viral cultures
- Treatment with acylovir, famcylovir or valcylovir for herpes
    - Penicillin is used for syphilis variety

STD – Genital Papules (Warts)

- Usually caused by HPV – human papilloma virus
- Incidence is 5 million new cases each year with 20 million harbor the virus
- Lesions seen in genital and anal areas from a few lesions to hundreds – can also be asymptomatic
- Diagnosis with a complete workup with colposcopy with lesions biopsied
- Treatment includes removing lesions with laser, electrocautery or topical podophyllin (OTC)

TABLE 26.11 Syphilis

① *Treponema pallidum* enters the body through a microscopic abrasion or mucous membrane, usually genitalia, mouth, or rectum.

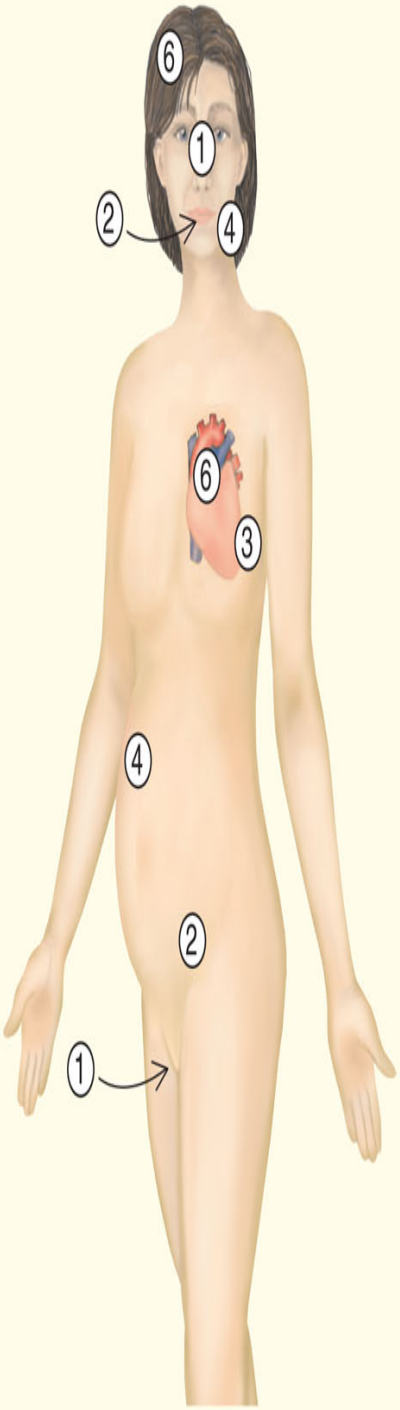
② A chancre develops at site of entry.

③ Organisms multiply locally and spread throughout the body by the bloodstream.

④ Infectious mucous patches and skin rashes of secondary syphilis appear. A fetus will become infected, resulting in miscarriage or a live-born infant with congenital syphilis.

⑤ An asymptomatic latent period occurs. *T. pallidum* disappears from blood, skin, and mucous membranes.

⑥ After months or years, symptoms of tertiary syphilis appear:
- heart and great vessel defects
- gummas
- strokes
- eye abnormalities
- general paresis
- insanity.



Symptoms	Chancre, fever, rash, stroke, nervous system deterioration; can imitate many other diseases
Incubation period	10 to 90 days
Causative agent	*Treponema pallidum*, a non-culturable spirochete
Pathogenesis	Primary lesion, or chancre, appears at site of inoculation, heals after 2 to 6 weeks; *T. pallidum* invades the blood vessel system and is carried throughout the body, causing fever, rash, mucous membrane lesions; damage to brain, arteries, and peripheral nerves appears years later.
Epidemiology	Sexual contact with infected partner; kissing; transplacental passage.
Prevention and treatment	Monogamous relationships, use of condoms, treatment of sexual contacts, reporting cases. Treatment: penicillin.

TABLE 26.8 Gonorrhea

① Eyes of adults and children are susceptible to the gonococcus; serious infections leading to loss of vision are likely in newborns.

