

Preview: infectious diseases

infectious diseases
in different organ
systems

Integument

Respiratory

Digestive

Urinary

Nervous

For each infectious
disease:

pathogen

transmission

symptoms

prevention

treatment

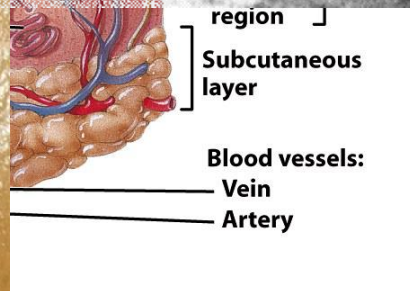
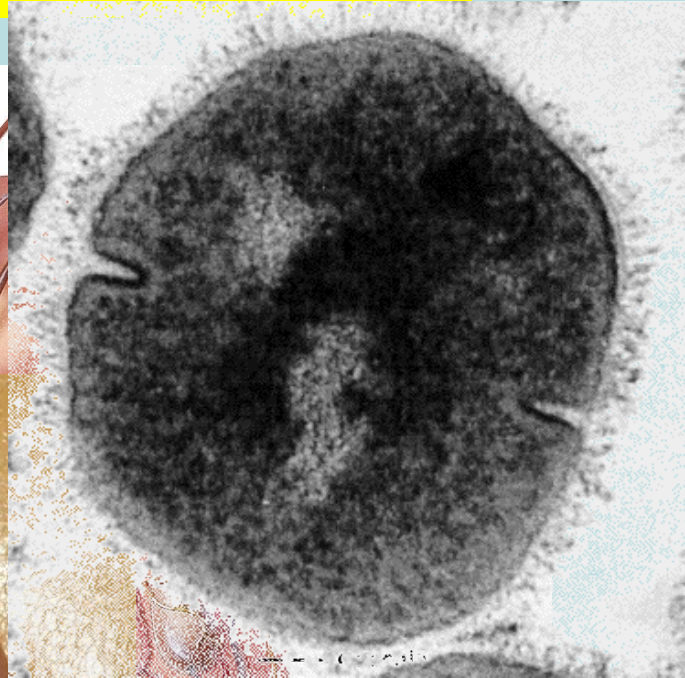
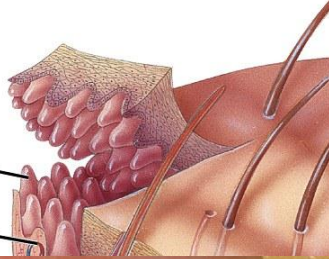
Skin infection



Dermal papilla

Capillary loop

Sweat pore

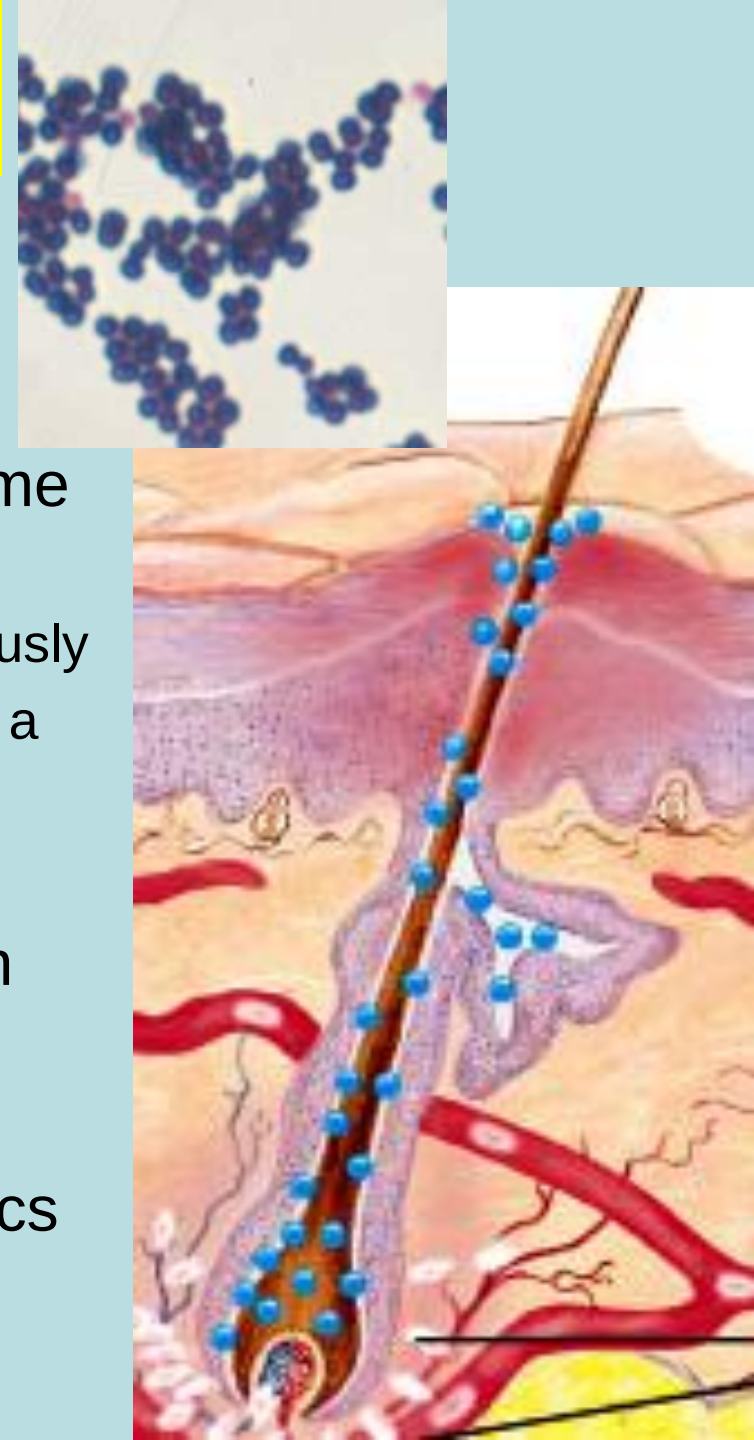


Erysipelas: acute streptococcus bacterial infection of the dermis

• **Scarlet Fever:** caused by an exotoxin released by *Streptococcus pyogenes*

Hair Follicle Infections

- Epidemiology
 - *S. aureus* is found primarily in the nostrils
 - Nearly everyone carries it at one time or another
 - 20% of healthy adults carry it continuously
 - 60% will be colonized at some point in a given year
 - Transmission is usually on hands
 - Individuals with staphylococcal skin infections shed large numbers of bacteria
 - Sources of staphylococcal epidemics are difficult to identify precisely

