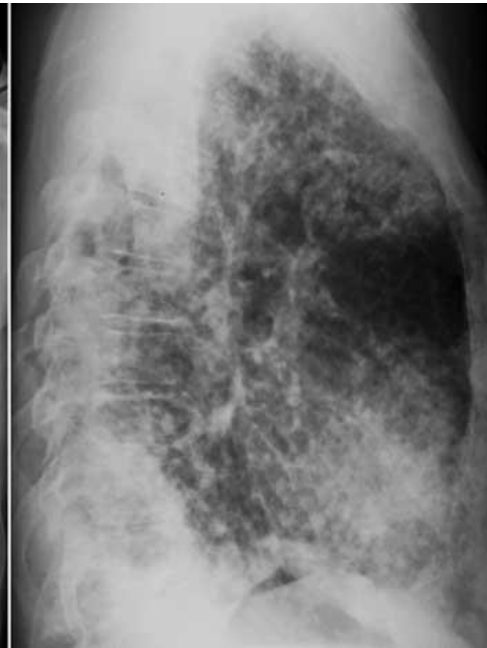


Diseases of the Respiratory System

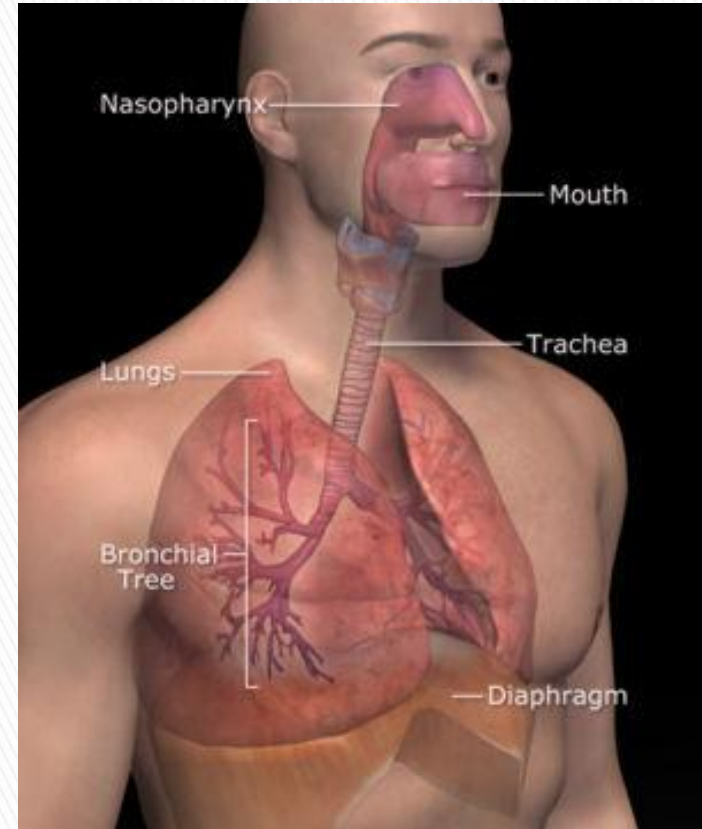


Respiratory Tract Anatomy

In humans the respiratory tract is the part of the anatomy that has to do with the process of respiration.

The respiratory tract is divided into 3 segments:

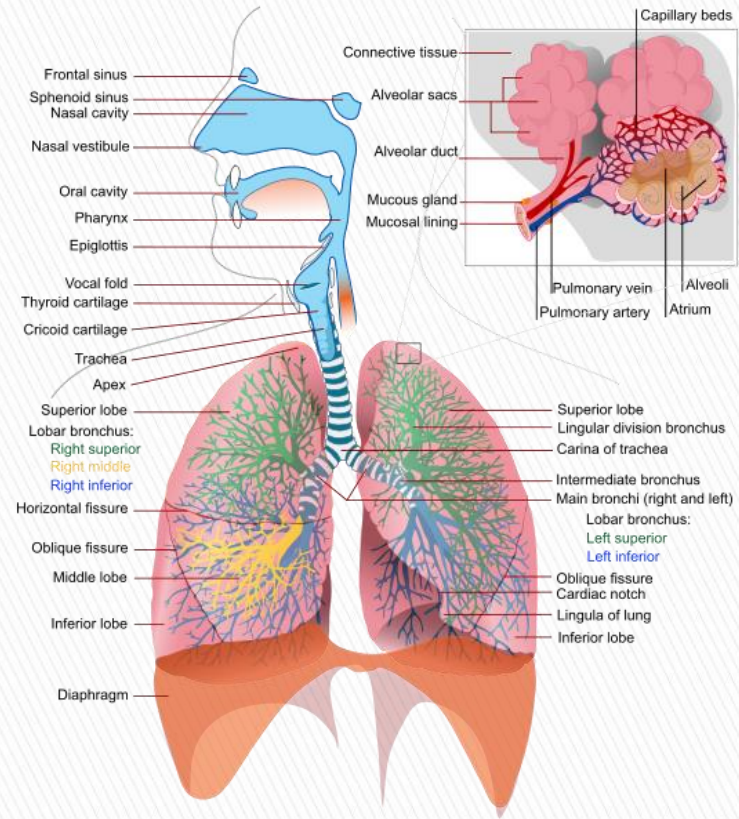
- ▶ Upper respiratory tract: nose and nasal passages, paranasal sinuses, and throat or pharynx
- ▶ Respiratory airways: voice box or larynx, trachea, bronchi, and bronchioles
- ▶ Lungs: respiratory bronchioles, alveolar ducts, alveolar sacs, and alveoli



Function of Respiratory Tract

Gas exchange

Most of the respiratory tract exists merely as a piping system for air to travel in the lungs; alveoli are the only part of the lung that exchanges oxygen and carbon dioxide with the blood.



Divisions of Respiratory Tract Infections

Upper Respiratory Tract Infections

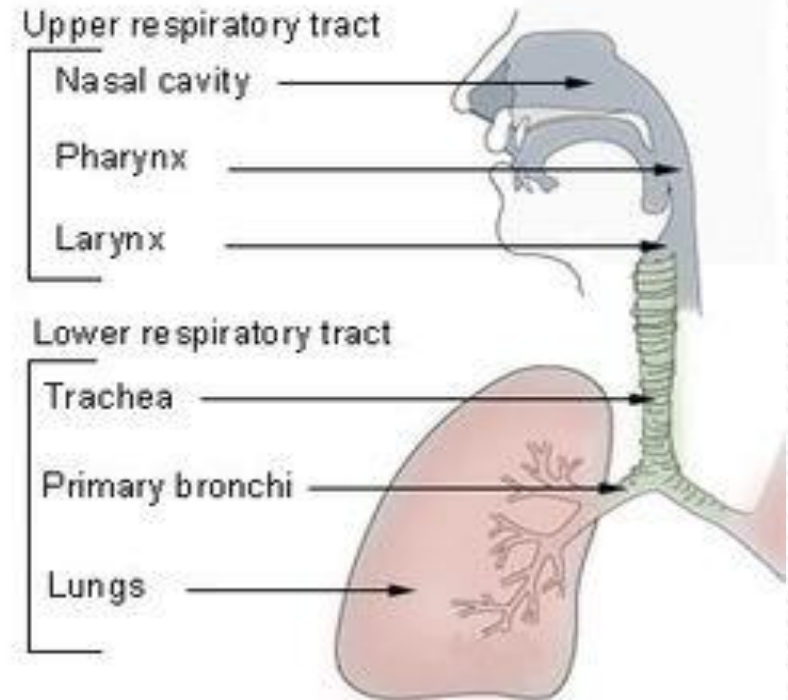
Lower Respiratory Tract Infections



Upper Respiratory Tract Infections

The respiratory tract is a common site for infections. Upper respiratory tract infections are probably the most common infections in the world.

Conducting Passages

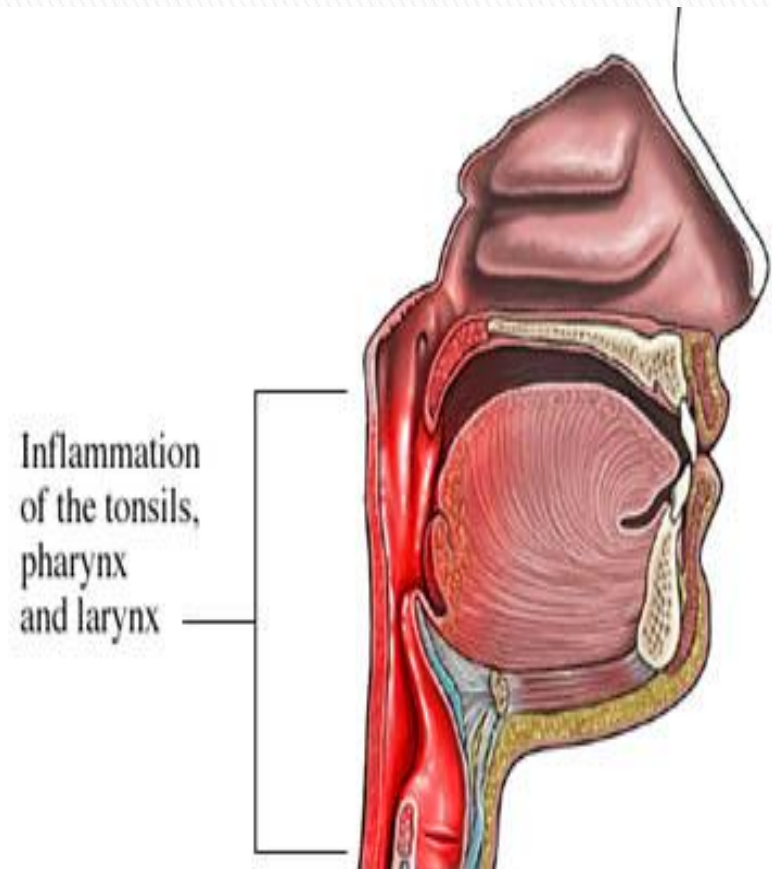


Pharyngitis

Pharyngitis is an inflammation of the throat or pharynx. In most cases it is painful and the initial infection can extend for a lengthy time period, and is often referred to as a sore throat.

