



AT THE FOREFRONT

**UChicago
Medicine**

Consolidating Lung Disease

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@jonherochung

Introduction

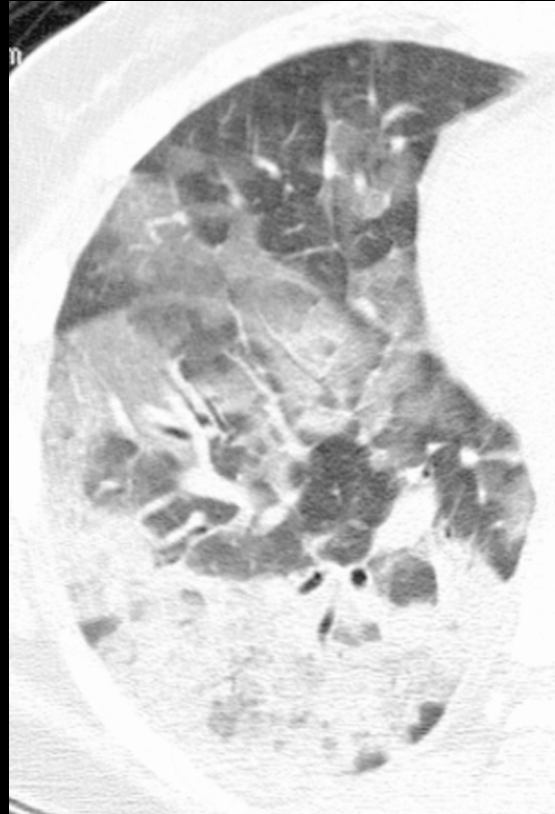
- *Radiographs and CT scans.*—Consolidation appears as a **homogeneous increase in pulmonary parenchymal attenuation** that obscures the margins of vessels and airway walls. An air bronchogram may be present. The **attenuation characteristics** of consolidated lung are only **rarely helpful** in differential diagnosis (e.g. decreased attenuation in lipoid pneumonia and increased in **amiodarone toxicity**).

Objectives

- State the differential diagnosis for lung consolidation based on the clinical context
- Illustrate examples of various lung pathologies manifesting as lung consolidation
- Provide clues that might help distinguish causes of lung consolidation

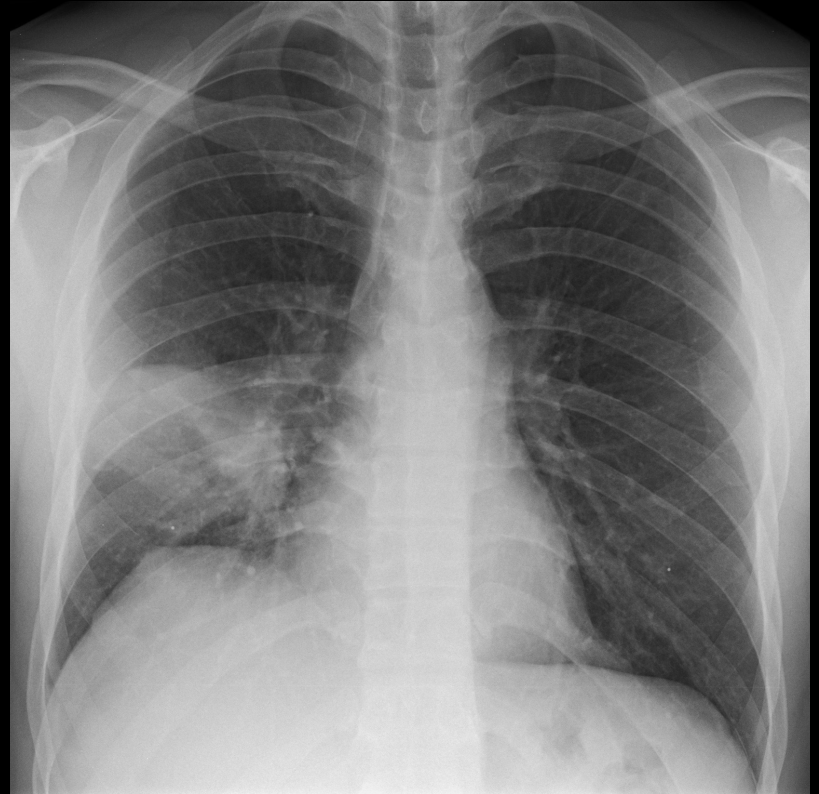
Acute Presentation

- Infection
- Edema
 - Cardiac
 - Noncardiac
- Aspiration
- Hemorrhage

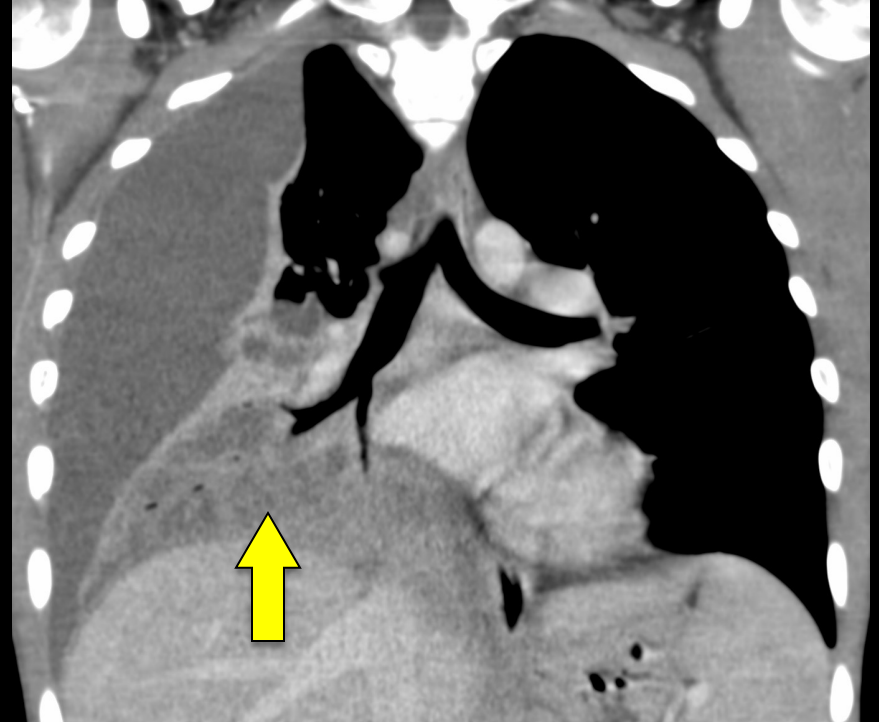


Infection

- Community acquired
 - Bacteria most common
 - Fungal infection - immune status and geography
 - Less common with viral
- Hospital acquired
 - More aggressive organisms