② Organisms carried by the bloodstream infect the heart valves and joints.

③ The outer covering of the liver is infected when gonococci enter the abdominal cavity from infected fallopian tubes.

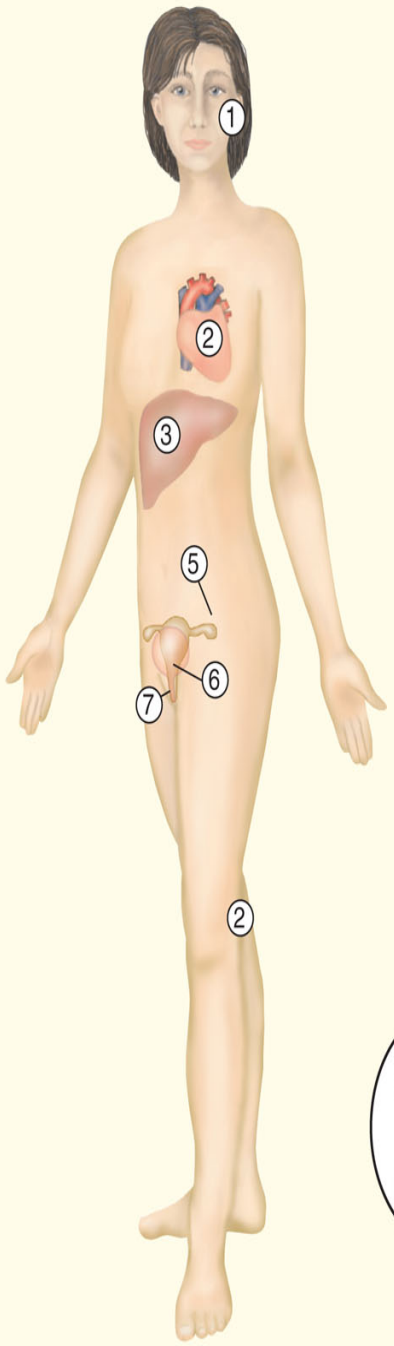
④ Prostatic gonococcal abscesses may be difficult to eliminate.

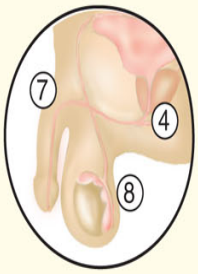
⑤ Infection of the fallopian tubes results in scarring, which can lead to sterility or ectopic pregnancy.

⑥ The cervix is the usual site of primary infection in women.

⑦ Urethral scarring from gonococcal infection can predispose to urinary infections by other organisms.

⑧ Scarring of testicular tubules can cause sterility.





male

Symptoms	Men: no symptoms, pain on urination, discharge; with complication impaired urinary flow, sterility, or arthritis. Women: no symptoms or pain on urination, discharge, fever, pelvic pain, sterility, ectopic pregnancy, arthritis can occur
Incubation period	2 to 5 days
Causative agent	*Neisseria gonorrhoeae,* a Gram-negative diplococcus
Pathogenesis	Organisms attach to certain non-ciliated epithelial cells by pili; phase and antigenic variation in surface proteins allows attachment to different host cells and escape from immune mechanisms. Inflammation, scarring; can spread by bloodstream.
Epidemiology	Transmitted by sexual contact. Asymptomatic carriers. No immunity.
Prevention and treatment	Abstinence, monogamous relationships, condoms, early treatment of sexual contacts. Treatment: intramuscular ceftriaxone.