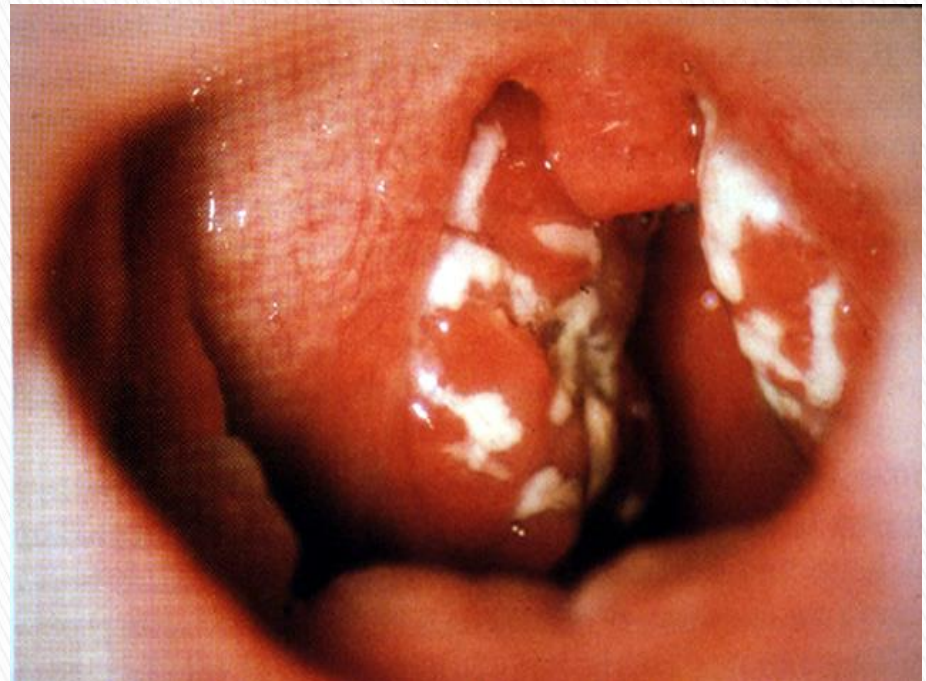
Acute pharyngitis can result in very large tonsils which cause trouble swallowing and breathing. Some cases are accompanied by a cough or fever.

Most acute cases are caused by viral infections (40%–60%), with the remainder caused by bacterial infections, fungal infections, or irritants such as pollutants or chemical substances.



Strep Throat

- ▶ Upper Respiratory Infection: inflamed mucous membranes of the throat
 - Caused by Group A β -hemolytic streptococci (*Streptococcus pyogenes*)
 - Virulence factors: resistance to phagocytosis
 - Streptokinases: lyse fibrin clots
 - Streptolysins: cytotoxic to tissue cells, RBCs, and protective leukocytes



Strep Throat

▶ Transmission:

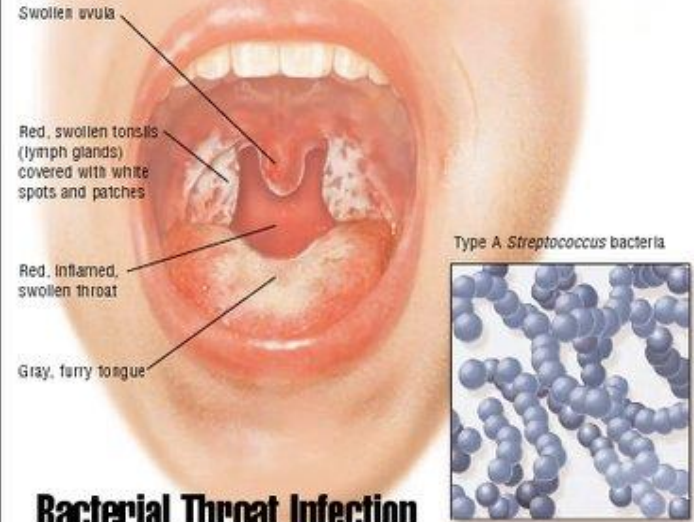
- person to person by direct contact with saliva or nasal discharge.
- Most people do not get group A strep infections from casual contact with others, but a crowded environment like a dormitory, school, or an institutional setting can make it easier for the bacteria to spread.
- A person becomes sick within 3 days after being exposed to the germ.
- Once people become infected, they can pass the infection to others for up to 2 to 3 weeks even if they don't have symptoms.
- After 24 hours of antibiotic treatment, a person will no longer spread the bacteria to others.



Strept Throat Sx

- ▶ throat may be red with white patches
- ▶ trouble swallowing
- ▶ have tender swollen glands (lymph nodes) on the sides of your neck, toward the front
- ▶ Usually the tonsils are red and enlarged
- ▶ may also have white craters or specks of pus on your tonsils or your tonsils may be covered with a gray or white coating. headache
- ▶ abdominal (lower stomach) pain
- ▶ fever
- ▶ general discomfort, uneasiness, or ill feeling
- ▶ loss of appetite and nausea
- ▶ muscle pain
- ▶ joint stiffness
- ▶ rash

Strep Throat



Bacterial Throat Infection

Pharyngitis is an inflammation of the pharynx, the area in the back of the throat. This inflammation causes the symptom of a sore throat. Although most infectious causes of sore throat are due to viruses, about 5% to 10% of pharyngitis cases result from a bacterial infection. Since the bacteria most often responsible for bacterial pharyngitis is a strain of *Streptococcus* bacteria, bacterial throat infections are referred to as strep throat. Strep throat is most common in young children between ages 3 and 15, but it can occur in anyone. Strep throat bacteria are spread easily from person to person in close-contact settings, such as schools, households, or day care centers. Classic symptoms of a strep throat include a painful sore throat, difficulty swallowing, fever, swollen neck glands, nausea, and headache. Upon examination, a strep throat appears red, often with white or yellow dots or streaks, tiny red dots on the upper palate, and swollen tonsils. Since a definitive diagnosis cannot be made by symptoms and examination alone, a swab of the throat area is used to detect a bacterial infection using a rapid strep test, followed by a culture if the rapid test is negative.

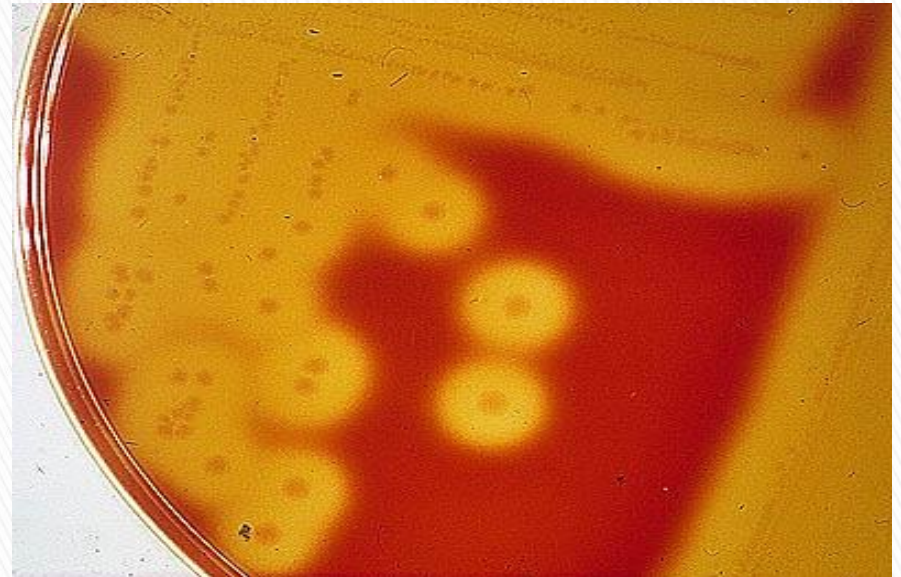
If the throat swab test or culture is positive, an antibiotic is prescribed to stop the infection from spreading and to prevent complications. Although unusual, an untreated strep throat can lead to a sinus or ear infection, abscess of the tonsils, scarlet fever, or more serious complications, such as kidney disease (glomerulonephritis) or heart disease (rheumatic fever). After 24 hours of antibiotic therapy, patients with strep throat are no longer considered contagious and can return to school or work if they have no fever. Most cases of strep throat respond quickly to antibiotic therapy, but patients must finish the entire course of medication to avoid the bacteria from returning. If a strep throat returns after appropriate treatment, the source of *Streptococcus* may be a close contact (who may or may not have symptoms), or the antibiotic was not effective.

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continued ▶

Strept Throat Dx

- ▶ Diagnosis:
 - Throat swab
 - Rapid test
 - Indirect agglutination diagnostic tests
 - Use microscopic latex particles coated with Abs against group A streptococci.



Strept Throat Tx

- ▶ Rx: 10 days of treatment with an antibiotic such as penicillin.
 - stay home for at least 48 hours, until the antibiotics have had a chance to work. It's typical to be contagious for about 24 hours after you start treatment. By the third day you should be feeling much better.
 - If you stop taking your antibiotics too soon, bacteria can remain in your throat, your symptoms may come back, and you could be contagious for up to 21 days.
 - No treatment or incomplete treatment of strep throat also increases your risk of complications, such as rheumatic fever (which can cause permanent damage to your heart), scarlet fever, blood infection, or kidney disease.

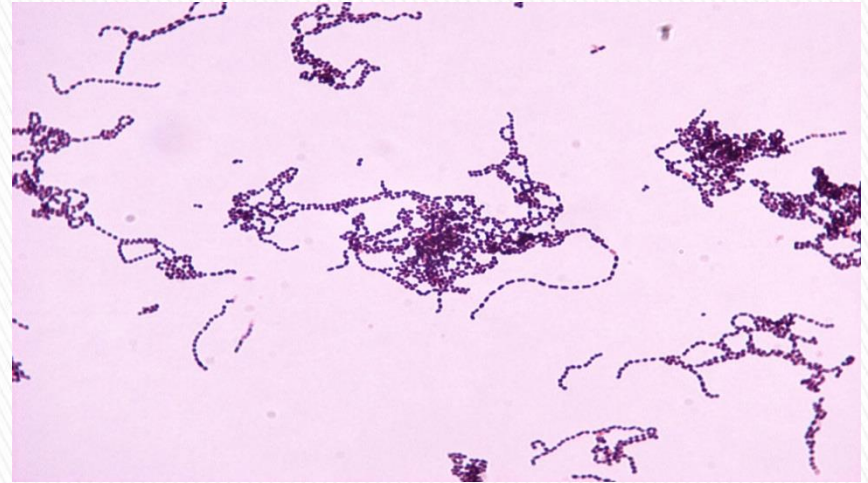


Table 2. Antibiotics and Dosing for Recurrent Episodes of Pharyngitis

Drug	Adult Dosage	Pediatric Dosage	Duration
Clindamycin	600 mg orally divided in 2-4 divided doses	20-30 mg/kg/day in 3 divided doses (max:1.8 g/day)	10 days
Amoxicillin-clavulanate	500 mg twice daily	40 mg/kg/day in 3 divided doses	10 days
Penicillin benzathine	1.2 million units intramuscularly for 1 dose	0.6 million units for under 27 kg (50,000 units/kg)	1 dose
Penicillin VK with rifampin	Rifampin: 300 mg PO BID	20 mg/kg/d divided in two equal doses	Last 4 days of treatment with 10 day therapy of penicillin VK