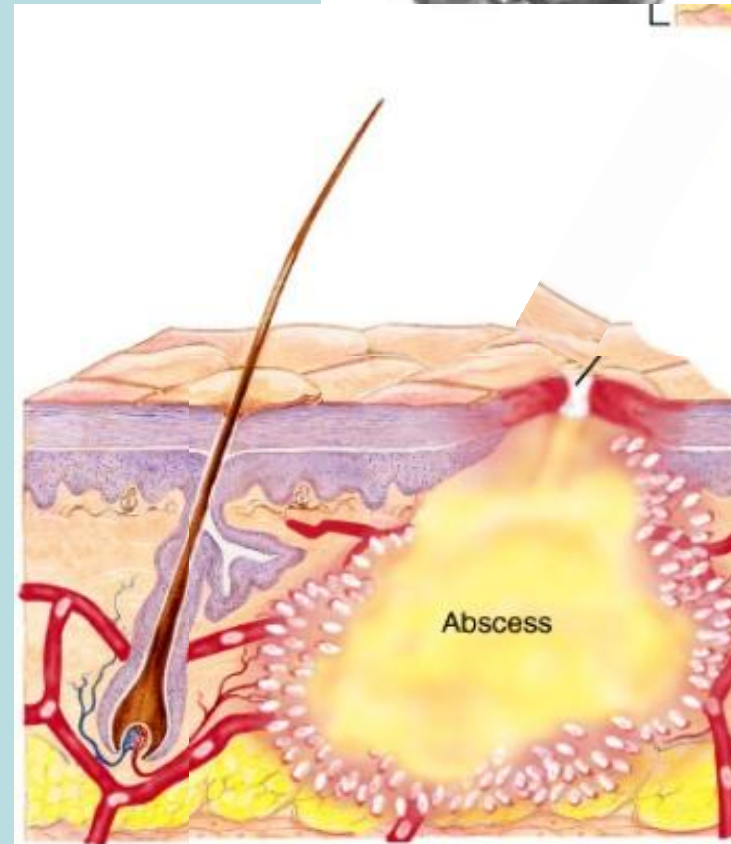


Hair Follicle Infections



Symptoms – Furuncles

- Furuncles are recognized by the extended redness, swelling and tenderness
- Pus often drains from the lesion along with a plug of inflammatory cells and dead tissue
- Numerous furuncle lesions produce a carbuncle

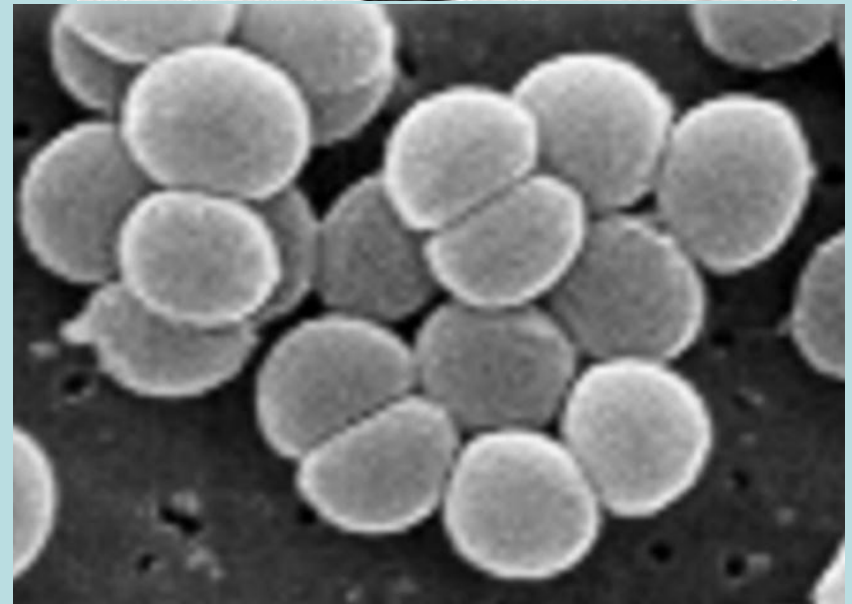
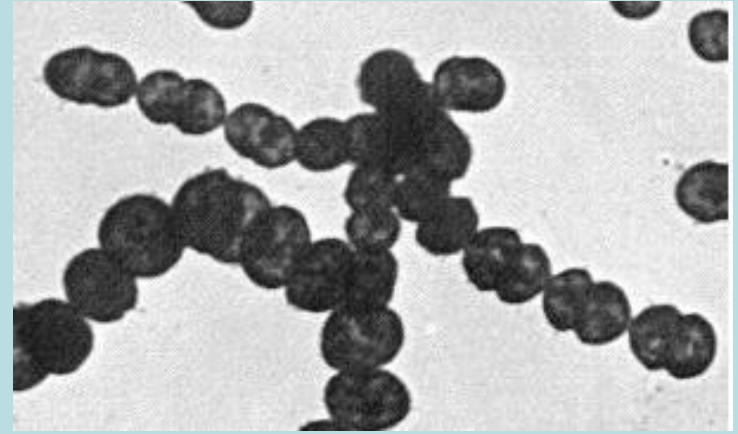


Hair Follicle Infections

- Prevention and Treatment
 - Prevention of staphylococcal disease is difficult
 - Application of anti-staphylococcal creams and soaps can decrease carrier state
- Treatment of furuncles and carbuncles usually requires surgical **draining**
 - Treatment is complicated by antibiotic **resistance**
 - 90% of *S. aureus* strains are resistant to penicillin

Q: What's the difference between streptococcus and staphylococcus?