Streptococcus pneumoniae



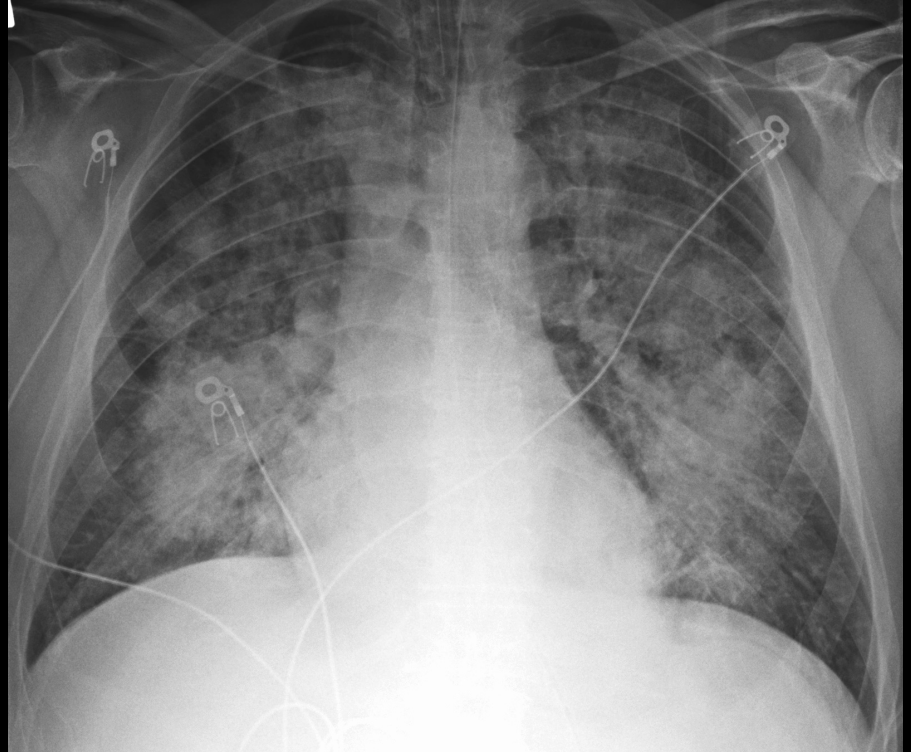
Courtesy of Travis S. Henry, M.D. (Durham, NC)

Blastomycosis

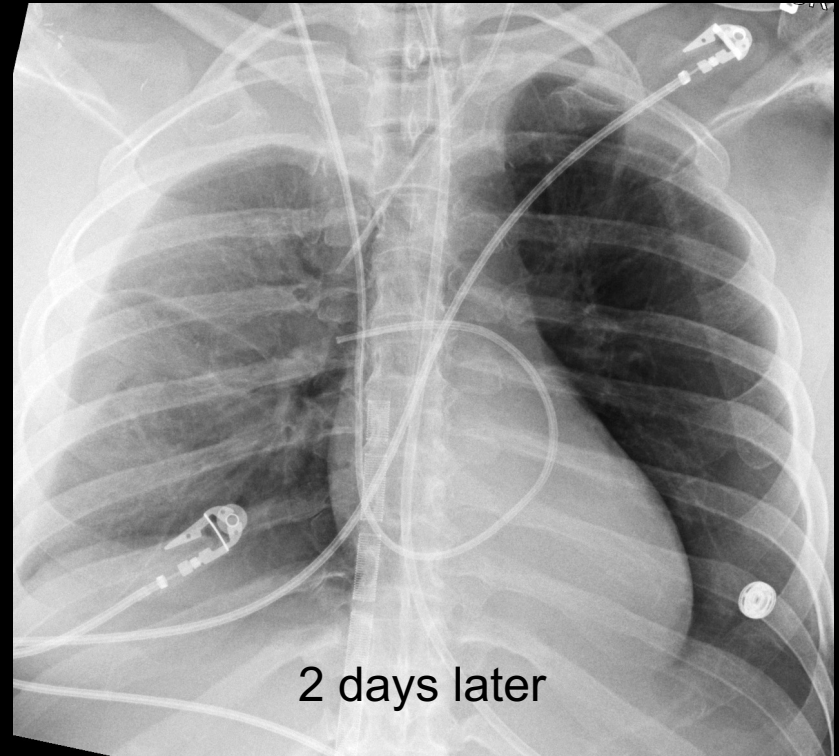
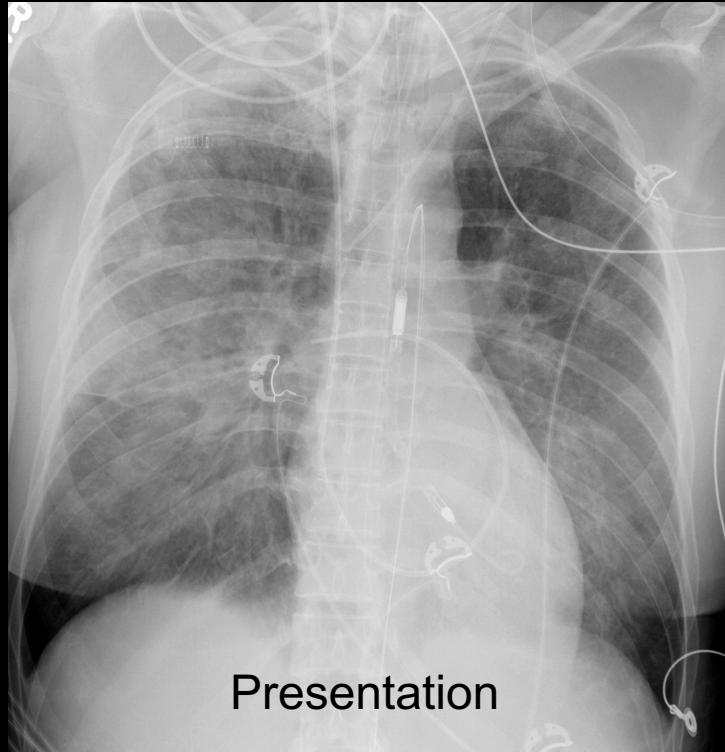