Streptococcus pyogenes Sequelae

acute epiglottitis

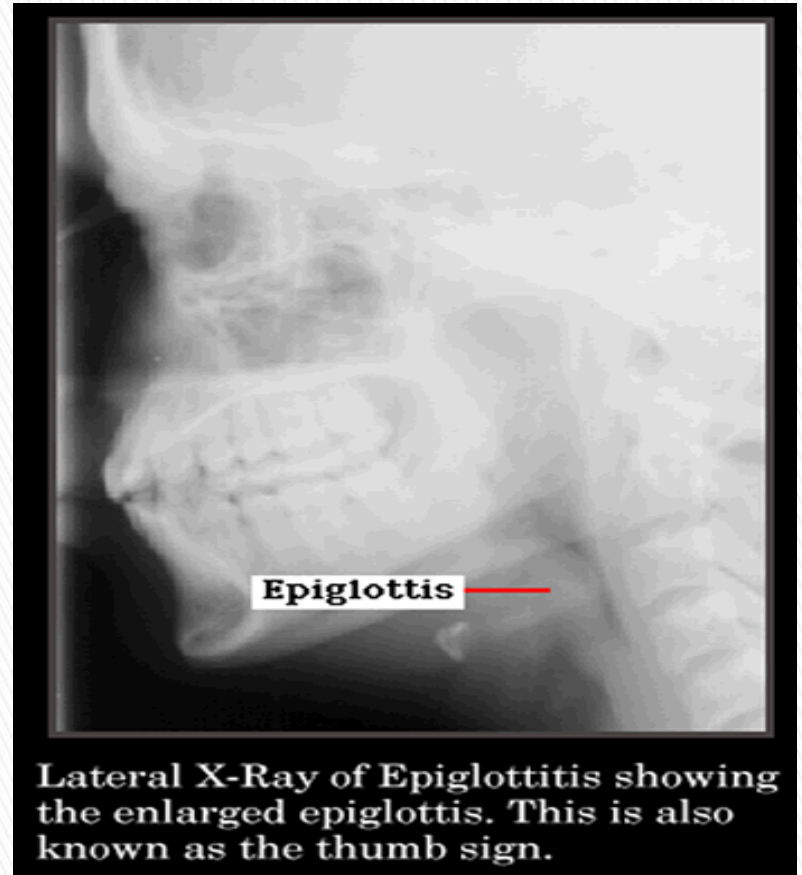
acute rheumatic fever

acute glomerulonephritis



Acute epiglottitis:

- ▶ A very rapidly progressive infection causing inflammation of the epiglottis (the flap that covers the trachea) and tissues around the epiglottis that may lead to abrupt blockage of the upper airway and death.
- ▶ The infection is usually caused by bacteria and is contracted through the respiratory tract. Subsequent downward extension produces what is called cellulitis with marked inflammation of the epiglottis and nearby structures.
- ▶ The inflamed epiglottis mechanically obstructs the airway; the work of breathing increases, and the retention of carbon dioxide and hypoxia (low oxygen) may result. Clearance of secretions is also impaired. These factors may result in fatal asphyxia within a few hours.



Rheumatic fever

- ▶ An inflammatory disease that may develop two to three weeks after a Group A streptococcal infection (such as strep throat or scarlet fever).
- ▶ It is believed to be caused by antibody cross-reactivity and can involve the heart, joints, skin, and brain.
- ▶ Acute rheumatic fever commonly appears in children between ages 5 and 15, with only 20% of first time attacks occurring in adults.
- ▶ It gets its name for its similarity in presentation to rheumatism.
- ▶ Some patients develop significant carditis which manifests as congestive heart failure.
- ▶ This requires the usual treatment for heart failure: diuretics and digoxin.
- ▶ Unlike normal heart failure, rheumatic heart failure responds well to corticosteroids ?

Category

RF with carditis and residual heart disease (persistent valvular disease)

RF with carditis but no residual heart disease (no valvular disease)

RF without carditis

Duration

At least 10 y since last episode at least until age 40 yrs; or lifelong if indicated.

10 yrs or well into adulthood, whichever is longer

5 y or until age 21 y, whichever is longer

*Adapted from American Heart Association, 1995 (7567345)

Table 2. Ratio of Rheumatic Recurrences to Streptococcal Infections in patients Stratified for Heart Disease and for ASO Rise¹

ASO rise*	Heart Disease	No heart disease
0-1	3/24 (13%)	1/72 (1%)
2	10/36 (28%)	2/46 (4%)
3	6/16 (37%)	4/32 (13%)
4	9/14 (65%)	9/25 (36%)

*Tube dilutions

Acute Glomerulonephritis

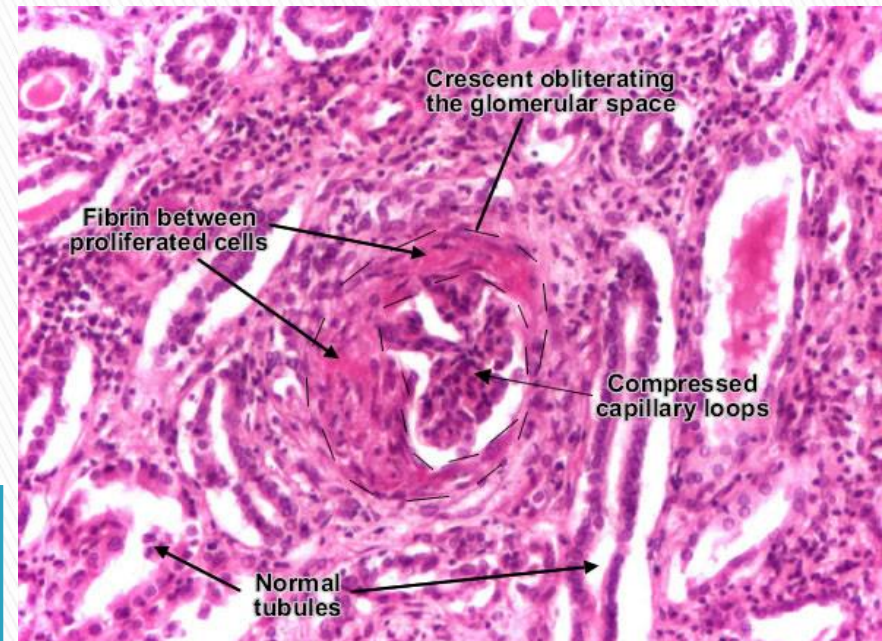
- ▶ Causes renal failure
- ▶ Occurs after infection with *Streptococcus pyogenes*.
- ▶ It typically occurs 10–14 days after a skin or pharyngeal infection with this bacterium.
- ▶ Patients present with signs and symptoms of glomerulonephritis.
- ▶ Diagnosis is made based on these findings in an individual with a history of recent streptococcal infection.
- ▶ Streptococcal titers in the blood (antistreptolysin O titers) may support the diagnosis.

Acute Glomerulonephritis

classical symptoms

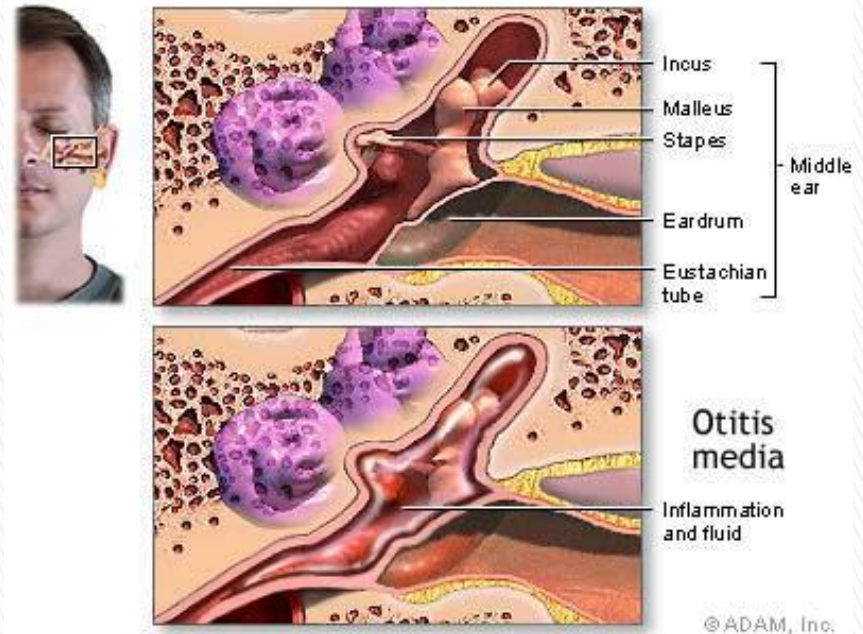
- fluid retention
- periorbital edema
- diminished urinary output
- dark tea-colored urine
- elevated blood pressure

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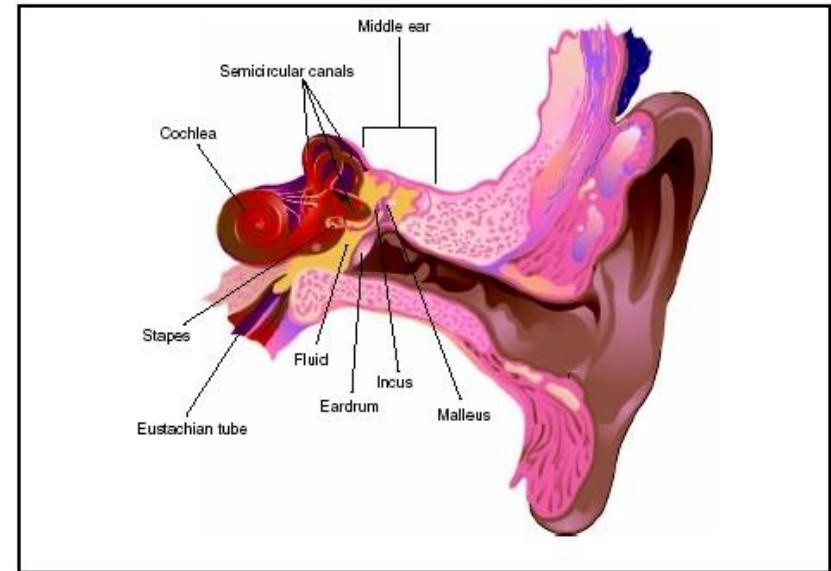
Otitis Media

- ▶ Strep throat or other infections of nose and throat, can progress to otitis media
- ▶ Most frequent in early childhood
- ▶ Affects 85% of children under the age of 3 years.



Otitis Media

- ▶ An untreated infection can travel from the middle ear to the nearby parts of the head, including the brain.
- ▶ Although the hearing loss caused by otitis media is usually temporary, untreated otitis media may lead to permanent hearing impairment.
- ▶ Persistent fluid in the middle ear and chronic otitis media can reduce a child's hearing at a time that is critical for speech and language development.
- ▶ Children who have early hearing impairment from frequent ear infections are likely to have speech and language disabilities.



