Lower Respiratory Infections: Bronchitis and Pneumonia

Biomedical Engineering - URJC

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7 February 2024

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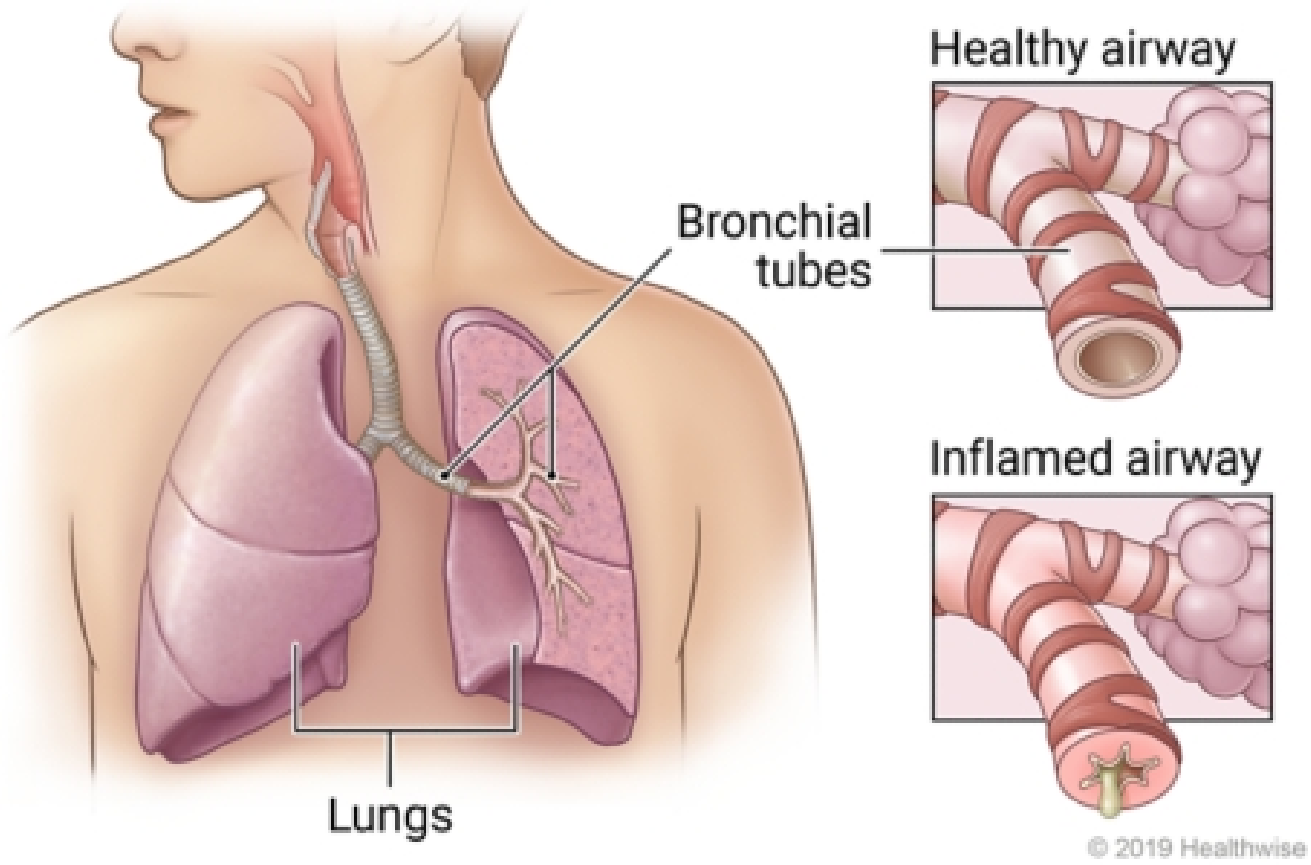
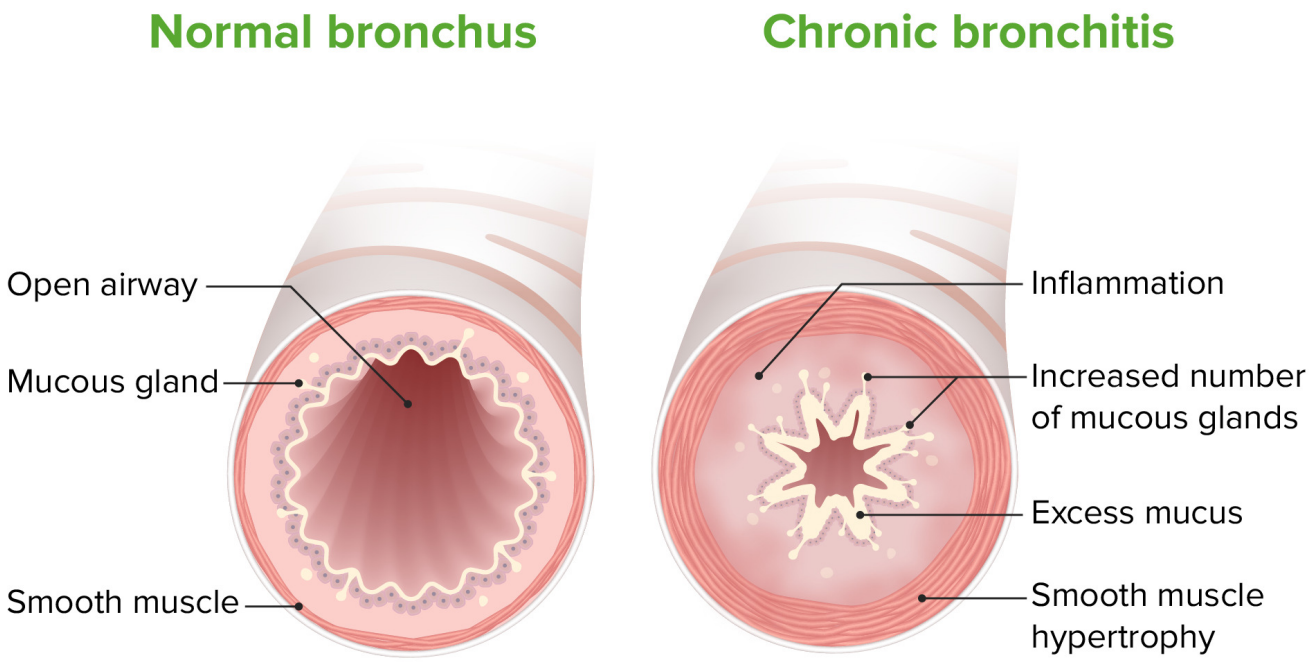
Bronchitis