Edema

- Cardiogenic
- Noncardiogenic
 - Fluid overload
 - Central airway obstruction
 - Inhalation injury
 - Neurogenic
 - Acute kidney injury
 - Acute lung injury

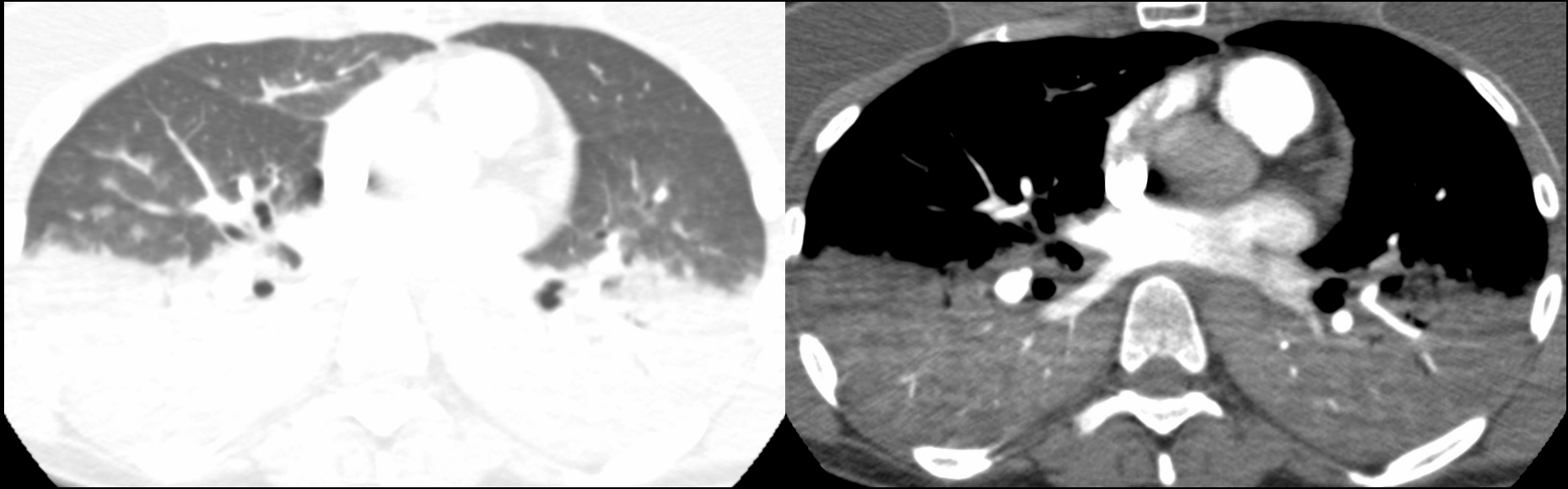


Edema



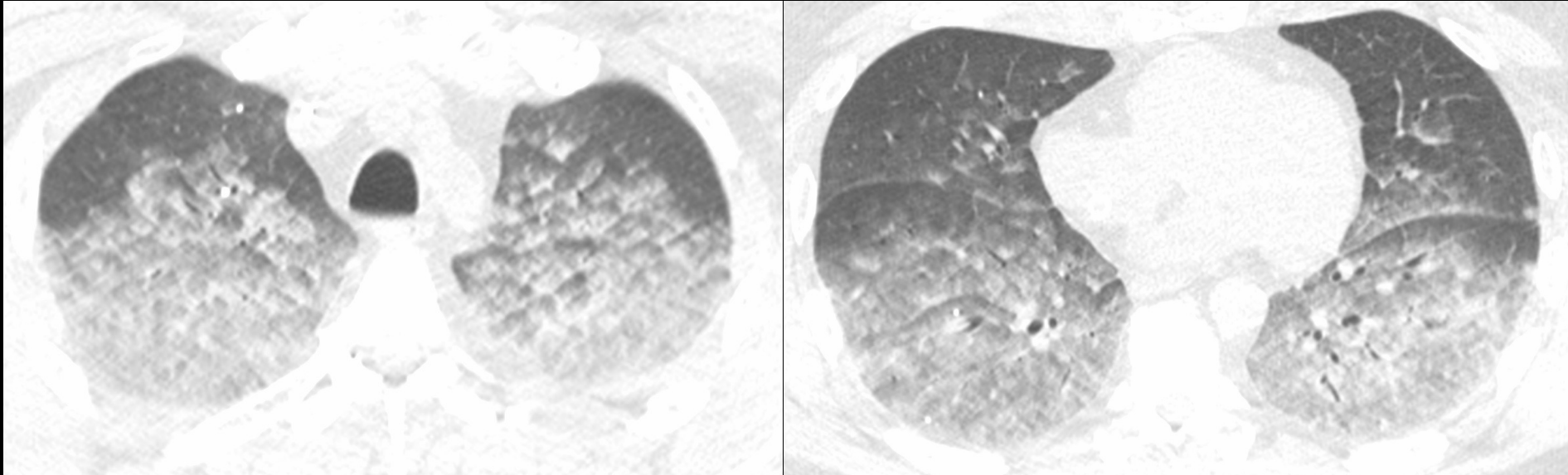
Courtesy of Travis S. Henry, M.D. (Durham, NC)