Otitis Media Sx

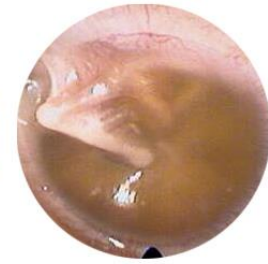
- unusual irritability
- difficulty sleeping
- tugging or pulling at one or both ears
- fever
- fluid draining from the ear
- loss of balance
- unresponsiveness to quiet sounds or other signs of hearing difficulty such as sitting too close to the television or being inattentive



Normal Ear
(no fluid)



Some Fluid
(air-fluid levels)



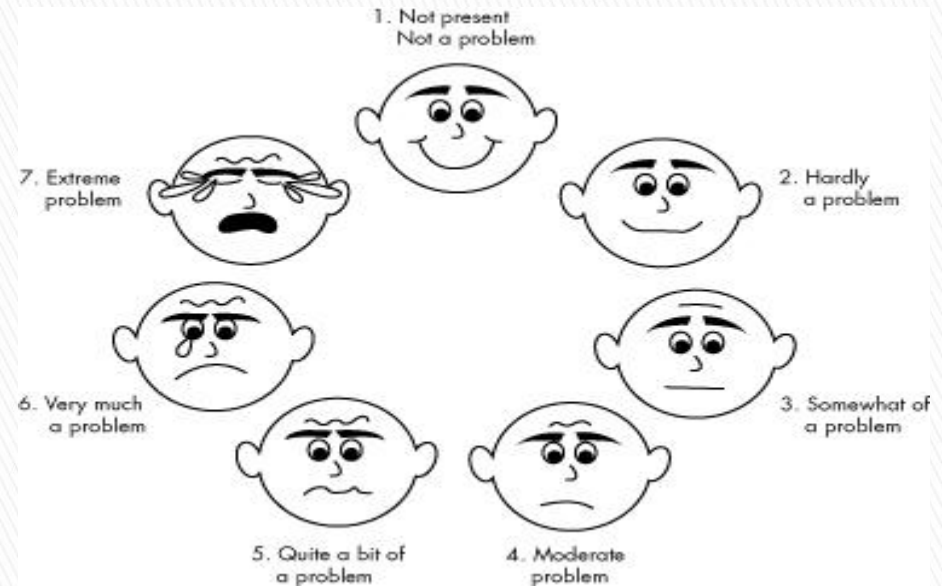
Effusion
(full of fluid)



Otitis Media Prevention

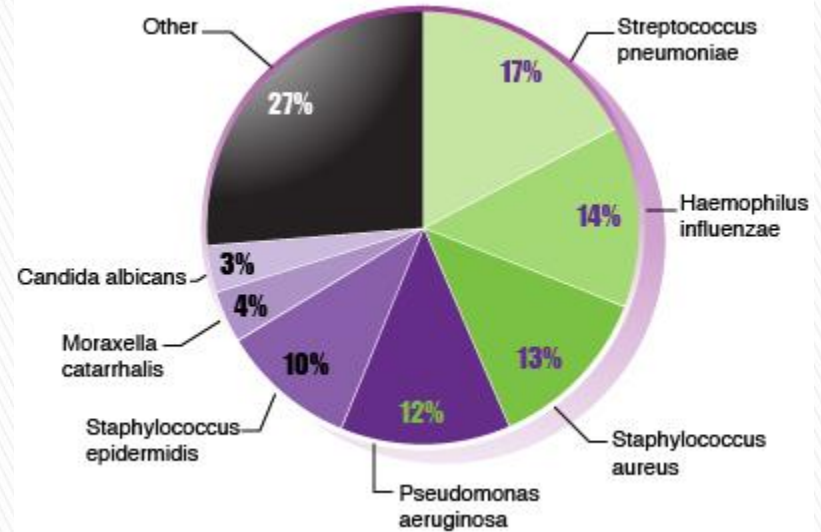
▶ Prevention:

- children who are cared for in group settings, as well as children who live with adults who smoke cigarettes, have more ear infections. Therefore, a child who is prone to otitis media should avoid contact with sick playmates and environmental tobacco smoke.
- Infants who nurse from a bottle while lying down also appear to develop otitis media more frequently. ?
- Children who have been breast-fed often have fewer episodes of otitis media. ?
- Research has shown that cold and allergy medications such as antihistamines and decongestants are not helpful in preventing ear infections.



Otitis media Tx

- Even though studies have shown that up to 80% of acute ear infections will clear up on their own without medical treatment, the standard therapy for acute otitis media remains antibiotics.
- Even after effective antibiotic treatment, 40% of children may retain noninfected residual fluid in the middle ear that can cause some temporary hearing loss. This may last for 3 to 6 weeks after the initial antibiotic therapy
- The duration of acute otitis media is variable. There may be improvement within 48 hours even without treatment. Treatment with antibiotics for a week to 10 days is usually effective.

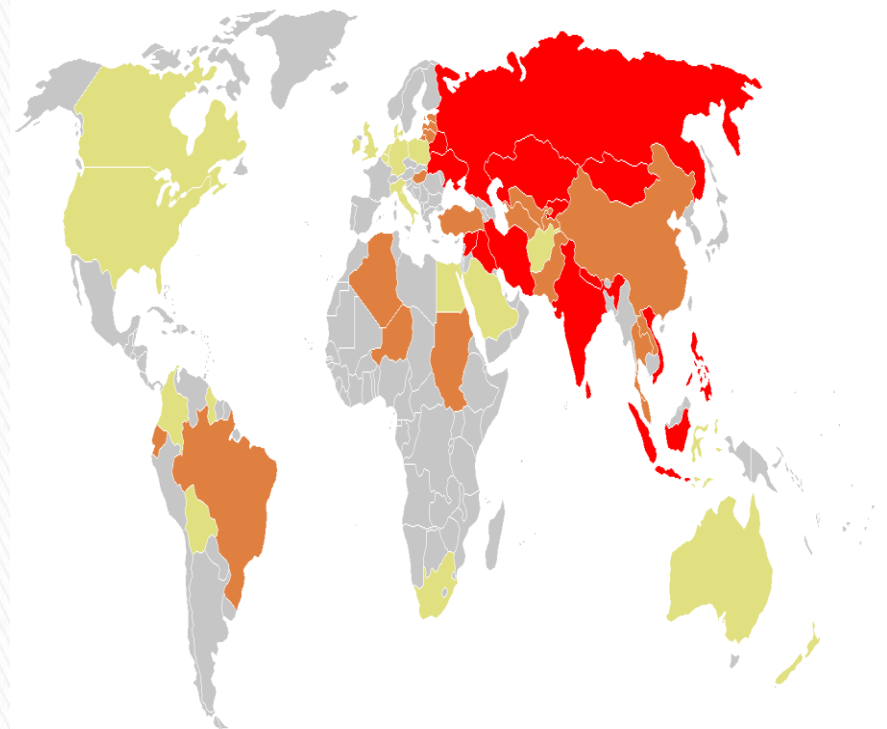


Ear Infections and Antibiotics

There is controversy about the usefulness of antibiotics in otitis media. A prestigious Cochrane Collaboration explored this issue, examining 16 randomized, controlled trials with 1,483 children to determine the role of antibiotics in the prevention of acute and chronic suppurative otitis media.¹⁵ They concluded that antibiotics reduced episodes of acute otitis media and the number of episodes. Antibiotics prevented 1.5 episodes of acute otitis media for every 12 months of treatment per child. Thus, antibiotics reduce the risk of acute otitis media in children at risk.

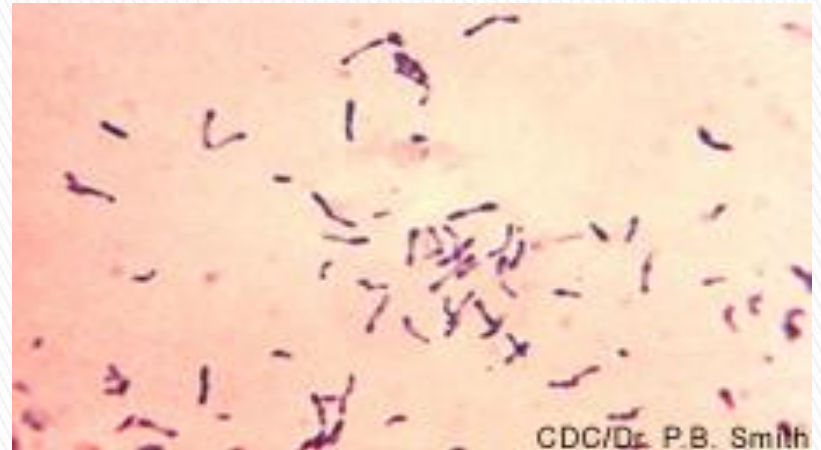
Diphtheria

- ▶ Diphtheria is an acute bacterial disease that usually affects the tonsils, throat, nose or skin. It is extremely rare in the United States.
- ▶ Diphtheria is most common where people live in crowded conditions. Unimmunized children under 15 years of age are likely to contract diphtheria. The disease is often found among adults whose immunization was neglected, and is most severe in unimmunized or inadequately immunized individuals.



Corynebacterium diphtheriae

- Gram-positive
- Pleomorphic
- Non endospore forming
- Non motile
- Used to say that it looked like Chinese characters



Diphtheria

- ▶ Causative Agent:
Corynebacterium diphtheriae
- ▶ Transmission: Diphtheria is transmitted to others through close contact with discharge from an infected person's nose, throat, skin, eyes and lesions
- ▶ There are two types of diphtheria. One type involves the nose and throat, and the other involves the skin.



Diphtheria Sx

Characterized by:

- Fever
- Headaches
- Sore throat
- Tiredness
- Eventual formation of a pseudomembrane that covers throat and nasal passages
 - RBCs
 - WBCs
 - Bacterium
 - Epithelial cells – organism has begun to destroy. Membrane inbedded in tissue



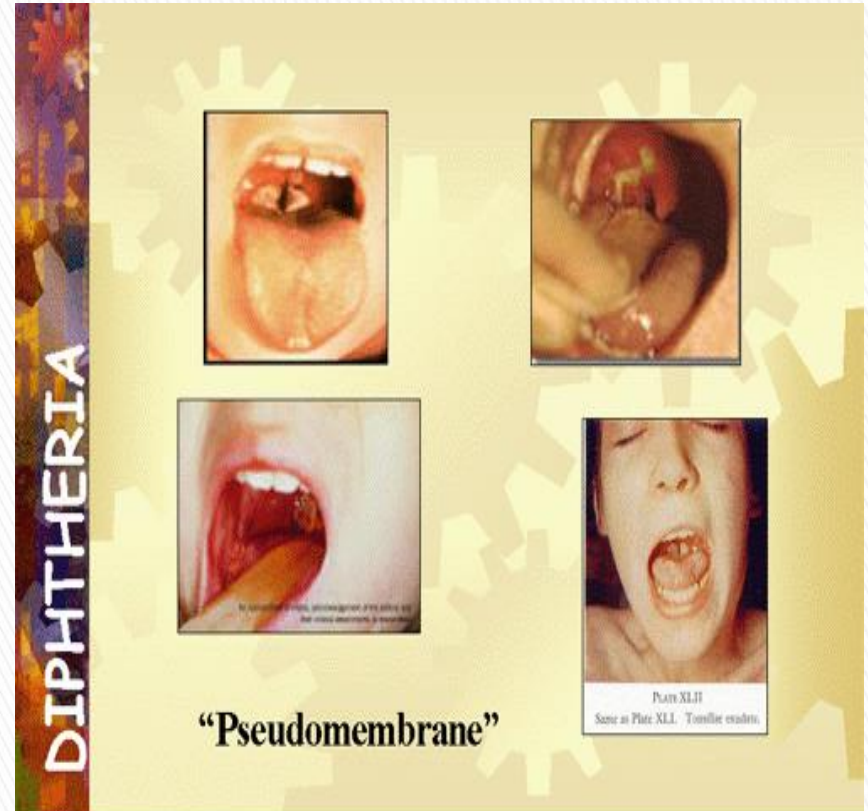
Diphtheria Sx

- Symptoms usually appear two to four days after infection, with a range of one to ten days
- Symptoms include sore throat, low-grade fever and enlarged lymph nodes located in the neck. Skin lesions may be painful, swollen and reddened.
- People who are infected with the diphtheria germ may be contagious for up to two weeks, but seldom more than four weeks. If the patient is treated with appropriate antibiotics, the contagious period can be limited to less than four days.