Bone and Joint Infections

Osteomyelitis

- Bone infection from hematogenous spread
- *Staphlococcus or Streptococcus*
- Usually seen in young children (affecting long bones) and elderly (affecting vertebral bodies)
- Can be seen in diabetic or ischemic ulcers
    - These deep sores occur in feet or legs or pelvis
- Can be seen in post-operative orthopedic surgery
- Can be acute over several days or chronic over weeks to months
- Symptoms – dull pain, fever, chills
- Diagnosis with CT, MRI, x-rays
- Treatment with specific IV antibiotics after cultures received, surgical debridement, revascularization

Septic Arthritis

- Life-threatening infection caused by hematogenous spread - *Staphlococcus*
- Common source is IV catheters, severe UTIs
- Most likely to occur in patients with joint pathology from RA or degenerative arthritis
- Acute joint pain, immobility, tenderness, swelling
- Diagnosis with synovial fluid culture
    - If aspiration yields pus, Dx is septic arthritis
    - If aspiration yields uric acid crystals, Dx is gout
- Treatment with nafcillin for one month

Infection in Prosthetic Joints

- Prosthetic joint infection can be rapid or slow and can take up to six months after surgery
- Symptoms – pain, redness, swelling, fever, joint pain
- Diagnosis is difficult as patients mimic common complications following joint surgery
    - Biopsy of joint tissue and synovial fluid analysis
- Treatment requires removing of prosthesis so the joint is not used followed by antibiotics for 1-3 months followed by new prosthesis

HIV & AIDS

HIV

- “Human Immunodeficiency Syndrome”
- A specific type of virus (a retrovirus)
- HIV invades the helper T cells to replicate itself.
- No Cure

AIDS

- Acquired Immunodeficiency Syndrome
- HIV is the virus that causes AIDS
- Disease limits the body's ability to fight infection
- A person with AIDS has a very weak immune system
- No Cure
- Four Stages of HIV
    - Stage 1 - Primary
        - Short, flu-like illness - occurs one to six weeks after infection
        - no symptoms at all
        - Infected person can infect other people
    - Stage 2 - Asymptomatic
        - Lasts for an average of ten years
        - This stage is free from symptoms
        - There may be swollen glands
        - The level of HIV in the blood drops to very low levels
        - HIV antibodies are detectable in the blood
    - Stage 3 - Symptomatic
        - The symptoms are mild
        - The immune system deteriorates
        - Emergence of opportunistic infections and cancers
    - Stage 4 - HIV ⇨ AIDS
        - The immune system weakens
        - The illnesses become more severe leading to an AIDS diagnosis
- Opportunistic Infections associated with AIDS
    - Bacterial
        - Tuberculosis (TB)
        - Strep pneumonia
    - Viral
        - Kaposi Sarcoma
        - Herpes
        - Influenza (flu)
    - Parasitic
        - Pneumocystis carinii
    - Fungal
        - Candida
        - Cryptococcus


TABLE 26.15	HIV Disease and AIDS
Symptoms	No symptoms, or "flu"-like symptoms early in the illness; an asymptomatic period typically lasting years; symptoms of lung, intestine, skin, eyes, brain, and other infections, and certain cancers
Incubation period	About 6 days to 6 weeks for "flu"-like symptoms; many months or years for cancers and unusual infections
Causative agents	Generally human immunodeficiency virus, type 1 (HIV-1)
Pathogenesis	The virus infects $CD4^+$ lymphocytes and macrophages, thereby slowly destroying the ability of the immune system to fight infections and cancers.
Epidemiology	HIV present in blood, semen, and vaginal secretions in symptomatic and asymptomatic infections; spread usually by sexual intercourse, sharing of needles by injected-drug abusers, and from mother to infant at childbirth. Other STDs foster transmission.
Prevention and treatment	Abstinence from sexual intercourse and drug abuse; monogamy; consistent use of latex condoms; avoidance of sexual contact with injected-drug abusers, those with multiple partners or history of STDs. Anti-HIV medication for expectant mothers and their newborn infants. Treatment: reverse transcriptase and protease inhibitors in combination.