Edema



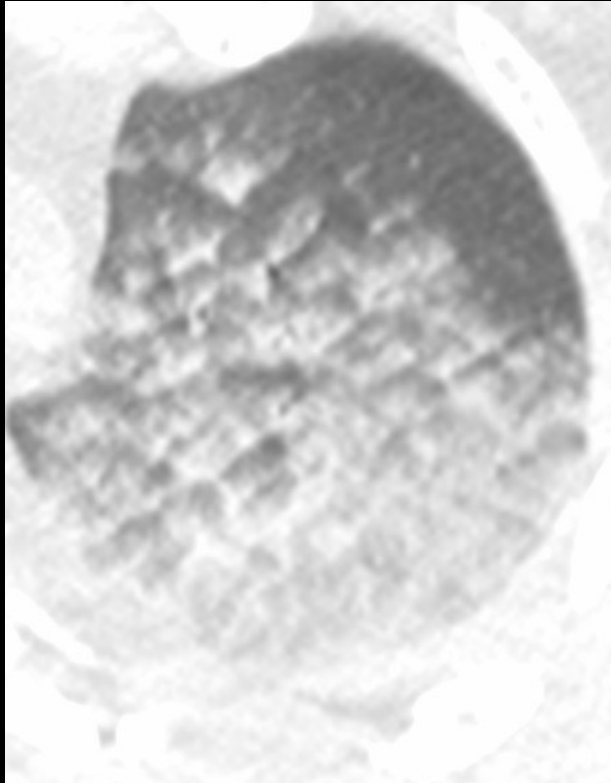
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Edema



Intralobular gradient

Edema



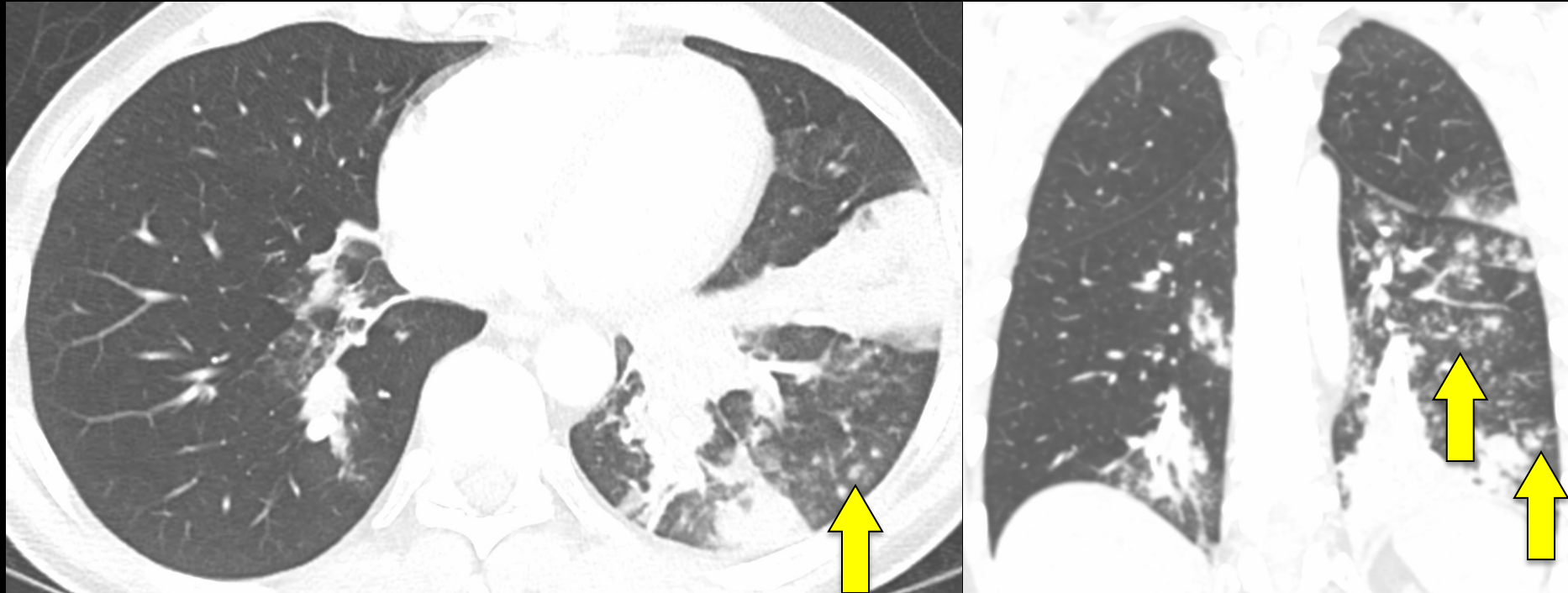
Lai YK et al. *Radiol Cardiothorac Imaging* 2019

Aspiration

- Neurologic disease
- Myopathies
- Drug abuse
- Head and neck cancers
- Esophageal cancer
- Trauma