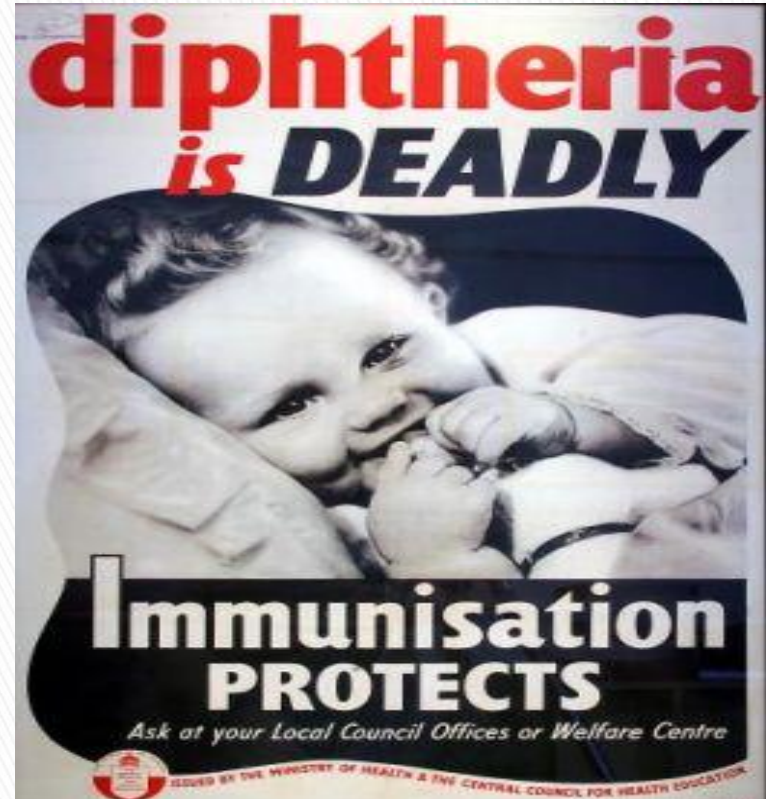
Diphtheria Pathology

- ▶ The toxin, or poison, caused by the bacteria can lead to a thick coating in the nose, throat, or airway (pseudomembrane).
- ▶ *C. diphtheriae* will only produce the clinical Sx, if transformed by a bacteriophage.
- ▶ This pseudomembrane is gray or black and can cause breathing problems and difficulty in swallowing.
- ▶ In more advanced stages, the patient may have difficulty breathing or swallowing, complain of double vision, have slurred speech, or even show signs of going into shock (pale, cold skin; rapid heartbeat; sweating; and an anxious appearance).



Diphtheria Prevention

- Preventing diphtheria depends almost completely on immunizing children with the combined diphtheria/tetanus/pertussis (DTP or Dtap) vaccine and non-immunized adults with the diphtheria/tetanus vaccine (DT).
- Most cases of diphtheria occur in people who haven't received the vaccine at all or haven't received the entire course.
- The immunization schedule calls for DTP or DTaP vaccines at 2, 4, and 6 months of age, with booster doses given at 12 to 18 months and then at 4 to 6 years.
- Booster shots should be given every 10 years after that to maintain protection.
- International studies have shown that a significant percentage of adults over 40 years of age are not adequately protected against diphtheria and tetanus.



Diphtheria Transmission

- ▶ **Incubation:**
The incubation period for diphtheria is 2 to 4 days, although it can range from 1 to 6 days.
- ▶ **Contagiousness:**
Diphtheria is highly contagious. It is easily passed from the infected person to others through sneezing, coughing, or even laughing. It also can be spread to others who pick up tissues or drinking glasses that have been used by the infected person.
- ▶ People who have been infected by the diphtheria bacteria can infect others for up to 4 weeks, even if they don't have any symptoms.



Diphtheria Tx

- ▶ Tx:
 - Treatment consists of immediate administration of diphtheria antitoxin and antibiotics.
 - Antibiotic treatment usually renders patients non-infectious within 24 hours.
- ▶ Vaccine:
 - Diphtheria vaccine is usually combined with tetanus vaccine and acellular pertussis vaccine to form a triple vaccine known as DTaP. This vaccine should be given at two, four, six and 15-18 months of age, and between four and six years of age. A combination of tetanus vaccine and diphtheria vaccine (Td) should be given every 10 years to maintain immunity.
 - Unless immunized, children and adults may repeatedly be infected with the disease.



Lower Respiratory Tract Infections

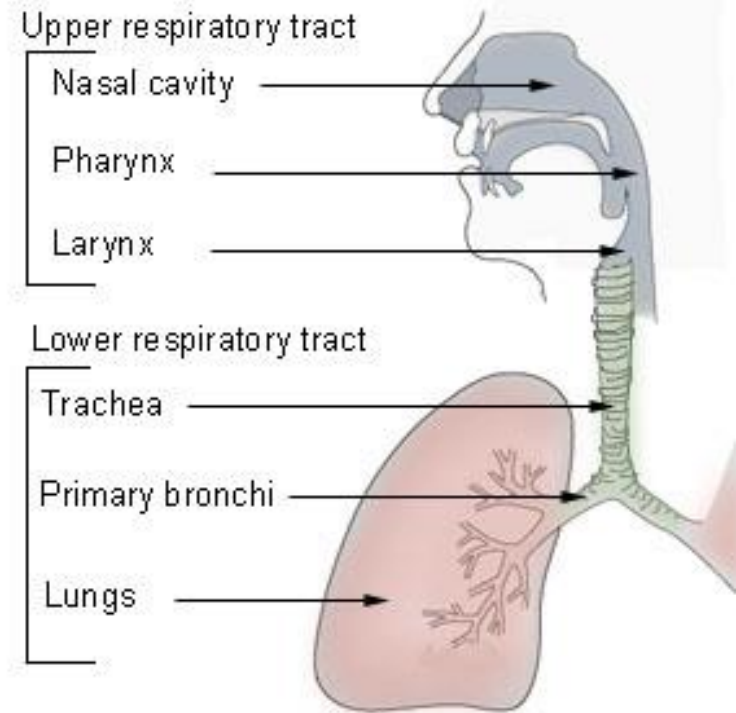
Infections of the Lungs

Pneumonia

Whooping Cough

Tuberculosis

Conducting Passages



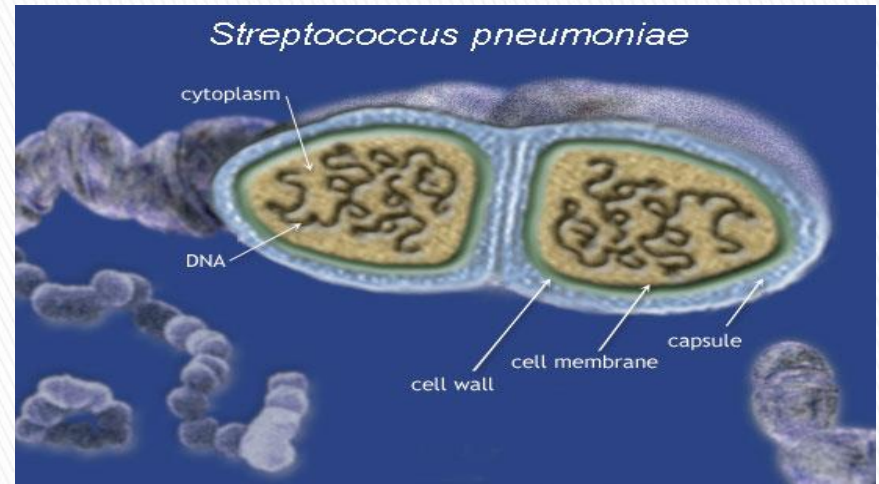
Pneumonia

Inflammation of lung with accompanying fluid build up

Much of pneumonia seen clinically is caused by viruses.

Streptococcus pneumoniae causes about 90% of all bacterial pneumonia cases.

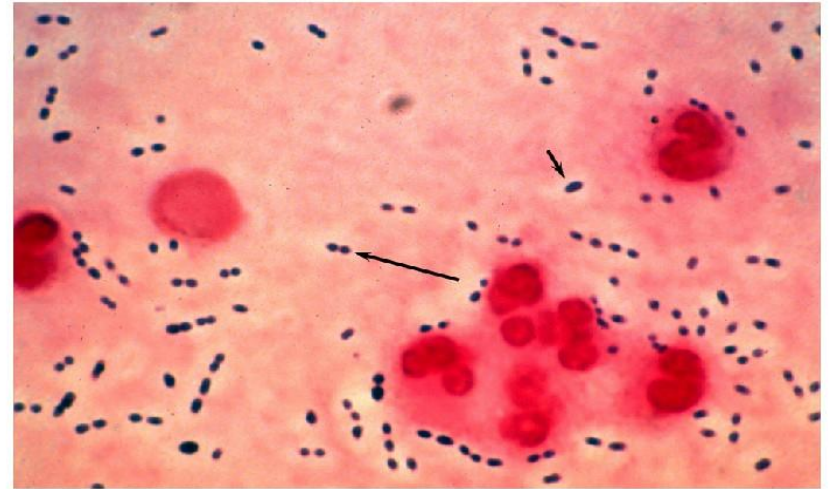
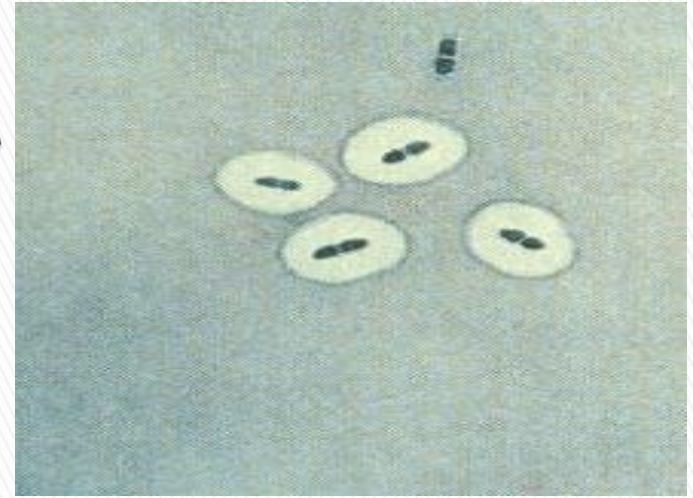
- Organism is Gram-positive diplococci
- Heavily encapsulated (primary virulence factor)
- Human host is resistant to *S. pneumoniae*
- Organism is very fragile
 - Alpha hemolytic – has green zone around colony because it only partially destroys RBC



Bacterial Pneumonia

Pneumococcal: caused by *S. pneumoniae*

- Most common cause of bacterial pneumonia
- Surrounded by capsule
- 83 serotypes distinguished by capsules
- ▶ Symptoms:
 - High fever
 - Difficulty breathing
 - Chest pain
 - Lungs have reddish appearance due to dilated blood vessels



Most Susceptible to *S. pneumoniae*

Alcoholics – alcohol will suppress immune system

Immunosuppressed – AIDS patients who are taking immunosuppressants for cancer, transplants etc...