- **Definition:** Self-limiting lower respiratory tract infection.
- **Characteristics:** Cough, sputum production, wheezing, or chest pain.
- **Pathogenesis:** Infection leads to hyperemic and edematous mucosa, increased mucus production, potential damage to respiratory epithelium.
- **Causative Agents:** Bacteria or viruses.
- **Associated Conditions:** Often follows upper respiratory tract infection, associated with diseases like influenza, pertussis, scarlet fever.

Bronchitis


Healthy airway
Bronchial tubes
Inflamed airway
Lungs
© 2019 Healthwise

Bronchitis


Normal bronchus
Chronic bronchitis
Open airway
Mucous gland
Smooth muscle
Inflammation
Increased number of mucous glands
Excess mucus
Smooth muscle hypertrophy

Bronchitis

Bronchiolitis

Viral respiratory disease in **infants**, primarily caused by respiratory syncytial virus, occasionally by other viruses.

Bronchitis

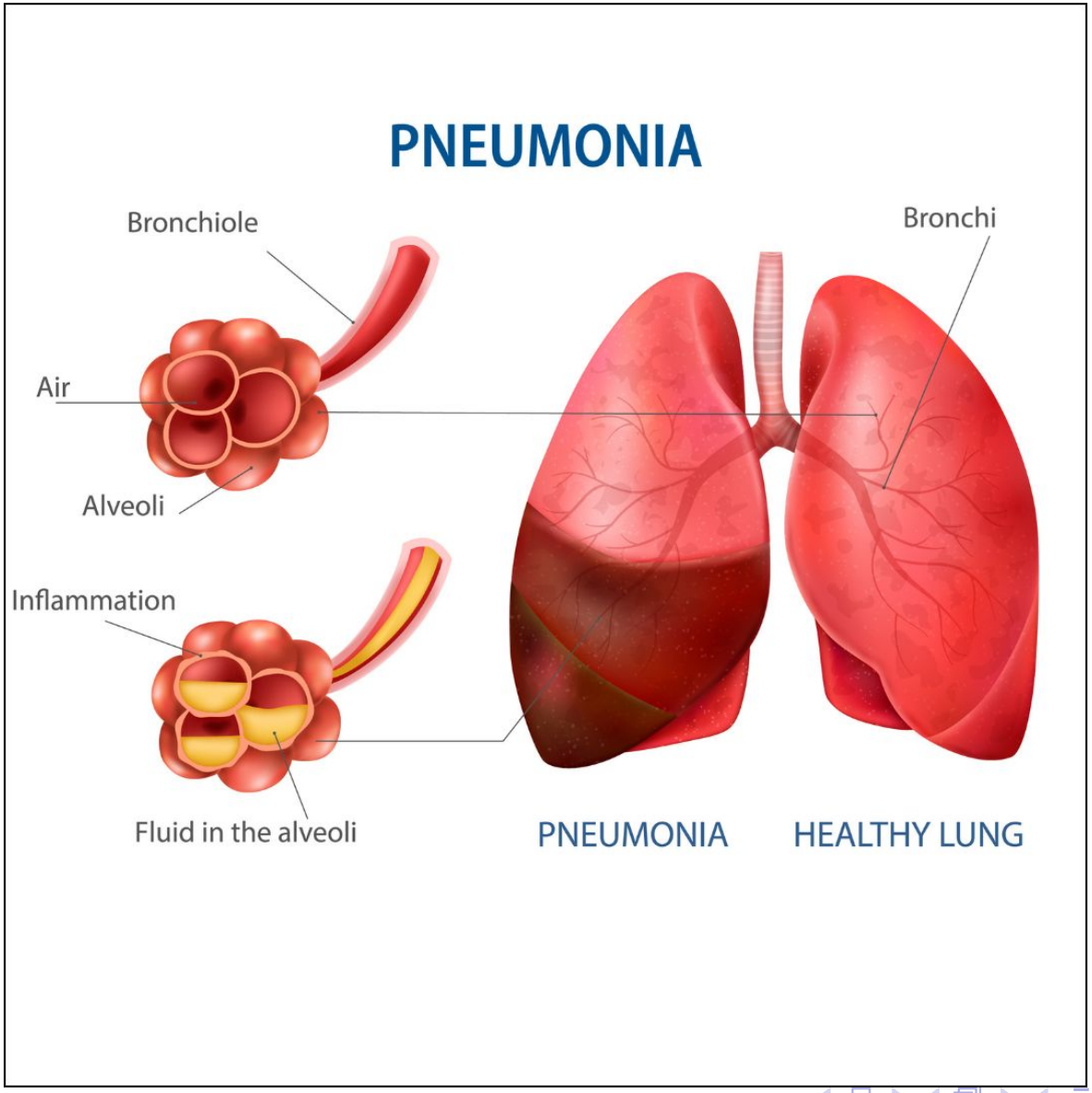
Diagnosis and Treatment

- **Microbiologic Diagnosis:** Sputum specimens cultured for bacteria, fungi, and viruses. Nasal washings for infants.
- **Treatment:** Symptomatic treatment; antibiotics if bacterial infection suspected.