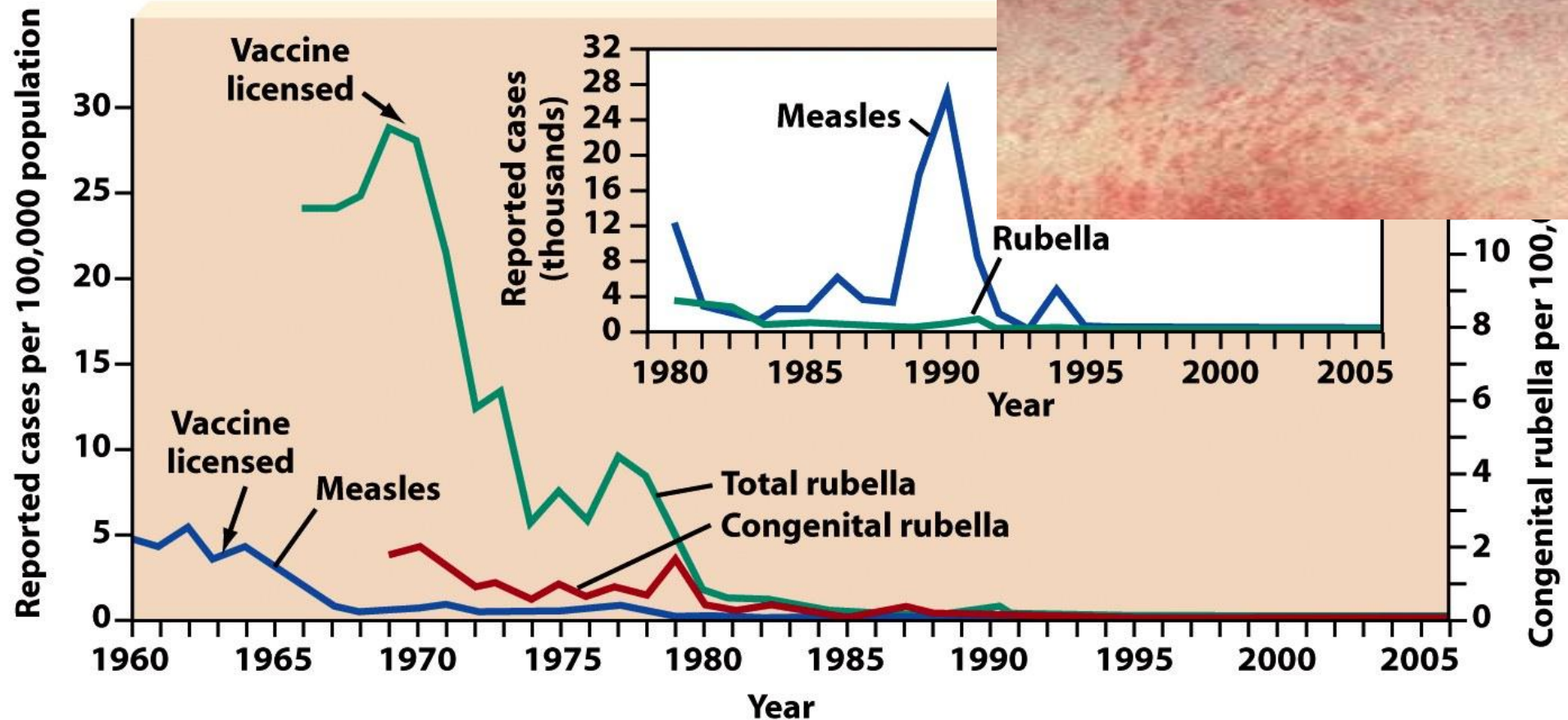
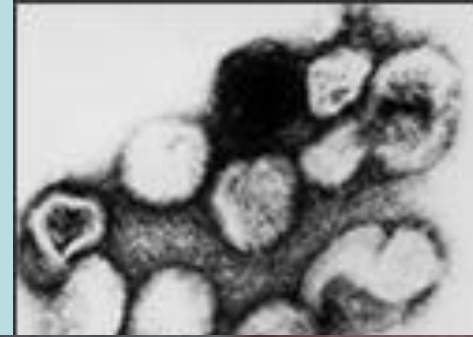
- A. different cell shape: one is sphere, one is oval
- B. different cell division: one is binary, one is meiotic
- C. different toxin: one is endotoxin, one is exotoxin
- D. different cell dividing direction



Viral Skin Diseases

- Rubella (*Latin, little red*)

rubella virus en (+)ss RNA



Fungus infection: athlete's foot

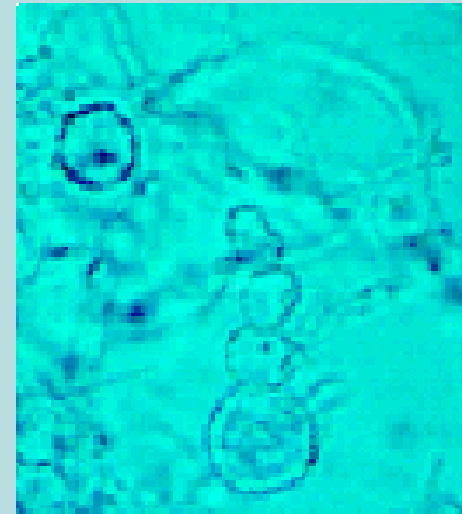


Pathogen: *Trichophyton concentricum*

Symptoms: dry skin, itching, scaling, inflammation, and blisters

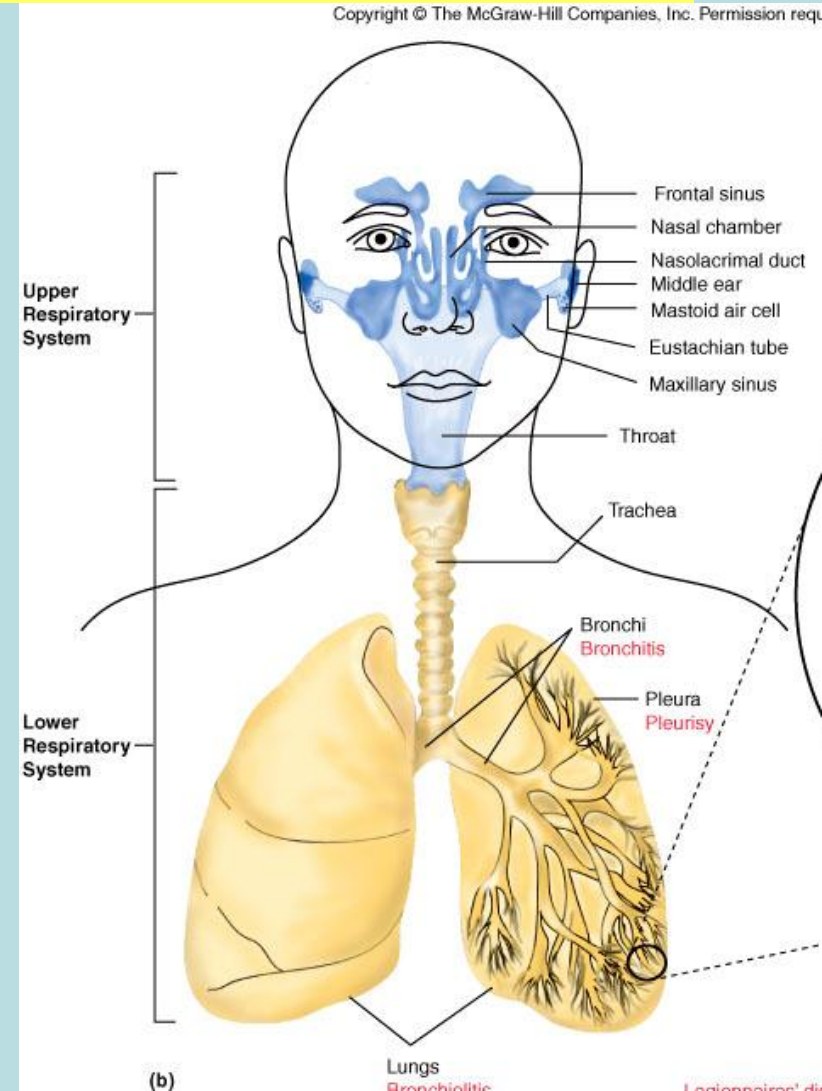
Prevention: shower shoes, talcum powder, airy shoes, dry socks etc.