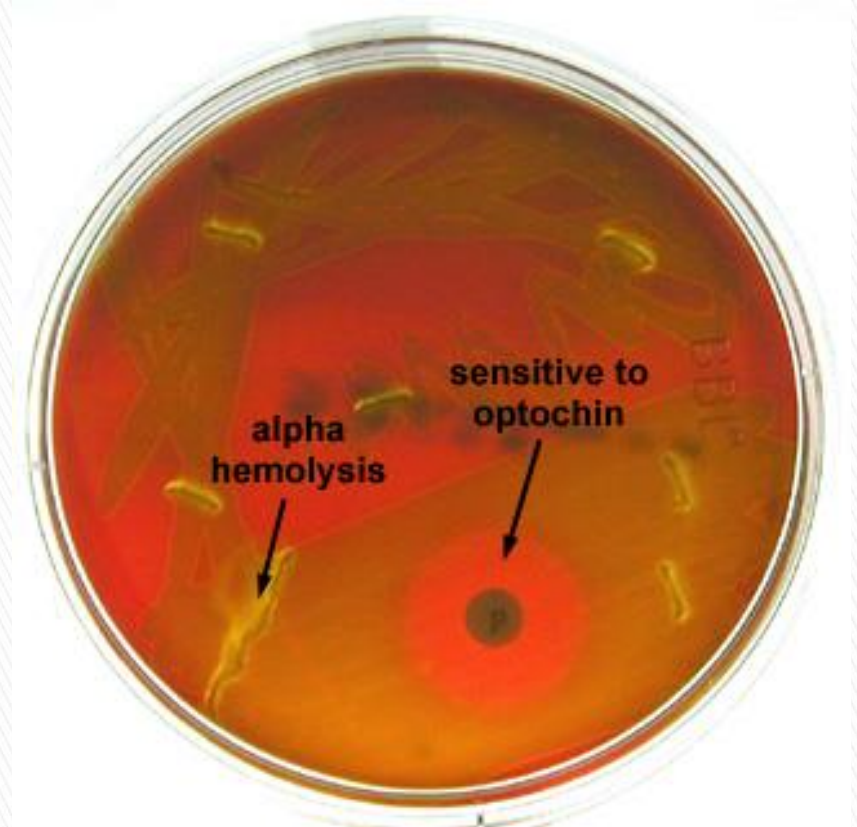
Debilitated individuals

- Those who live a very sedentary lifestyle (morbidly obese, elderly)



S. Pneumoniae

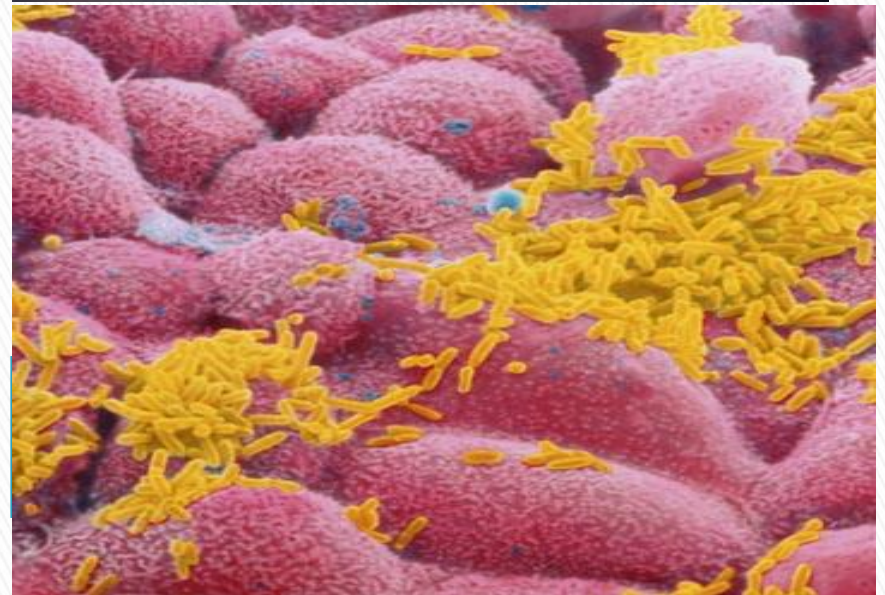
- In response to the infection, alveoli fill with some RBCs, neutrophils, and fluid from surrounding tissues
- Sputum is often rust-colored from blood coughed up from lungs
- Diagnosis:
 - Culture of bacterium from sputum and optochin sensitive
- Tx: Penicillin
- Vaccine available, usually for children and elderly patients



Other Pneumonia Etiologies

Smaller players in causing pneumonia

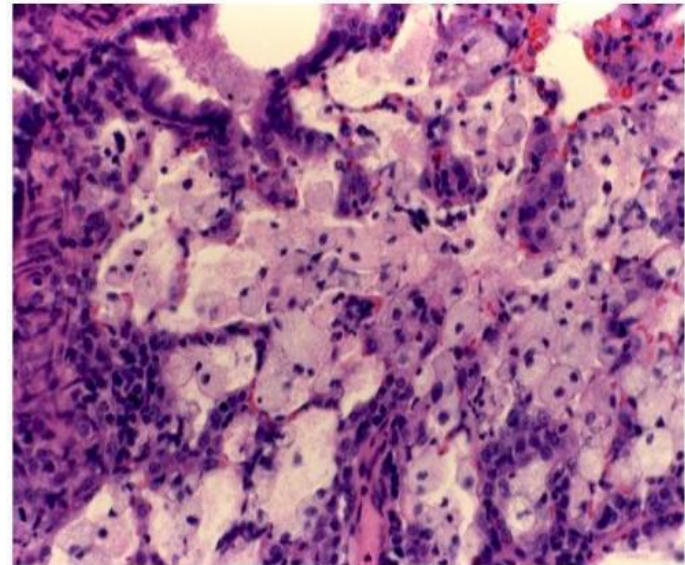
- ▶ *Klebsiella pneumoniae*
 - Gram-negative enteric
 - Destroys lungs
 - Very degenerative
 - Associated with alcoholics
- ▶ *Haemophilus influenzae*
 - 5-6 years ago started giving kids a vaccination
- ▶ *Mycoplasma pneumoniae*
 - Causes milder type of pneumonia (Atypical / walking pneumonia)



Pneumocystis Pneumonia

- Causative agent:
Pneumocystis carinii
 - Uncertainty whether organism is protozoan or fungus
 - Recent analysis of RNA indicate yeast
 - Found in healthy human lungs but causes disease among immunosuppressed patients
 - Before AIDs epidemic, uncommon disease
 - By 1993, indicator of AIDS more than 20,000 cases

Pneumocystis carinii



(c) 2004, Angeline Warner, D.V.M., D.Sc.

Pneumocystis carinii

- ▶ Tx:
 - People with severe PCP are treated in a hospital with IV medicine (medicine put into a vein through a tube).
 - As they get better--or if the illness was mild to begin with--they can take medicine in pill form. TMP-SMZ is also a good treatment for PCP.
 - If you can't take TMP-SMZ, or if you don't get better quickly with TMP-SMZ, you can take other medicines or combinations of medicines.
 - Although these days the treatments for PCP are good, it's better to try not to get PCP at all.

Pneumocystis carinii

- **Fungus (previously parasite!)**
- **Endogenous reactivation**
- **Pneumonia - Diffuse interstitial**
- **Dx: Methanamine silver stain, looks like small cups**
- **Prevention**
- **Treatment - TMP-SMX, Pentamidine**

Pertussis (Whooping Cough)

- ▶ Pertussis, commonly known as "whooping cough," is an infection of the respiratory tract caused by *Bordetella pertussis* bacteria.
- ▶ A pertussis infection is very contagious and can be quite serious.
- ▶ Once inside the airways, pertussis bacteria produce chemical substances (toxins) that interfere with the respiratory tract's normal ability to eliminate germs.
- ▶ *B. pertussis* destroys the ciliated cells of the trachea and lungs thus inhibiting the flushing mechanism out of the lungs.



Pertussis (Whooping Cough)

- ▶ Transmission:
 - People become infected with *Bordetella pertussis* bacteria by inhaling contaminated droplets from an infected person's cough or sneeze.
 - Once an unimmunized child has been infected after exposure to a person with pertussis, it usually takes three days to 21 days for symptoms to begin.



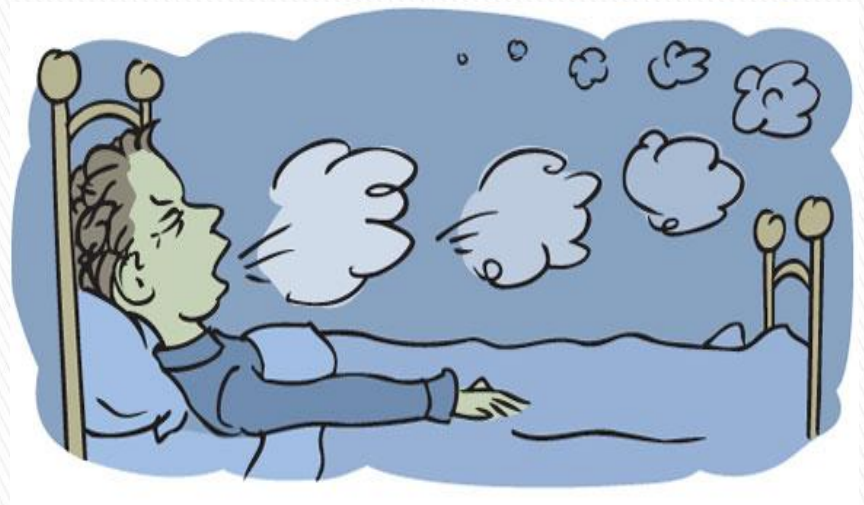
Pertussis (Whooping Cough)

- ▶ Symptoms:
 - first symptoms of pertussis may be similar to those of a common cold, including nasal congestion, runny nose, sneezing, red and watery eyes, mild fever, and a dry cough.
 - After about 1 to 2 weeks, the dry cough becomes a wet cough that brings up thick, stringy mucus.
 - At the same time, coughing begins to occur in long spells that may last for over a minute, sometimes causing a child to turn red from effort or blue from lack of oxygen.