Aspiration



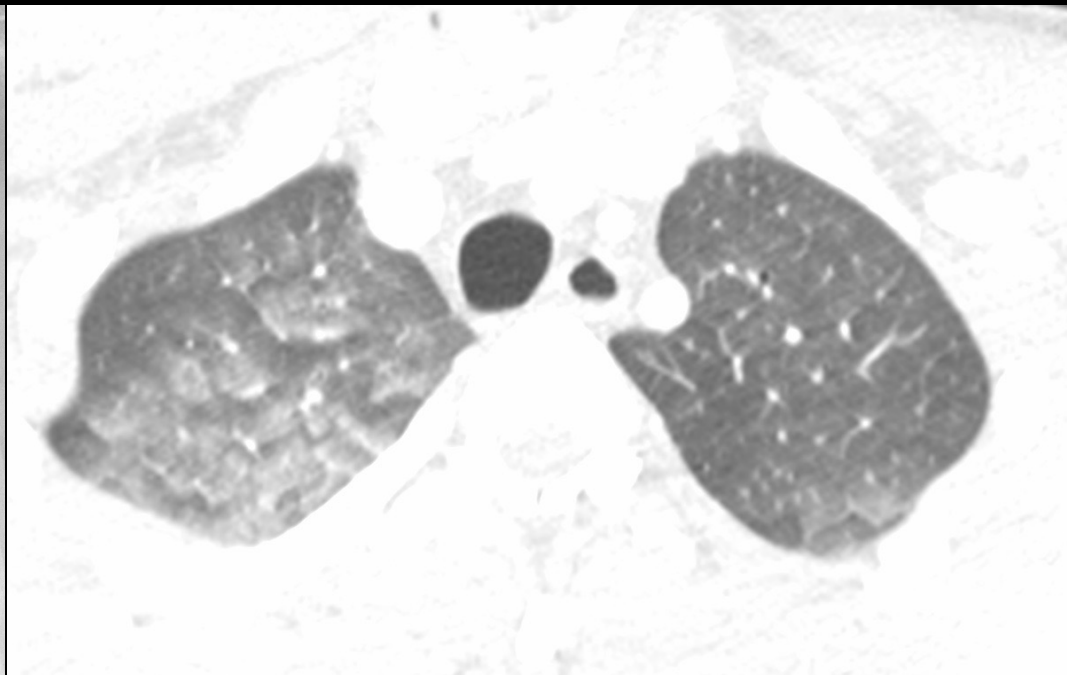
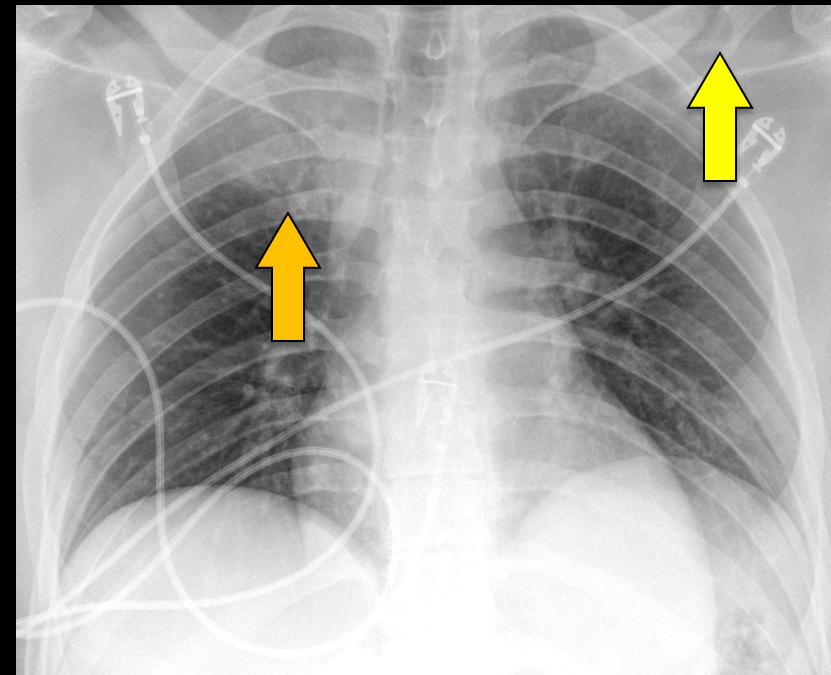
🔑 Presence of airway-centric nodules favors aspiration or infection

