Subacute Bacterial Endocarditis

- **Symptoms**
  - Marked fatigue and slight fever
  - Typically become ill gradually
    - Slowly lose energy over a period of weeks or months
  - Abrupt development of stroke may occur

- **Causative Agent**
  - Usually member of normal bacterial flora of mouth and skin
    - α-hemolytic viridians streptococci and *Staphylococcus epidermidis*

- **Pathogenesis**
  - Bacteria gain entry to bloodstream during dental procedures, toothbrushing or other trauma to mouth or skin
  - Organisms may become trapped in clots formed near deformed heart valves
    - Organism may multiply and produce biofilms
    - Organisms inaccessible to phagocytic killing
  - As organisms multiply more clot is formed
    - Clot builds to fragile mass
      - Bacteria break away from clot and are washed away
      - Clots may block significant vessels
  - Masses of organism growing in heart can burrow into tissue and cause abscesses

- **Epidemiology**
  - Viridians streptococci account for smaller portion of cases
    - Due to dentist prescribing antibiotics to patients with distinct heart murmurs before treatment
  - More cases of disease produced by *Staphylococcus epidermidis*
    - Occur most often in
      - Injected-drug users
      - Patients with intravenous catheter
        - Particularly if used for extended periods
      - Individuals with artificial heart valves
Subacute Bacterial Endocarditis

- Prevention and Treatment
  - No proven prevention
    - Antimicrobial treatment to susceptible population previous to dental procedures most notable attempt to prevent
    - Rigid attention to sterile technique helps prevent occurrence in hospital setting
  - Only bacteriocidal medications are effective in treatment
    - Usually two or more given together for prolonged period
      - Penicillin and gentamicin given over one or more months

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Fever, loss of energy over a period of weeks or months; sometimes, a stroke</th>
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<tbody>
<tr>
<td>Incubation period</td>
<td>Poorly defined, usually weeks</td>
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<td>Causative agents</td>
<td>Usually oral α-hemolytic viridans streptococci or Staphylococcus epidermidis</td>
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<td>Pathogenesis</td>
<td>Normal microbiota gain entrance to bloodstream through dental procedures, other trauma; in an abnormal heart, turbulent blood flow causes formation of a thin clot that traps circulating organisms; a biofilm forms, makes them inaccessible to phagocytic killing; pieces of clot break off, block important blood vessels, leading to tissue death.</td>
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<td>Epidemiology</td>
<td>Persons at risk are mainly those with hearts that have congenital defects or are damaged by disease such as rheumatic fever; situations that cause bacteremia.</td>
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<td>Prevention and treatment</td>
<td>Administration of an antibiotic immediately prior to anticipated bacteremia, such as before dental work. Treatment: Bactericidal antibiotics given together, such as penicillin and gentamicin.</td>
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Septicemia

- Symptoms
  - Violent shaking chills and fever
    - Often accompanied by anxiety and rapid breathing
  - In case of septic shock
    - Urine output drops
    - Respiration and pulse become more rapid
    - Arms and legs become cool and dusky colored
Septicemia

- Causative agent
  - Gram (-) bacteria more likely cause of fatal septicemia
  - Shock is common despite treatment
  - Mortality rate nearly 50%
  - Blood cultures from patients usually reveal
    - *E. coli* - Gram (-) facultative anaerobe
    - *Ps. Aeruginosa* - Gram (-) aerobe
      - Generally found in natural environment
    - *Bacteroides* sp. - Gram (-) aerobe
      - Part of normal intestinal and upper respiratory flora

- Pathogenesis
  - Generally originates outside of bloodstream
    - Alterations in normal body defenses may allow organism to infect blood
  - Endotoxin is released
    - Antibiotics can enhance endotoxin release
  - Macrophages respond intensely to endotoxin to try to localize
    - Exaggerated response considered hypersensitivity
  - Failed localization allows endotoxin into bloodstream
    - Causes cascade of harmful events
  - Lungs particularly susceptible to irreversible damage
    - Often results in death despite successful treatment of infection

- Epidemiology
  - Mainly a nosocomial disease
    - Reflects high incidence of Gram (-) bacteriemia in hospitals
  - General trend to increasing disease that relates to increased life span, antibiotic suppression of normal flora, use of immunosuppressive drugs and biofilm formation of medical devices

- Prevention and Treatment
  - Depends largely on identification and effective treatment of localized infections
  - Treatment against causative organisms
    - Treatment methods will vary according to infecting organism

Tularemia (Rabbit Fever)

- Symptoms
  - Characterized by development of skin ulcerations and enlargement of regional lymph nodes
  - Other symptoms include
    - Fever
    - Chills
    - Achiness
  - Symptoms usually abate in 1 to 4 weeks
    - Sometimes may become chronic
  - Mortality rate between 30% and 50%
Tularemia (Rabbit Fever)

- **Causative agent** - *Francisella tularensis*
- **Pathogenesis**
  - Causes ulcer at entry sight
  - Lymphatic vessels carry organism to regional lymph nodes
    - Become large, tender and filled with pus
  - Spread to other body sites via lymphatics and blood vessels
  - Pneumonia occurs in 10% - 15% of lung infections
    - Mortality rate as high as 30%
  - Multiplies within phagocytes
  - Cell mediated immunity responsible for ridding infection
    - 90% of infected individuals survive in the absence of treatment
- **Epidemiology**
  - Occurs among wild animals in Northern Hemisphere
  - In eastern U.S. most infections occur in winter
    - Result from skinning hunted rabbits
  - In western U.S. infections increase in summer
    - Due to bites from fleas and ticks
  - Other reservoirs for infection include
    - Muskrats, beavers, squirrels, and deer
- **Prevention and Treatment**
  - Uses of rubber gloves and goggles when working with animal carcasses
  - Insect repellents and protective clothing
    - Inspect routinely for ticks after exposure
  - Vaccine available for workers at higher risk of exposure
  - Treated with gentamicin

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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 herpesvirus 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 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

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Yellow Fever

- Symptoms
  - Disease can range from mild to severe
  - Most common form may be only fever and slight headache lasting a day or two
  - Severe disease characterized by high fever, nausea, nose bleeds and bleeding into the skin, “black vomit” from GI bleeding and jaundice
  - Mortality rate of severe disease can reach 50%
  - Reason for the variation in symptoms is unknown

- Causative agent
  - Enveloped, single-stranded RNA arbovirus
    - Belongs to flavivirus family
  - Virus multiplies in mosquitoes
    - Mosquitoes transmit virus to humans

- Pathogenesis
  - Introduce via bite of Aedes mosquitoes
  - Multiplies and enters blood stream
    - Carried to liver
      - Jaundice results in liver damage
      - Injury to small blood vessels produces petechiae
  - Kidney failure is a common consequence of disease

- Epidemiology
  - Reservoir mainly infected mosquitoes and primates in tropical regions of Central and South America and Africa
  - Periodically spread to urban areas via mosquito bite

- Prevention and Treatment
  - Control achieved by spraying and elimination of breeding sites
    - Control almost impossible in jungle regions
  - Attenuated vaccine available for high risk groups
  - No proven antiviral treatment

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
Malaria

- 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
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