AIDS

- Epidemiology
    - HIV is spread mainly through sexual contact, needles or from mother to newborn
    - Virus not highly contagious outside of risk factors
    - Transmission can be halted by changes in human behavior
- Prevention and Treatment
    - Interruption of mother to child transmission via chemotherapy
    - Needle exchange programs
    - Educational programs targeting at risk populations
    - Treatment of other STD to lessen risk on contracting HIV
    - Treatment is designed to block replication of HIV
        - Generally with cocktail of medication

Blood Diseases

Infectious Mononucleosis

- Symptoms
- Appear after long incubation
    - Usually 30 to 60 days post infection
- Symptoms include fever, sore throat covered with pus, fatigue, enlarged lymph nodes and spleen
- Most cases fever and sore throat disappear within 2 weeks, lymph node enlargement within 3
- Causative agent
    - Caused by Epstein-Barr virus - Belongs to herpes virus family
- Pathogenesis
    - Infection begins in cells of throat and mouth and become latent in another cell type
    - Virus carried to lymph nodes after replication in epithelial cells of mouth, saliva producing glands and throat
    - Infects B lymphocytes
    - Virus activates B cells to produce multiple clones
- Epidemiology
    - Infects individuals in crowded areas
        - Infects at early age without producing symptoms producing immunity
        - More affluent populations missed exposure and lack immunity
    - Occurs almost exclusively in adolescents and adults who lack antibody
    - Virus present in saliva for up to 18 months
        - Mouth-to-mouth kissing important mode of transmission
    - No animal reservoir
- Prevention and Treatment
    - Avoiding saliva of another person
    - No vaccine
    - Acyclovir inhibits productive infection
        - Has no activity on latent viruses

TABLE 28.6	"Kissing Disease" (Infectious Mononucleosis, "Mono")
Symptoms	Fatigue, fever, sore throat, and enlargement of lymph nodes
Incubation period	Usually 1 to 2 months
Causative agent	Epstein-Barr (EB) virus, a DNA virus of the herpesvirus family
Pathogenesis	Productive infection of epithelial cells of throat and salivary ducts; latent infection of B lymphocytes; activation of B and T lymphocytes; hemorrhage from enlarged spleen is a rare but serious complication.
Epidemiology	Spread by saliva; lifelong recurrent shedding of virus into saliva of asymptomatic, latently infected individuals.

Malaria

- Symptoms
  - "flu-like"
- Includes fever, headache and pain in the joints and muscles
- Generally begin 2 weeks post infection
  - Transmission via bite of infected mosquito
- Symptom pattern changes after 2 to 3 weeks
  - Falls into three categories
    - Cold phase – abruptly feels cold and develops shaking
    - Hot phase – follows cold phase
      - Temperature rises steeply reaching 104°F
    - Wet phase – follows hot phase
      - Temperature falls and drenching sweat occurs
- Causative agent
  - Human malaria caused by four species of genus *Plasmodium*
    - *P. vivax, P. falciparum, P. malatiae, P. ovale*
  - Infectious form of parasite injected via mosquito
  - Carried by bloodstream to liver
    - Infects cells of liver
      - Thousands of offspring released to produce infection in erythrocytes
- Pathogenesis
  - Characteristic feature - Recurrent bouts of fever followed by times of wellness
  - Each species has different incubation periods, degrees of severity and preferred host age and range
  - Spleen enlarges to cope with large amount of foreign material and abnormal RBC
    - Common cause of splenic rupture
  - Parasites cause anemia by destroying red RBC and converting iron from hemoglobin to non-usable form
  - Stimulates immune system
    - Overworked immune system fails and immunodeficiency develops
- Epidemiology
  - Once common in both temperate and tropical areas
    - Now dominantly disease of warm climate
  - Eliminated from continental U.S. in late 1940's
  - Mosquitoes of genus *Anopheles* are biological vectors
  - Infected mosquitoes and humans constitute reservoir
  - Transmission via mosquitoes, blood transfusion and sharing of syringes
- Prevention and Treatment
  - Treatment is complicated
  - Chloroquine
    - Effective against erythrocyte stage. Will not cure liver infection
  - Primaquine and tafenoquine
    - Generally effective against exoerythrocyte stage and certain species gametocytes