Alveolar Hemorrhage

- Trauma
- Vasculitis
- Medications
- Illicit drugs

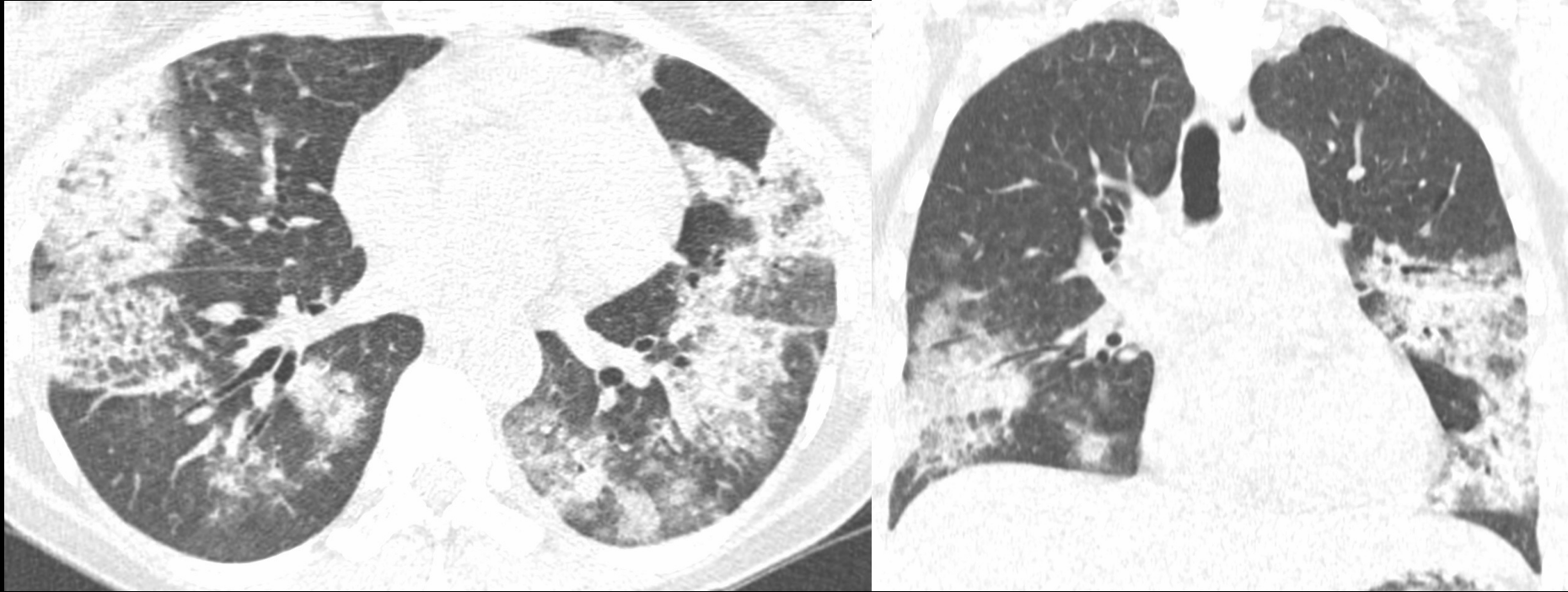


Trauma



🔑 Intra-alveolar gradient favors blood or other fluid

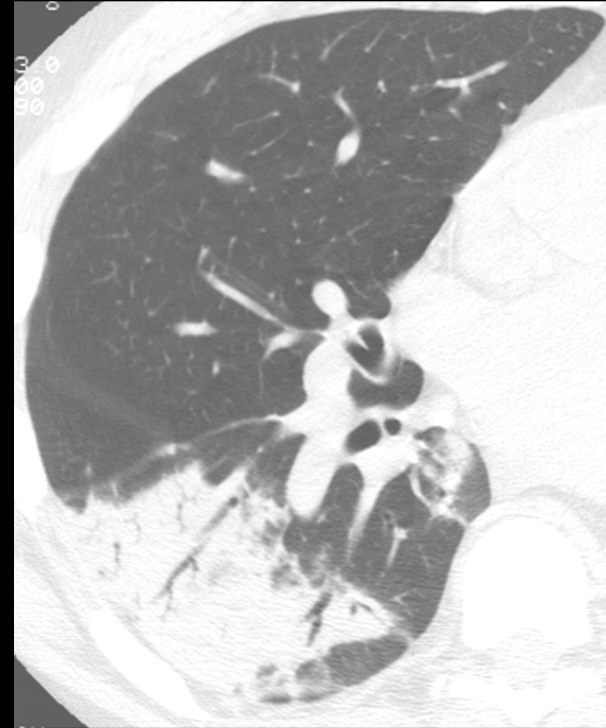
Granulomatosis with polyangiitis



🔑 Patients with hemorrhage often more hypoxic than those with edema

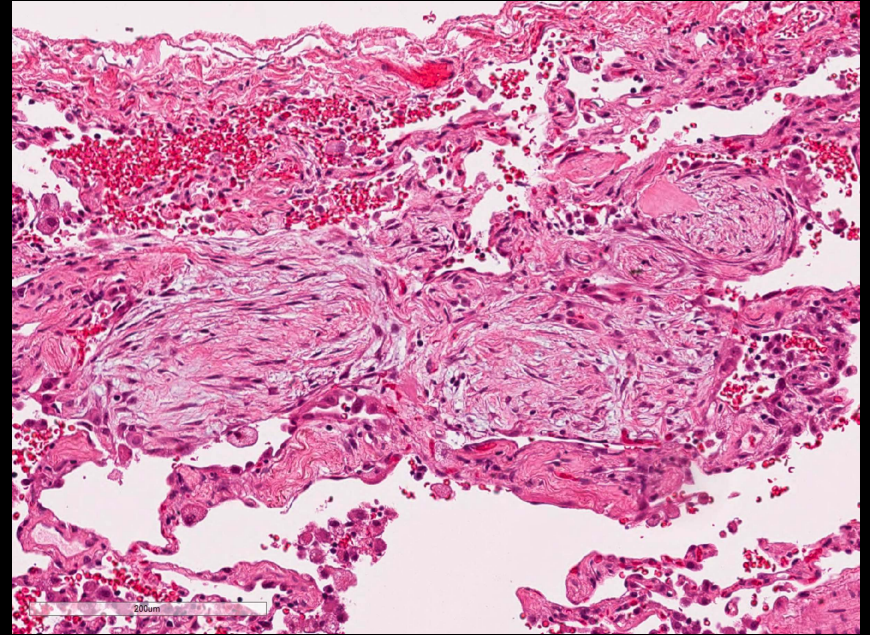
Nonacute Presentation

- Organizing pneumonia
- Eosinophilic pneumonia
- Adenocarcinoma
- Lymphoproliferative disease
- Chronic aspiration (lipid)
- Chronic or subacute infection
- Sarcoidosis



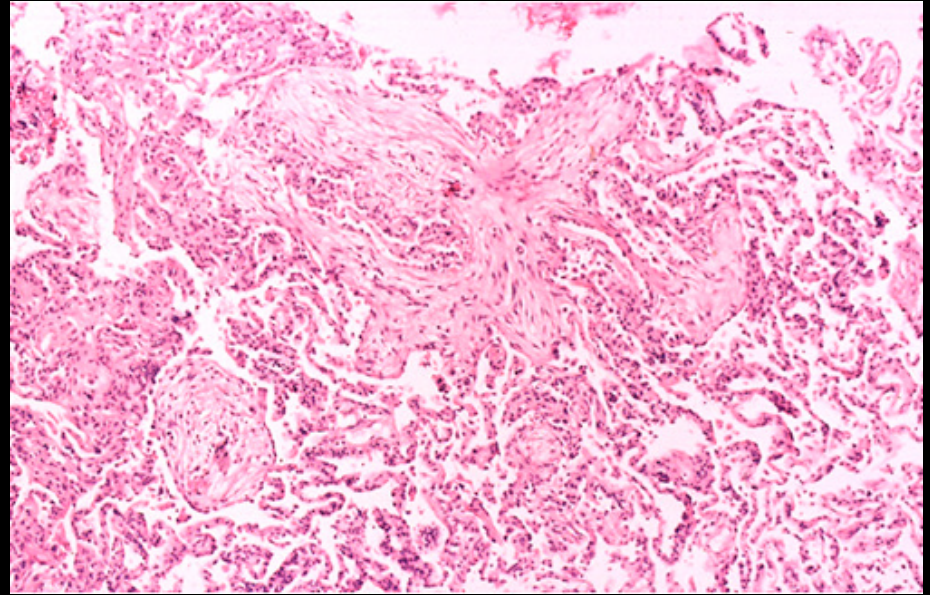
Organizing Pneumonia

- Fibroblastic plugs in alveolar sacs, ducts, and bronchiolar lumen
- Common histopathologic pattern of response to lung injury