Pertussis (Whooping Cough)

- At the end of a coughing spell, the child gasps for air with a characteristic "whooping" sound.
- Infants may not whoop at all or as loudly as older children.
- Severe coughing spells can lead to vomiting and may make it hard for a child to eat or drink.
- Severe coughing can also cause petechiae (tiny, red spots caused by ruptures in blood vessels at the skin's surface) in the skin of the upper body, as well as small areas of bleeding in the whites of the eyes.
- Coughing spells can continue for several weeks.



Pertussis (Whooping Cough)

Tx:

- Pertussis is treated with antibiotics, usually erythromycin.
- Human pertussis serum immunoglobulin is also used in treatment.
- Antibiotics are also very important in stopping the spread of pertussis bacteria from the infected child to other people.
- To help decrease the chance of vomiting, give frequent meals with small portions.
- In some cases, a child with pertussis may need treatment in a hospital.



Pertussis (Whooping Cough)

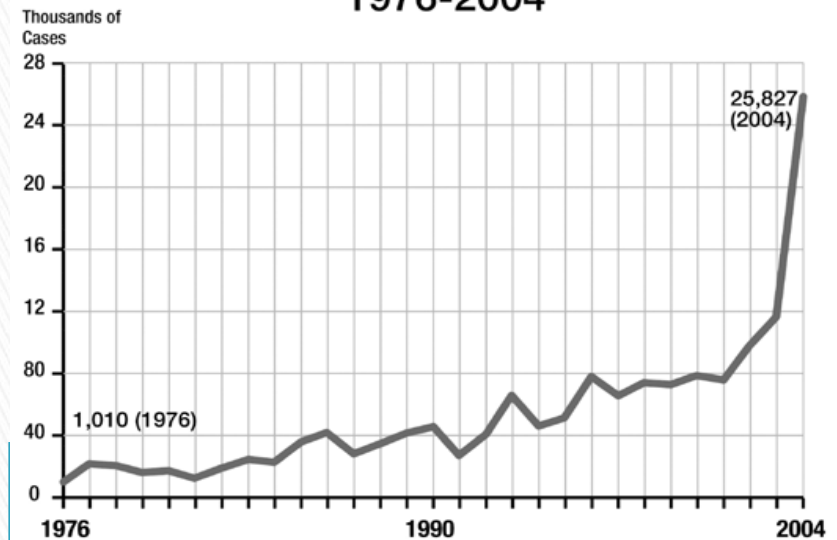


- ▶ Prevention:
 - Pertussis can be prevented by the pertussis vaccine, which is part of the DTaP (diphtheria, tetanus, acellular pertussis) or DTP immunizations.
 - These important immunizations are routinely given in five doses before a child's sixth birthday.
 - The pertussis vaccine has dramatically decreased the number of cases of whooping cough that occur each year and saved countless lives.
 - Prophylactic (preventive) oral antibiotics should be given to anyone who lives in the same household as someone with pertussis.
 - Others who have had close contact with the infected person, including day-care staff and students, should also receive prophylactic antibiotic treatment.

Medscape®

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Reported Cases of Pertussis 1976-2004



Sources: Centers for Disease Control and Prevention. Historical Summaries of Notifiable Diseases in the United States. MMWR. 52(54); April 22, 2005.

Centers for Disease Control and Prevention. National Immunization Program. Pertussis Surveillance Report, 2004 August 12, 2005

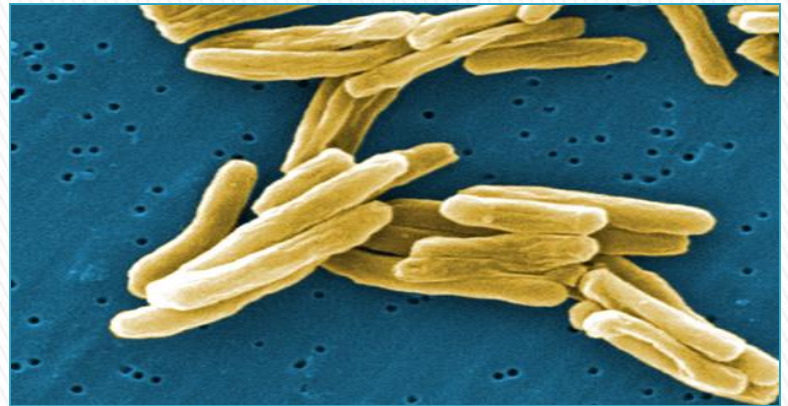
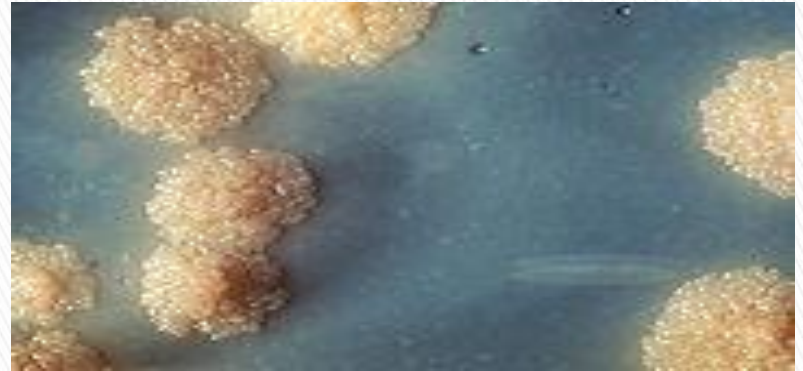
Mycobacterium tuberculosis

Causative agent: *Mycobacterium tuberculosis*

Chronic infection of lower respiratory tract

Symptoms:

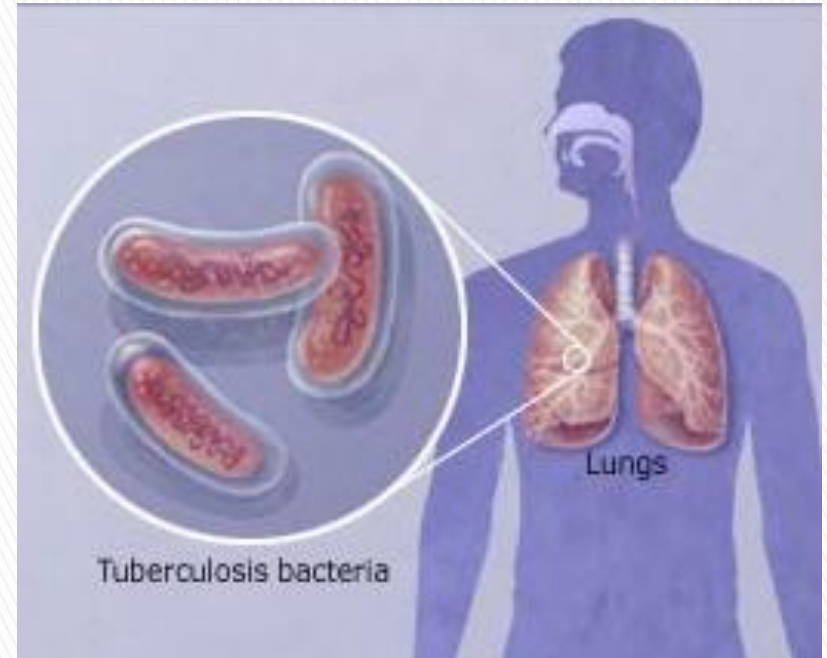
- ▶ Low grade fever
- ▶ Chronic cough
- ▶ Tiredness
- ▶ Night sweat
- ▶ Patients with active TB care constantly shedding agent in aerosols when they cough



Mycobacterium tuberculosis

Second largest infectious disease killer in the world

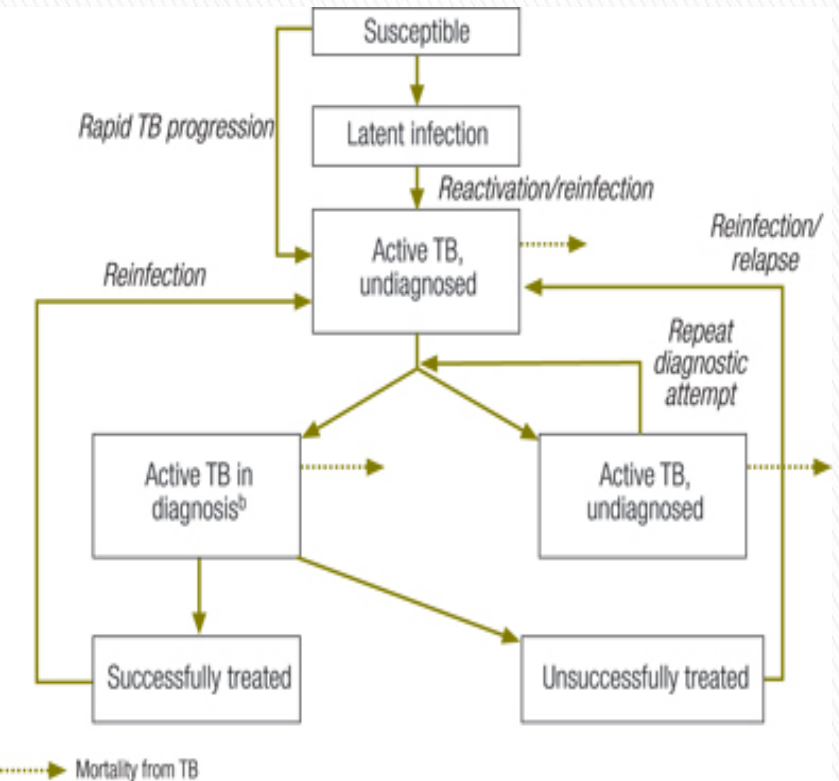
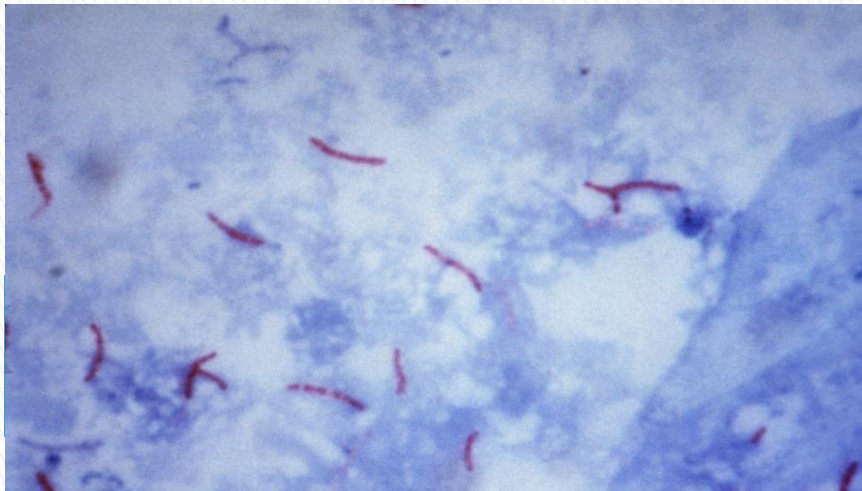
- 300,000 new cases a year in the U.S.
- U.S. has 10% mortality rate, in most of the world it is 75%.
- If you test positive for TB you must get treatment
- Humans mount a significant and effective immune response but immune response seriously damages the lungs.