Pneumonia Overview

- **Definition:** Inflammation of lung parenchyma with consolidation or interstitial lung infiltrates.
- **Symptoms:** Fever, cough, dyspnea, chest pain.
- **Categorization:** Based on causative organism.

Pneumonia


PNEUMONIA
Bronchiole
Air
Alveoli
Inflammation
Fluid in the alveoli
Bronchi
PNEUMONIA
HEALTHY LUNG

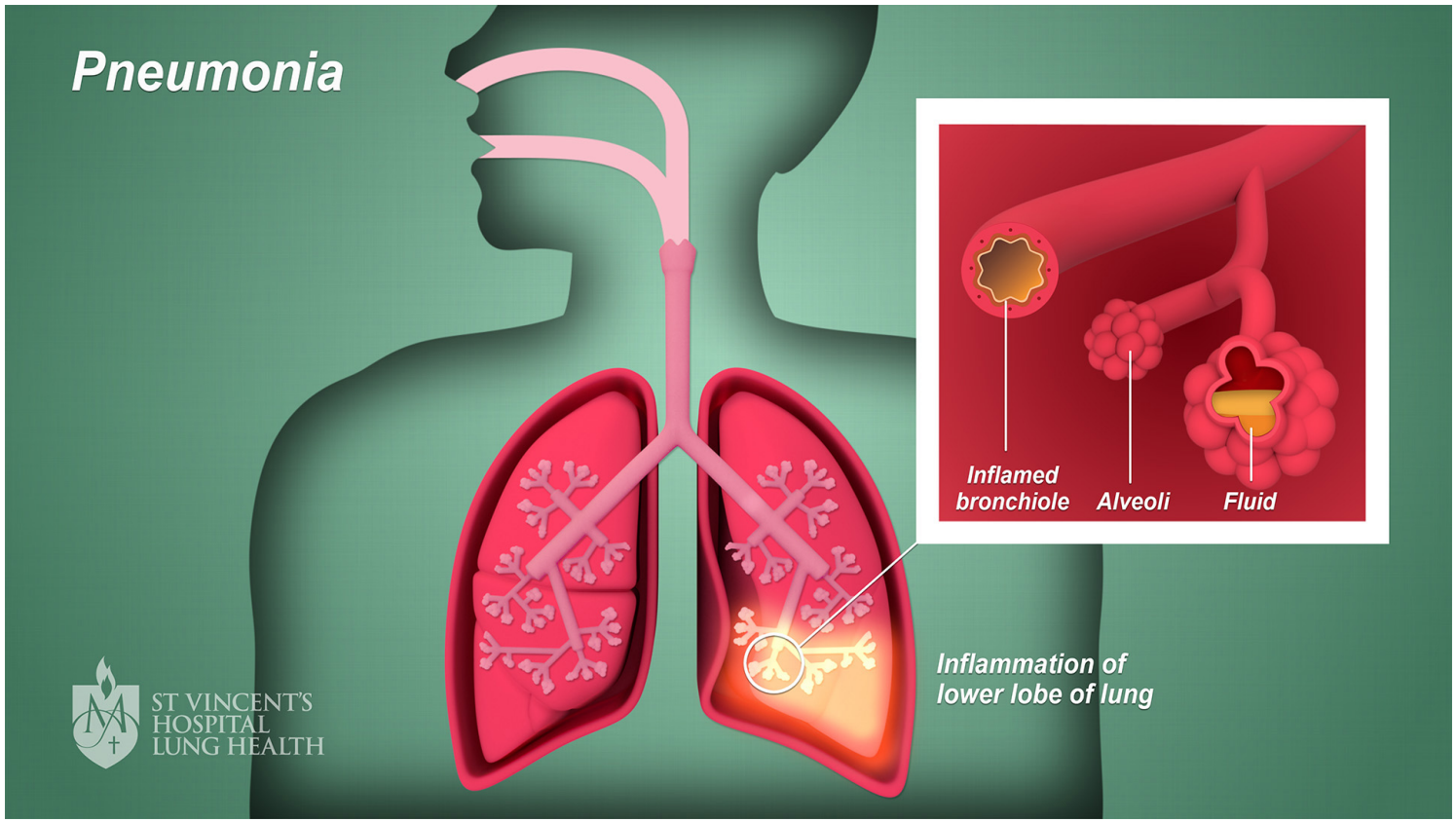
Pneumonia - Types

Pneumonias can be classified attending to several criteria, such as distribution:

Distribution

- **Lobar Pneumonia:** Involves an entire lobe of the lung.
- **Bronchopneumonia:** Patchy alveolar process without filling an entire lobe.