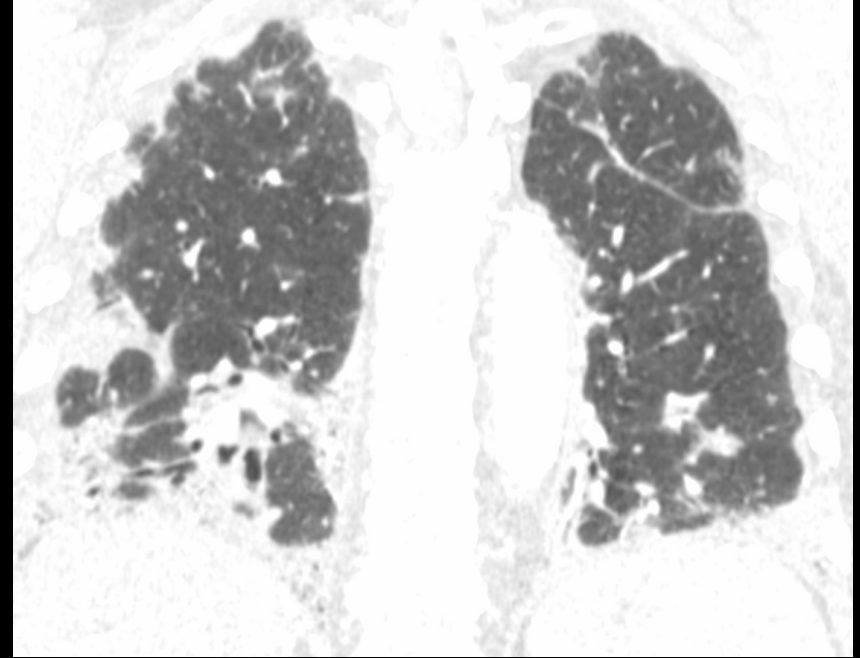
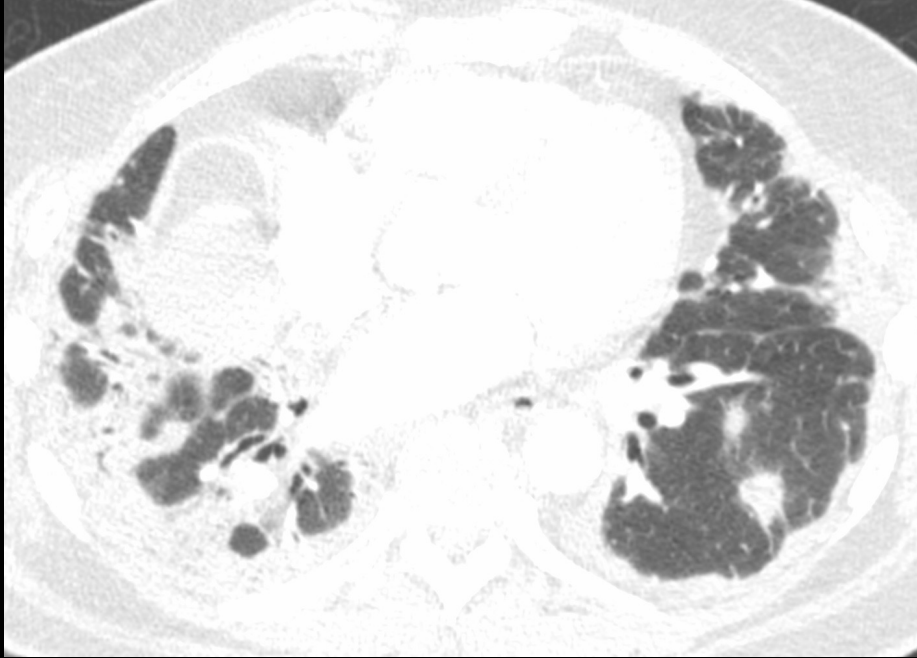


Organizing Pneumonia

- Infection
 - COVID-19
 - Influenza
- Medication
 - Checkpoint inhibitors
 - Antibiotics
- Autoimmune disease
- Transplant rejection
- Radiation