Mycobacterium tuberculosis

Two stages of TB

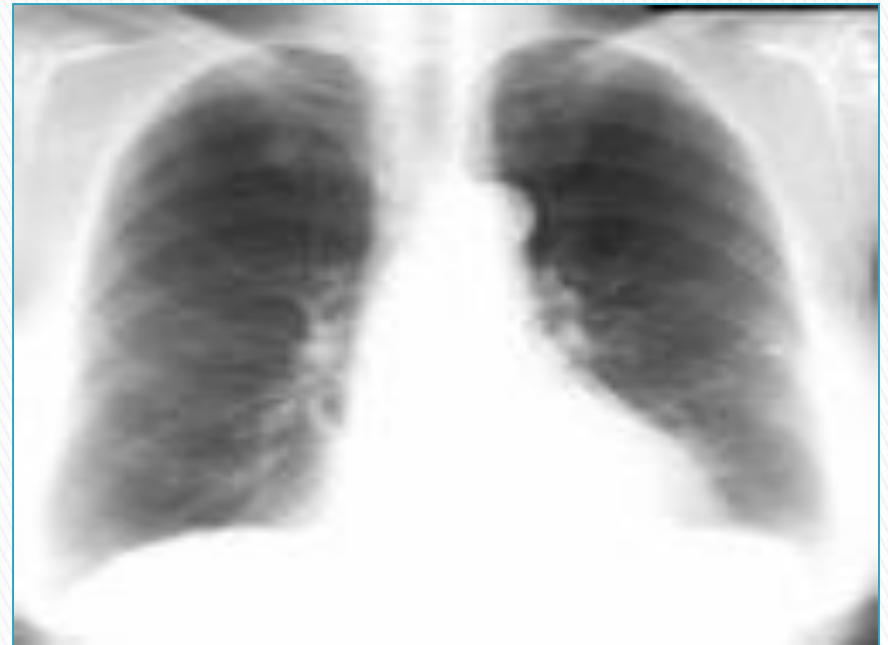
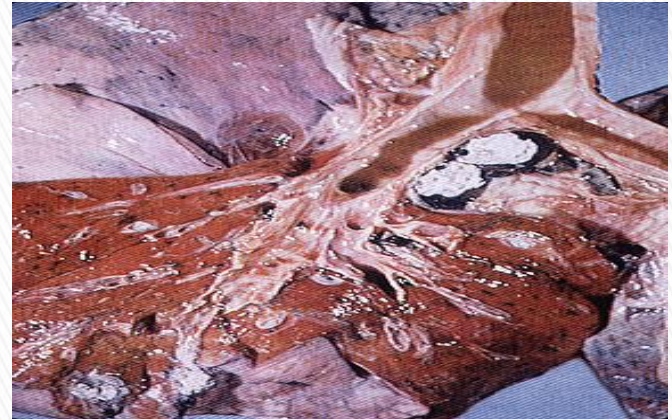
- ▶ Inactive
- ▶ Active



Mycobacterium tuberculosis

Inactive

- Happens after the organism has started to grow in the lungs but hasn't shown any symptoms.
- Body calcifies them – Gohn tubercles can remain for yrs
- When Gohn tubercles begin to grow infection is activated
- Everytime someone with TB coughs they are releasing it into the air via droplet nuclei. Even when moisture dries up, TB is still there as long as it is inside. It doesn't like sunlight.



Mycobacterium tuberculosis

Active TB infection begins when the mycobacteria reach the pulmonary alveoli, where they invade and replicate.

The primary site of infection in the lungs is called the Gohn focus, and is generally located in either the upper part of the lower lobe, or the lower part of the upper lobe.

Further spread is through the bloodstream to other tissues and organs where secondary TB lesions can develop in other parts of the lung (particularly the apex of the upper lobes), peripheral lymph nodes, kidneys, brain, and bone



Mycobacterium tuberculosis

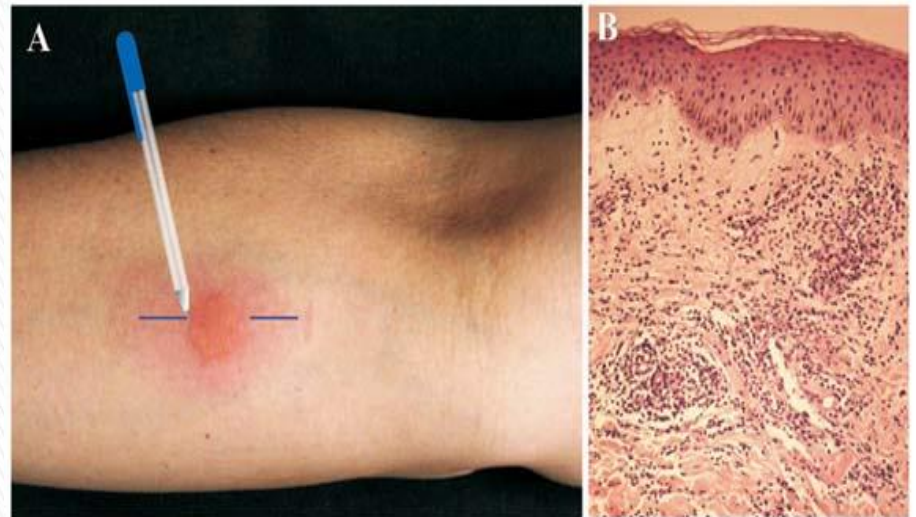
- ▶ PPD – purified protein derivative
 - Take pieces of cell and inoculate under the skin
 - If PPD is negative you are happy
 - If PPD is positive you take a chest x-ray in which they look for infiltration (cloudy lungs)
 - Negative chest x-ray means you take 6 months of antibiotics
 - Positive means you take 2 years of anti TB drugs. If you don't take the meds you can be arrested.



Mycobacterium tuberculosis Vaccine

BCG (Bacillus Calmette–Guérin)

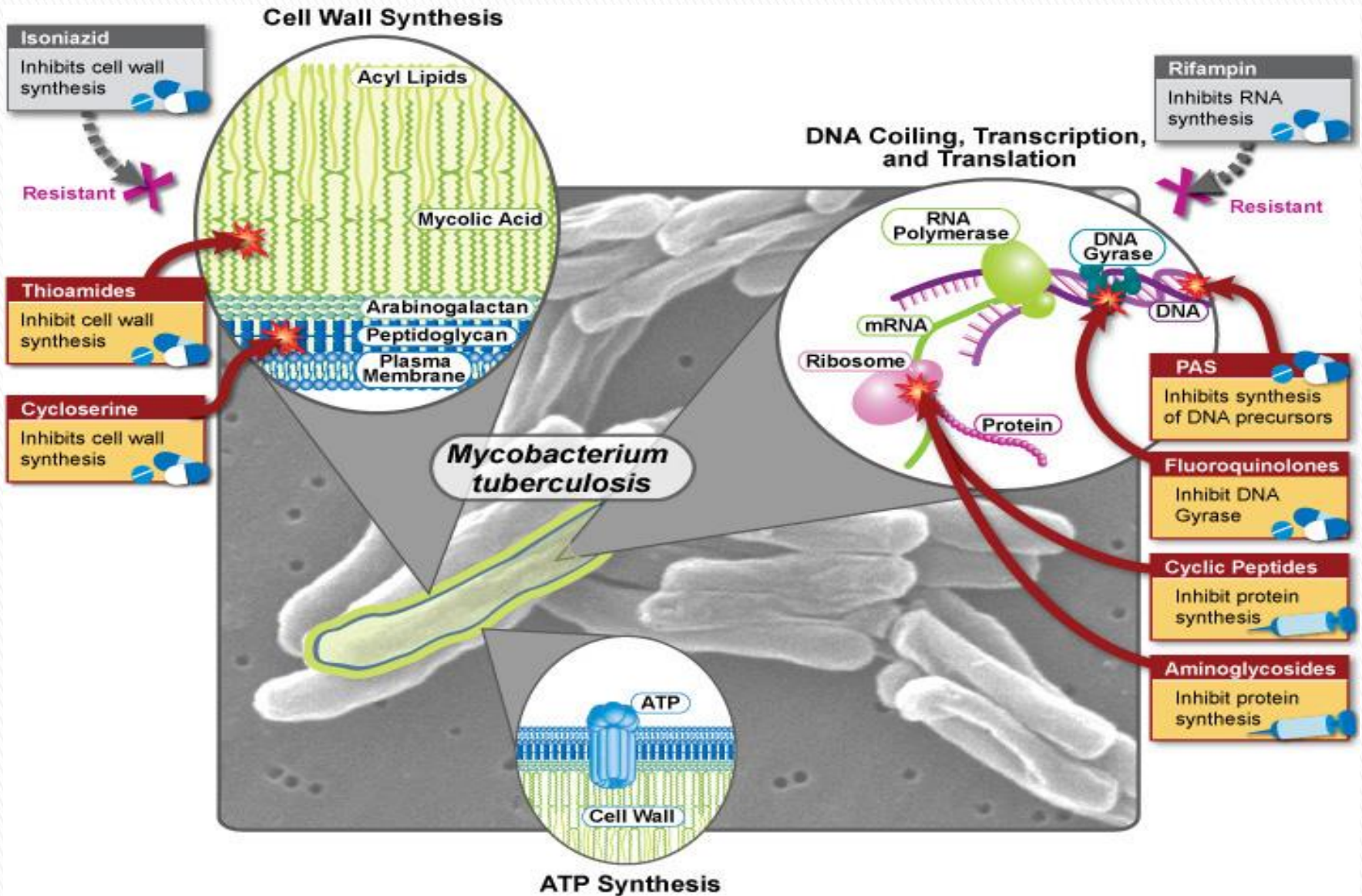
- ▶ We don't give this vaccine in the U.S b/c mortality rate is so low.
- ▶ PPD test works and if you take vaccine you will always tests positive and then everyone will have to get the chest xrays.
- ▶ If you tests PPD positive NEVER take another test because you might become anaphylactic



Mycobacterium tuberculosis Tx

Treatment for TB uses antibiotics to kill the bacteria. Effective TB treatment is difficult, due to the unusual structure and chemical composition of the mycobacterial cell wall, which makes many antibiotics ineffective and hinders the entry of drugs.

The two antibiotics most commonly used are rifampicin and isoniazid. However, instead of the short course of antibiotics typically used to cure other bacterial infections, TB requires much longer periods of treatment (around 6 to 24 months) to entirely eliminate mycobacteria from the body.



MDR-TB and XDR-TB

Drug-resistant TB is a public health issue in many developing countries, as treatment is longer and requires more expensive drugs.

Multi-drug-resistant tuberculosis (MDR-TB) is defined as resistance to the two most effective first-line TB drugs: rifampicin and isoniazid.

Extensively drug-resistant TB (XDR-TB) is also resistant to three or more of the six classes of second-line drugs



Atypical tuberculosis

- ▶ *M. avium* intracellular complex
- ▶ *M. gordonae*
- ▶ *M. Kanasii*

- ▶ In the 1960s we had TB almost gone but then we stopped putting money into programs and now it is coming back.