Pneumonia - Types



Pneumonia - Types

But they also can be classified attending to clinical presentation:

Clinical presentation (I)

- **Community-Acquired vs. Nosocomial:** Different pathogens; different risk factors.
- **Typical (pyogenic bacteria) Pneumonias:** Streptococcus pneumoniae, Staphylococcus aureus, Haemophilus influenzae, Klebsiella pneumoniae, etc.
- **Atypical (intracellular bacteria) Pneumonias:** Mycoplasma pneumoniae, Legionella species, Chlamydia spp, Coxiella burnetii.

Pneumonia - Types

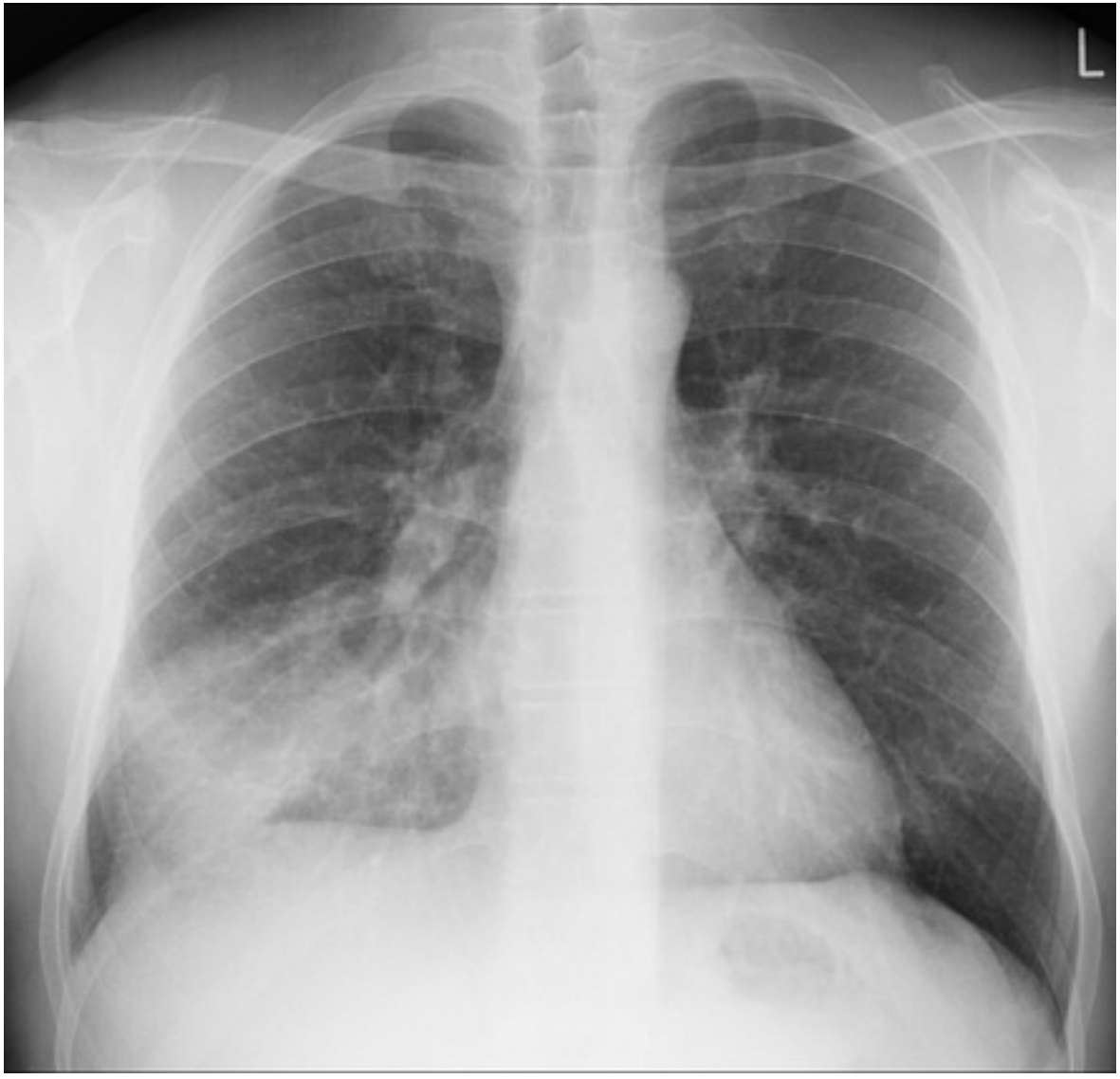
More types of pneumonias:

Clinical presentation (I)

- **Nosocomial Pneumonias:** Common agents include Pseudomonas aeruginosa, Escherichia coli, Enterobacter, Proteus, Klebsiella species.
- **Tuberculosis:** Mycobacterium tuberculosis can cause pneumonia.
- **Aspiration Pneumonias:** Anaerobic organisms, often in patients with periodontal disease or depressed consciousness.

Pneumonia - Some Examples

Pneumonia - Some Examples

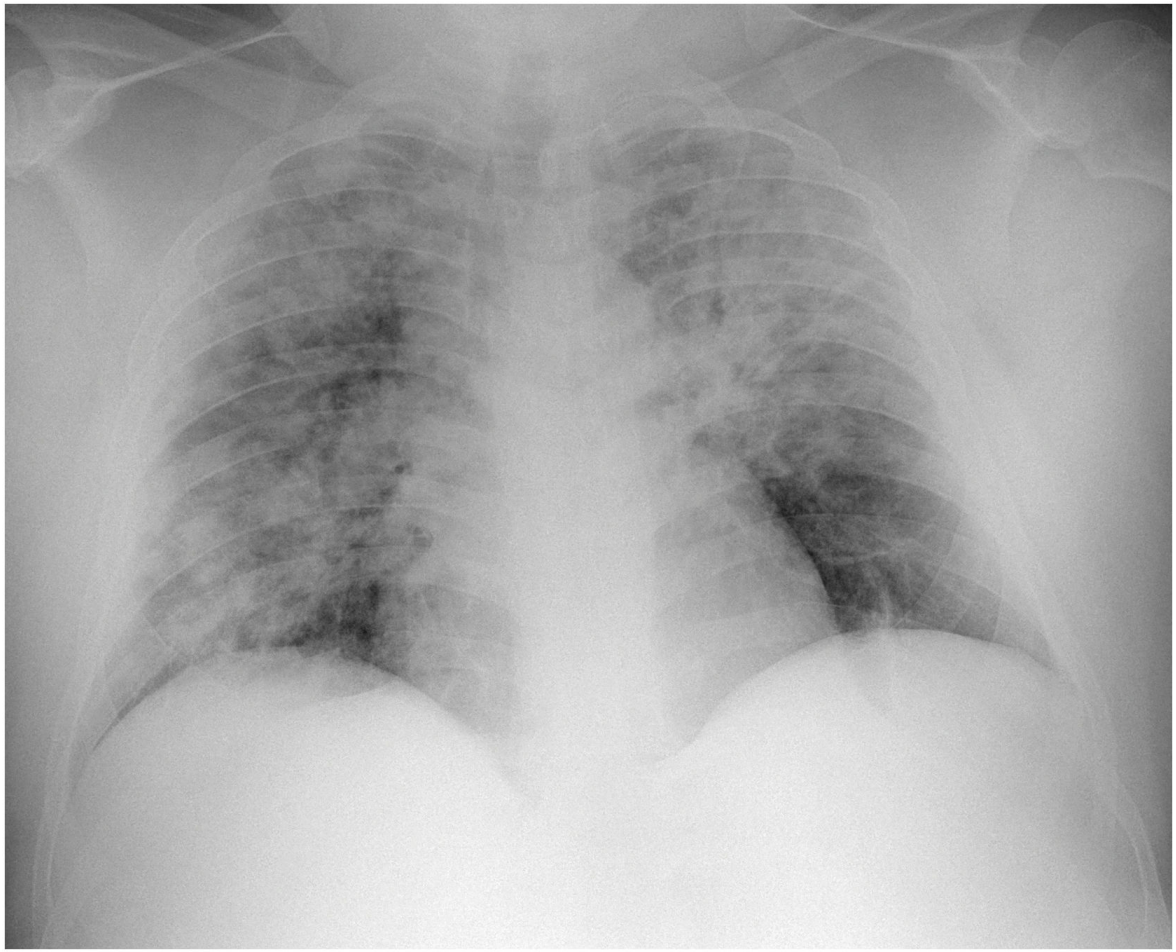


Pneumonia - Viral Pneumonias

Very common in winter (and nowadays):

- **Influenza Virus:** High mortality in elderly, can lead to secondary bacterial pneumonia.
- **Respiratory Syncytial Virus:** Serious pneumonia in infants, outbreaks in institutionalized adults.
- **Varicella-Zoster Virus:** Rare in children, common in individuals over 19 years old.
- **Measles Pneumonia:** May occur in adults.
- **COVID-19:** High mortality during the pandemic (2020-2022).

Pneumonia - Some Examples



Pneumonia - Other Pathogens

Common in immunosuppressed patients

- *Cytomegalovirus*, *Actinomyces*, *Nocardia*, *Cryptococcus neoformans*, *Sporothrix schenckii*, *Blastomyces dermatitidis*, *Coccidioides immitis*, *Histoplasma capsulatum*, *Paracoccidioides brasiliensis*, *Aspergillus*, *Candida*: Associated with **pneumonitis**.
- **Pneumocystis carinii:** Life-threatening pneumonia among immunosuppressed patients (**VIH-AIDS**).

Pneumonia - Some Examples

Pneumonia - Pathogenesis and Clinical Manifestations

- **Infectious Agents' Access:** Inhalation, aspiration, hematogenous seeding.
- **Major Symptoms:** Cough, chest pain, fever, shortness of breath, sputum production. Tachycardia.
- **Other Symptoms:** Headache, confusion, abdominal pain, nausea, vomiting, diarrhea (age and organisms dependent).

Pneumonia - Microbiologic Diagnosis

- **Diagnosis Challenge:** Clinical grounds alone insufficient.
- **Bacterial Pneumonia:** Sputum examination, blood, pleural fluid culture.
- **Viral Infection:** Antigen demonstration, cultures, antibody response.
- **Rapid Tests:** Available for respiratory viruses and bacteria.

Pneumonia - Prevention and Treatment

- **Prevention:** Pneumococcal vaccine for high-risk patients, yearly influenza vaccinations.
- **Treatment:** Directed at specific organism after identification. Considerations: exposure history, age, underlying disease, past pneumonias, severity of illness.