Treatment: external fungicidal, topical or oral antifungal drugs



Respiratory System Infections

- Encompass enormous variety of illnesses
 - Trivial to fatal
- Divided into infections of
 - Upper respiratory
 - Head and neck
 - Uncomfortable but generally not life threatening
 - Lower respiratory
 - Chest
 - More serious
 - Can be life threatening
 - Particularly in the immunocompromised



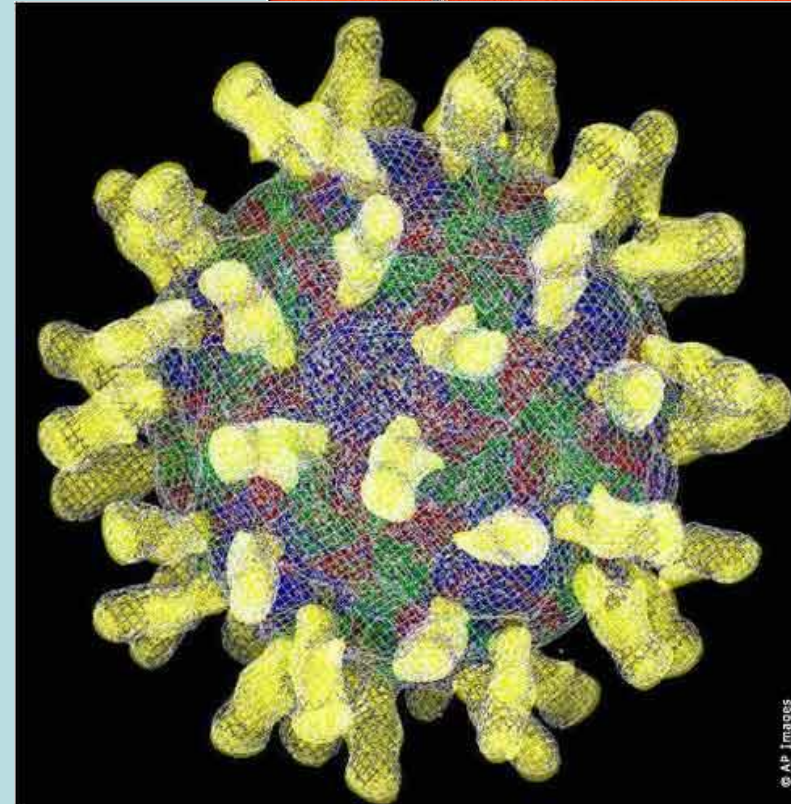
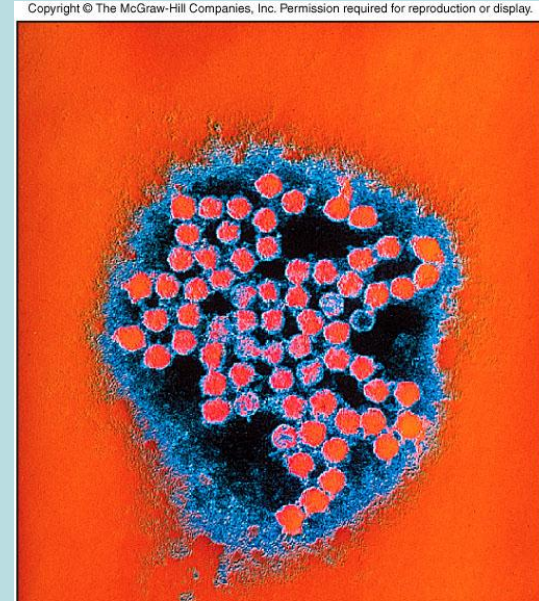
Common Cold

Symptoms

- Malaise
- Scratchy mild sore throat
- Runny nose
- Cough and hoarseness
- Nasal secretion
 - Initially profuse and watery
 - Later, thick and purulent
 - No fever
 - Unless complicated with secondary infection
- Symptoms disappear in about a week

Causative Agent

- 30% to 50% caused by rhinovirus **ss(+)**
RNA
 - More than 100 serotypes of rhinovirus
 - Member of picornavirus family
 - Small
 - Non-enveloped
 - Single-stranded RNA genome



Common Cold



- Pathogenesis
 - Virus attach to specific receptors on respiratory epithelial cells and multiply in cells
 - Large number of viruses released from infected cells
 - Injured cells cause inflammation which stimulates profuse nasal secretion, sneezing and tissue swelling
 - Infection is halted by inflammatory response, interferon release, and immune response
 - Infection can extend to ears, sinuses and lower respiratory tract before stopping

Common Cold

- Epidemiology
 - Humans are only source for cold virus
 - Close contact with infected person or secretions usually necessary for transmission
 - High concentrations are found in nasal secretions during first 2 or 3 days of a cold
 - Young children transmit cold virus easily
 - Due to lack of good hygiene
 - relationship between exposure to cold temperature and development of a cold



Common Cold

- Prevention
 - No vaccine
 - Too many different types of rhinovirus
 - Prevention directed at
 - Hand washing
 - Keeping hands away from face
 - Avoiding crowds during times when colds are prevalent
- Treatment
 - Antibiotic therapy is ineffectual
 - Certain antiviral medications show promise
 - Must be taken at first onset of symptoms
 - Treatment with over-the-counter medications may prolong duration due to inhibition of inflammation

Explain the difference between common cold and influenza.