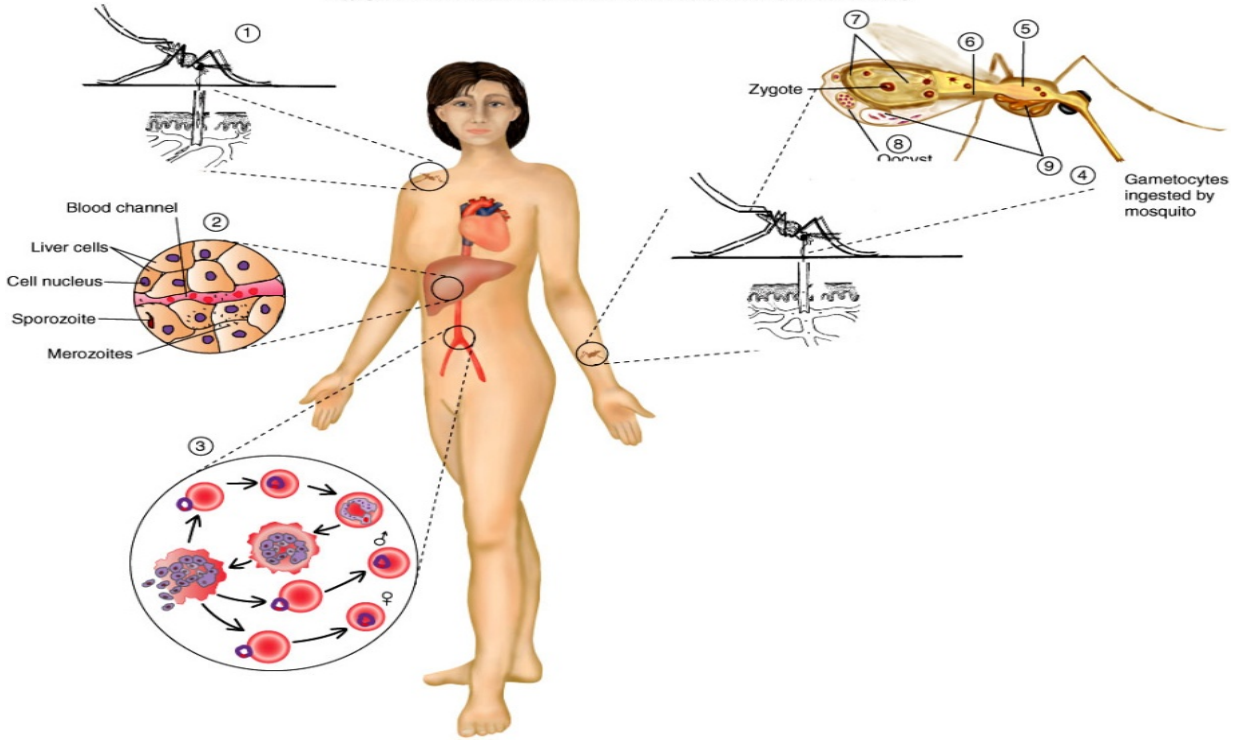


TABLE 28.8	Malaria
Symptoms	Recurrent bouts of violent chills and fever alternating with feeling healthy
Incubation period	Varies with species; 6 to 37 days
Causative agent	Four species of protozoa of the genus *Plasmodium*
Pathogenesis	Cell rupture, release of protozoa causes fever; infected red blood cells adhere to each other and to walls of capillaries; in the case of *falciparum* malaria; vessels plug up, depriving tissue of oxygen; spleen enlarges in response to removing large amount of foreign material and many abnormal blood cells from the circulation.
Epidemiology	Transmitted from person to person by bite of infected anopheline mosquito. Some individuals genetically resistant to infection.
Prevention and treatment	For prevention, weekly doses of chloroquine if in chloroquine-sensitive malarial areas; doxycycline, mefloquine, or other alternative if in chloroquine-resistant areas; after leaving, primaquine is given for liver stage; ACTs or other medicines for resistant strains; eradication of mosquito vectors; mosquito netting impregnated with insecticide; vaccines under development. Treatment: usually ACTs; other medicines if sensitivity known.