Pathogen	>100 rhinoviruses and bacteria	~3 orthomyxovirus
Pathogenesis	infect but not destroy respiratory epithelia cell;	infect and destroy epithelia cells +/-second infection
Symptoms	- fever	+ fever
Prevent	-vaccines	+vaccines

SARS (Severe Acute Respiratory Syndrome)

Pathogen: Coronavirus, ss(+) RNA

Symptoms: flu-like, fever,
myalgia, cough, sore throat etc.

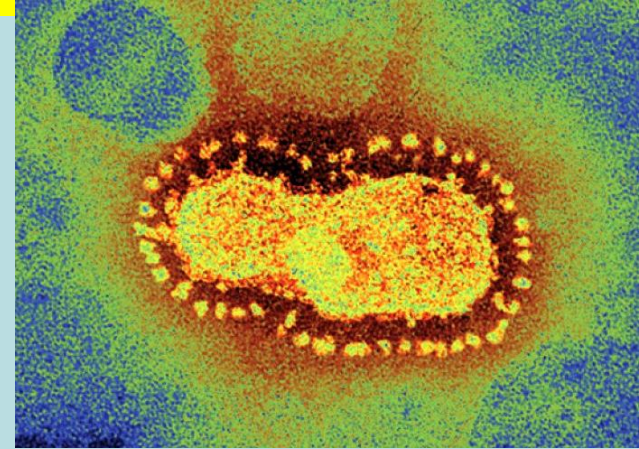
Epidemiology:

mortality: 9.6% (774/8096)

compare flu: 0.6% overall, 33% local

Prevention: personal/social
hygiene

Treatment: antipyretics, passive
immunization, symptomatic
therapy

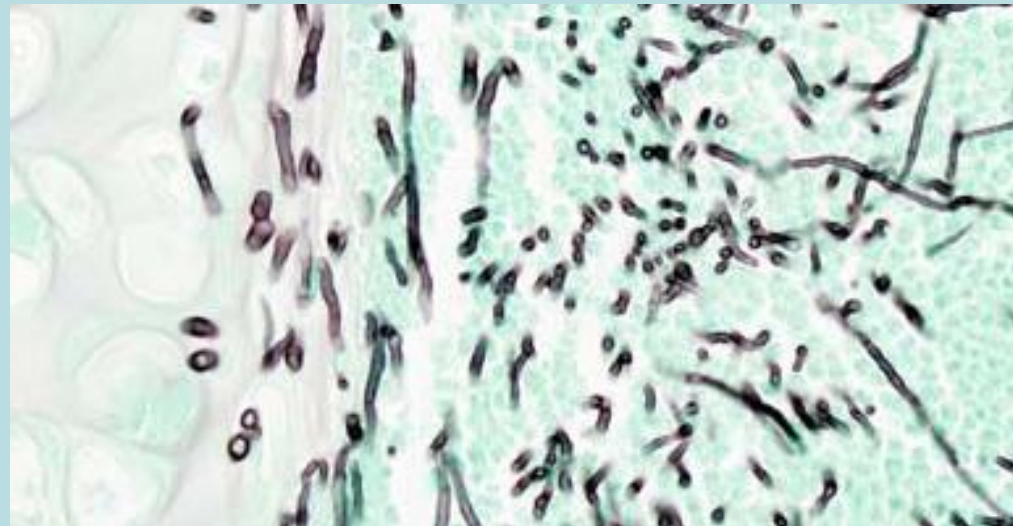
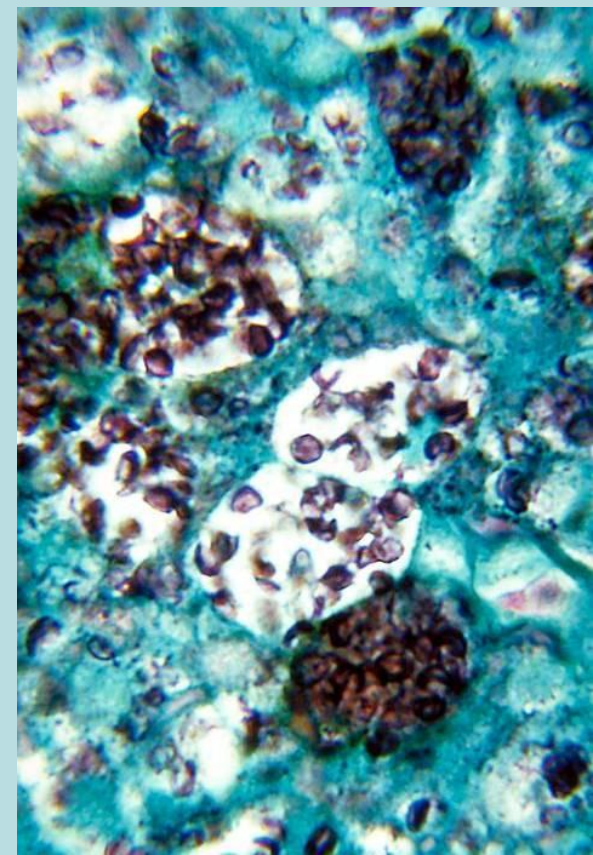


<1%	<24yr
6%	25-44yr
15%	45-64yr
>50%	>65yr

Fungal Diseases

PCP Pneumonia

- **Pathogen:** >10 fungal species
- **Symptoms:** dyspnea, cough, chest pain, fever, etc.
- **Transmission:** airborne spores
- **Prevention:** hygiene
- **Treatment:** antifungal, anti-inflammation therapy



LRT Parasitic Diseases

Lung flukes

- Pathogen: *Paragonimus westermani*
- Symptom: bad cough, bronchitis, hemoptysis (blood in sputum)
- Transmission: pets, raw seafood etc.
- Prevention: cook well
- Treatment: anti-helminthes like Praziquantel*

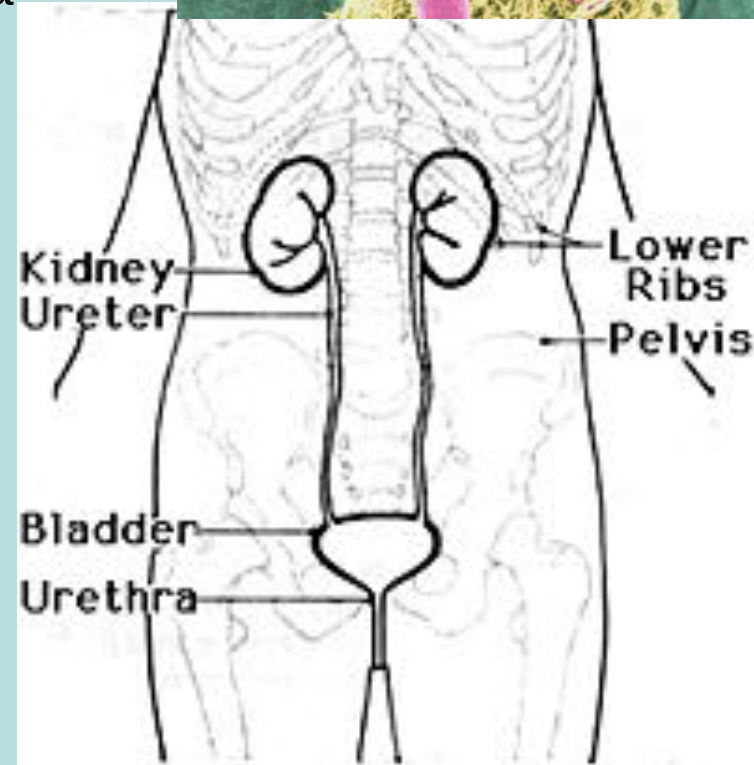
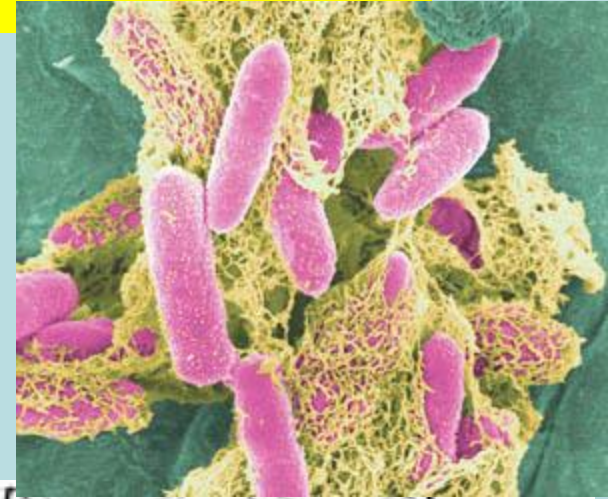


Bacterial Urogenital Diseases

- Urinary Tract Infections (UTIs)

Urethritis, cystitis, prostatitis etc.

- Pathogen: viruses, bacteria, fungi
- Symptom: frequent urination, dysuria
- Transmission: contact
- Prevention: personal hygiene F>M
- Treatment: antibiotics



Parasitic Urogenital Diseases

- **Trichomoniasis**
- Pathogen: *Trichomonas vaginalis*
- Symptoms: rare, irritation, mild discharge
- Transmission: STD enteroviruses
- Prevention: condom and others for STD
- Treatment: anti-protozoan, metronidazole or tinidazole



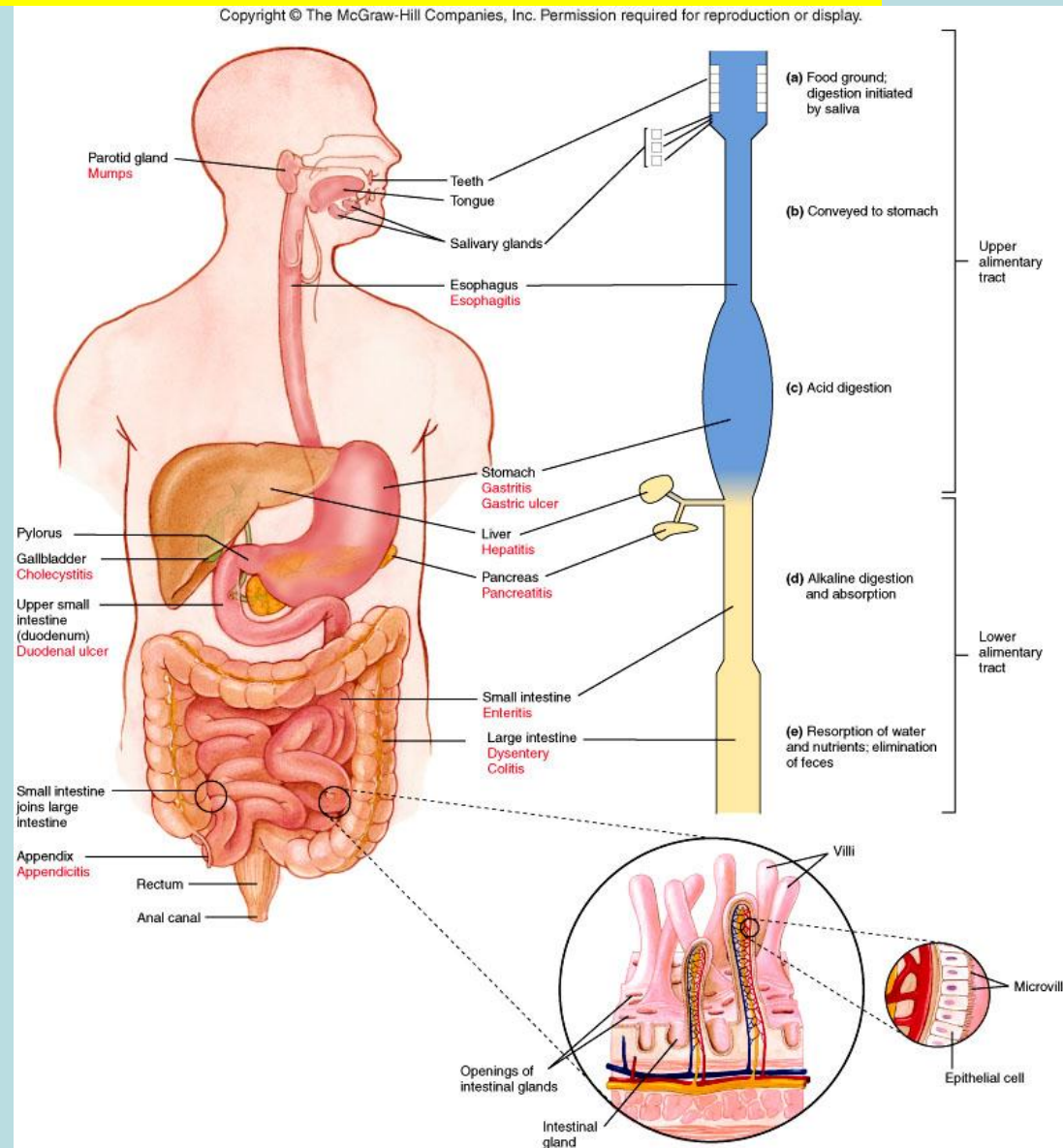


UTIs (urinary tract infections) are common problems because the urinary tract:

- a. gets microbes from the urine, which is not sterile
- b. gets microbes from outside environment
- c. has weak epithelial layer, easy to be destroyed
- d. has nutrients coming from urine

Digestive System Infections

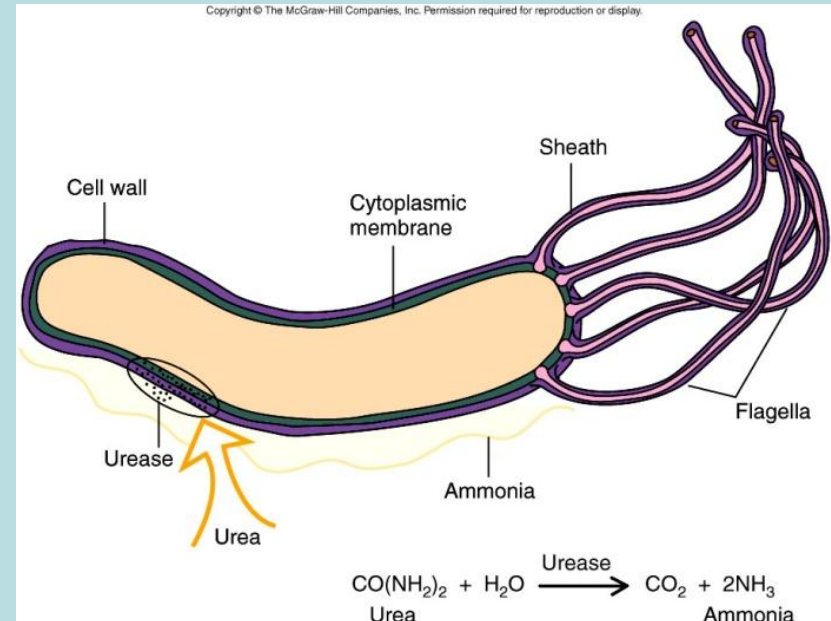
- Sometimes referred to as the alimentary or gastrointestinal tract
- Passageway running from mouth to anus
- One of the body's boundaries from the environment
- Major route of microbial invasion
- Main purpose to provide nutrients to body
- Divided into upper and lower tracts



Helicobacter pylori Gastritis

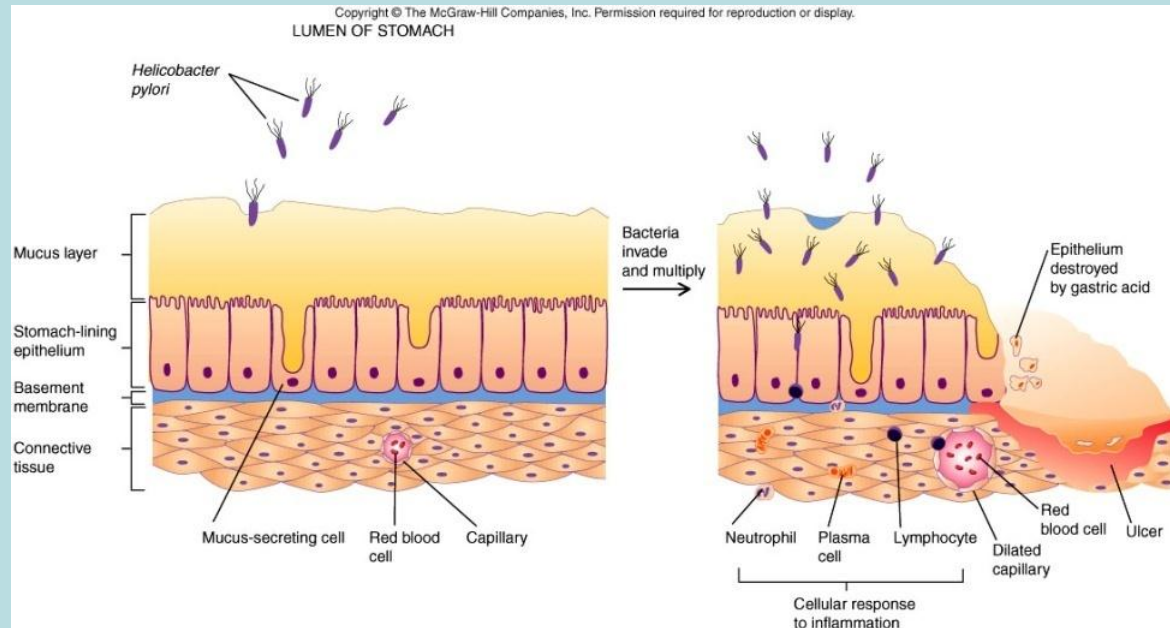
- Symptoms
 - Range from belching to vomiting
 - Most are asymptomatic
 - Symptoms occur when infection is complicated with ulcers or cancer
 - Symptoms include
 - Abdominal pain
 - Tenderness
 - Bleeding

- Causative Agent
 - *Helicobacter pylori*
 - Short
 - Spiral
 - Gram negative
 - Microaerophile
 - Multiple polar flagella



Helicobacter pylori Gastritis

- Pathogenesis
 - Bacteria survive extreme acidity of the stomach
 - Able to neutralize environment
 - Organism uses flagella to corkscrew through mucosal lining
 - Inflammatory response begins



- Mucus production decreases
 - Without mucus stomach lining not protected from acidic environment
- Infection persists for years
 - Possibly for a life time

Helicobacter pylori Gastritis

- Epidemiology

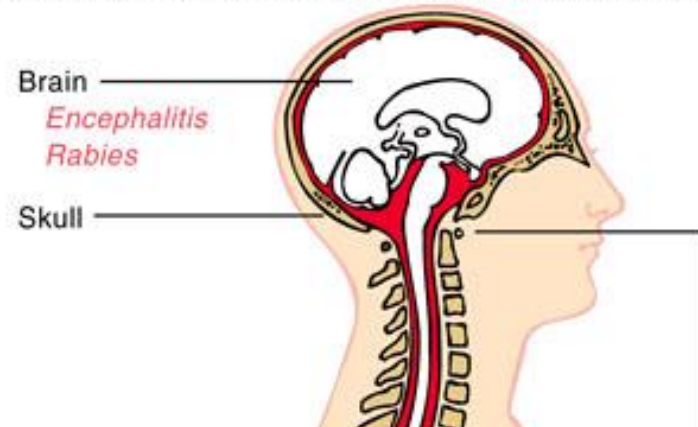
- Infections tend to cluster in families
- Transmission most likely fecal-oral route
 - Flies also capable of transmission
- 20% of US population infected
 - Incidence increases with age
 - Almost 80% of those over 75 infected
 - Rates highest in lower socioeconomic groups

- Prevention and Treatment

- No proven prevention measures
- Infection can usually be eradicated with combined antibiotic treatment
 - Medication is also used to inhibit production of stomach acid



Infectious disease in nervous system



- **Meningitis**
- Pathogen: *viruses (enteroviruses) or bacteria*
- Viral meningitis usually is mild than bacterial meningitis
- Before 1990, leading causal bacteria is *Haemophilus influenzae (Hib)*, now are *Streptococcus pneumoniae* and *Neisseria meningitidis*

Bacterial meningitis is severe than viral meningitis because:



- a. Bacteria that cause meningitis can cause septic shock or brain damage
- b. Viruses that cause meningitis can be suppressed by immune system
- c. Generally bacteria is more dangerous than virus
- d. Both a and b.



Meningococcal Meningitis

Symptoms

- First symptoms similar regardless of agent
 - Mild cold followed by onset of throbbing headache
 - Fever
 - Pain and stiffness of neck and back
 - Nausea and vomiting
 - Deafness and alteration in consciousness may appear progressing to coma

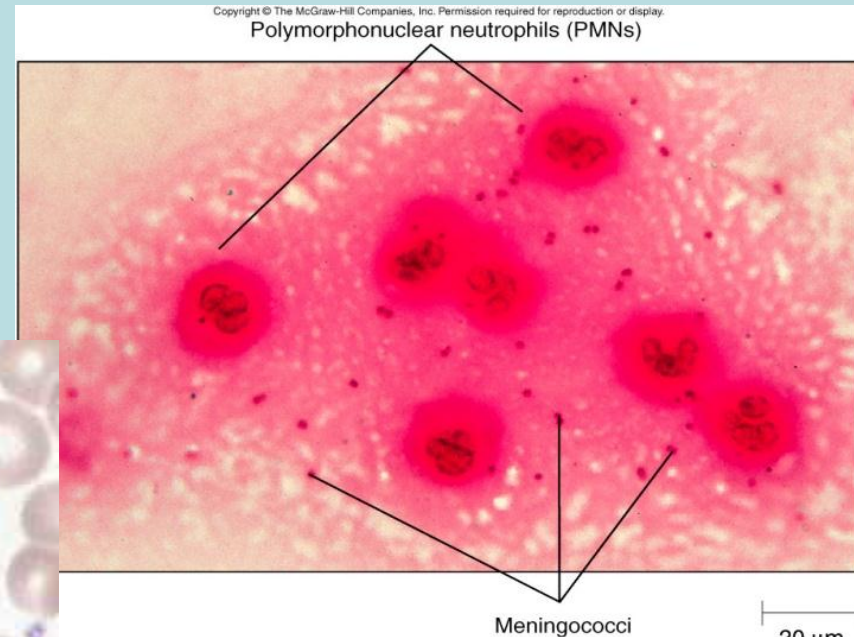


- Small hemorrhages called petechiae may appear on skin
- Infected person may develop shock and die within 24 hours
 - Usually progression of disease is slower allowing time for treatment

Meningococcal Meningitis

- Pathogenesis

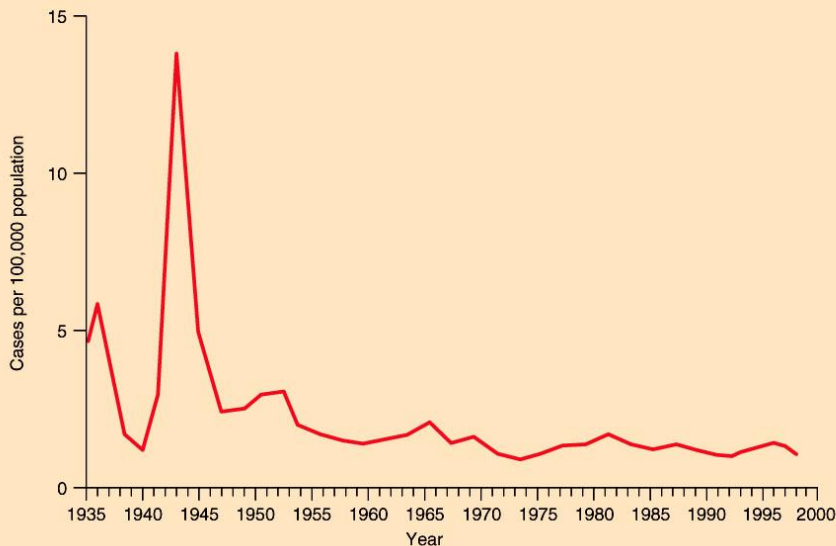
- Acquired by inhaling infected respiratory droplets
 - Bacteria adhere to mucous membranes via pili and multiply
 - Invade bloodstream by passing through respiratory epithelium
 - Bloodstream carries organisms to CSF
 - Organisms phagocytized by PMNs
 - Enter fluid in large numbers
- Inflammation causes 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



Meningococcal Meningitis

- Causative agent
 - *Neisseria meningitidis*
 - Gram negative diplococci
 - 12 antigenic serotypes
 - Most serious infections due to types A,B,C and Y
- Epidemiology
 - *N. meningitidis* more prone to cause epidemics
 - Reasons unknown
 - 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

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Meningococcal Meningitis

- 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
 - Individuals immediately exposed given antibiotic rifampin
 - Can usually be cured unless brain injury or shock present
 - Mortality is less than 10% in treated populations

Review: infectious diseases

infectious diseases in different organ systems

Integument

Respiratory

Digestive

Urinary

Nervous

For each infectious disease:

pathogen

transmission

symptoms

prevention

treatment