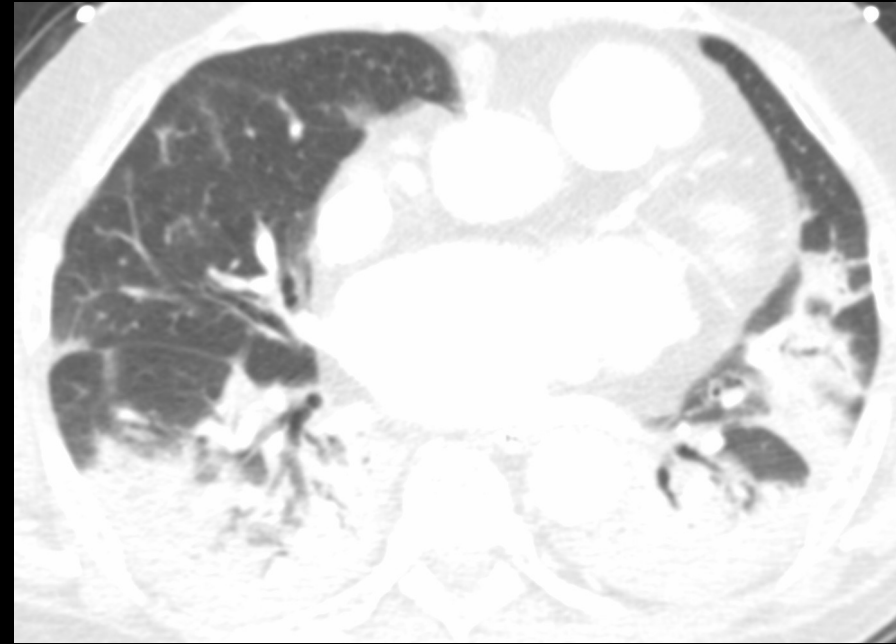


COVID-19

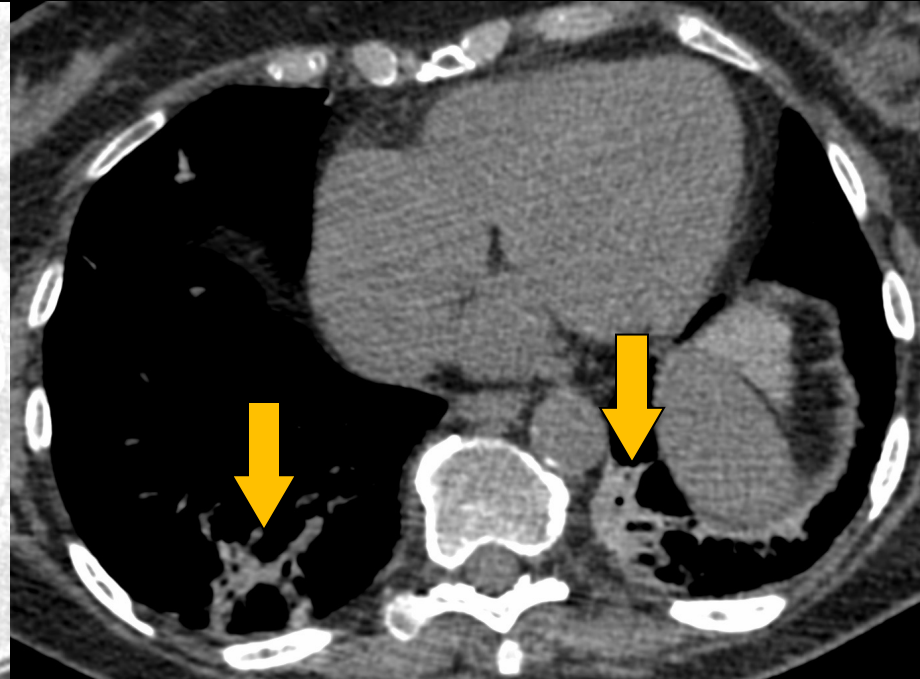


🔑 Viral infection most common cause of infection-related OP

Influenza

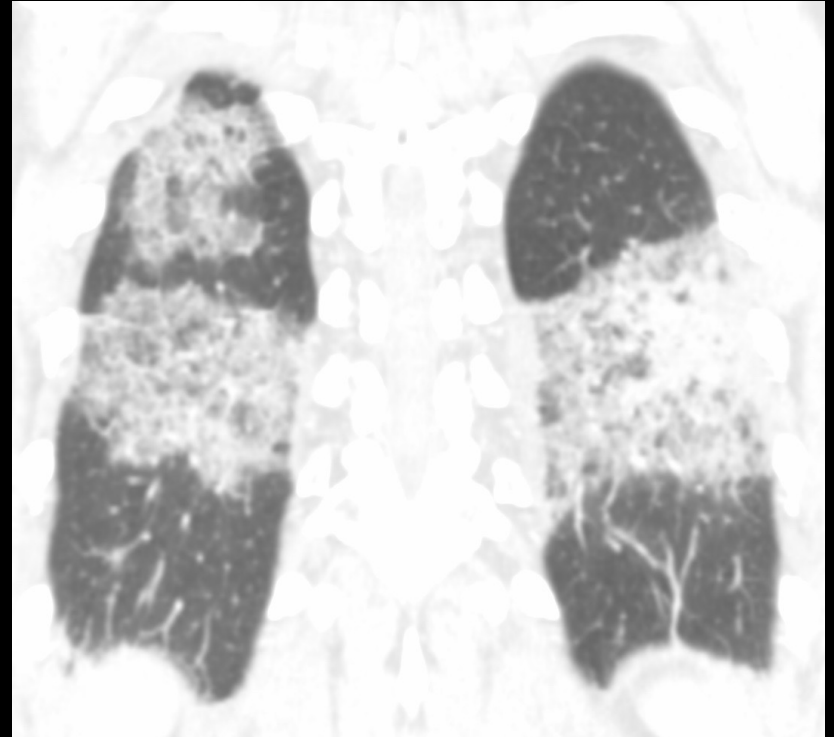
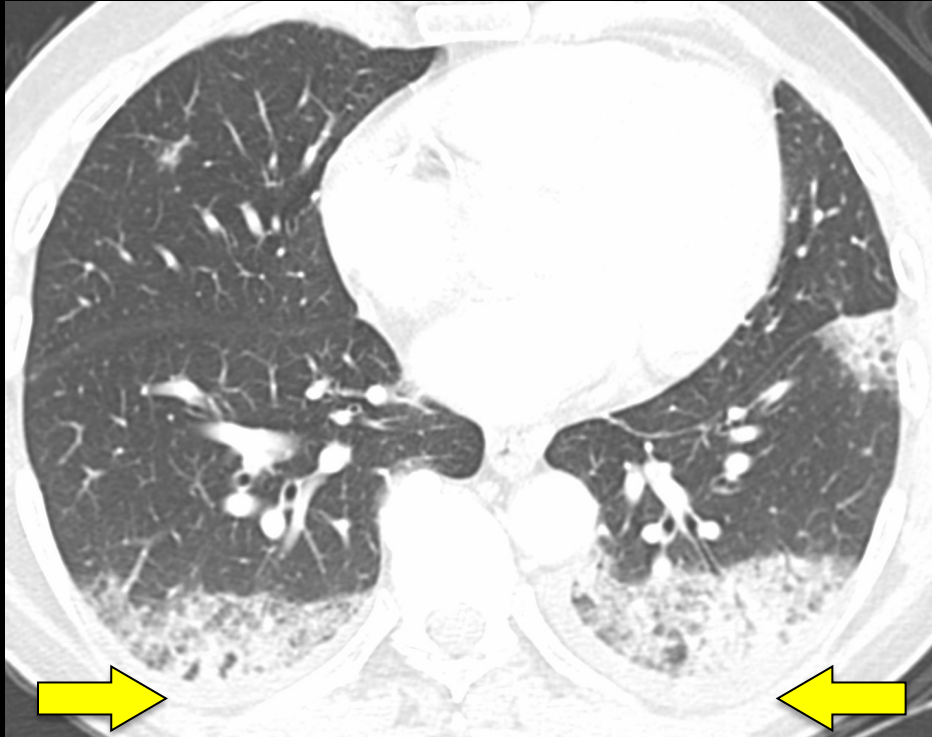


Amiodarone Toxicity



🔑 High attenuation consolidation \neq amiodarone toxicity

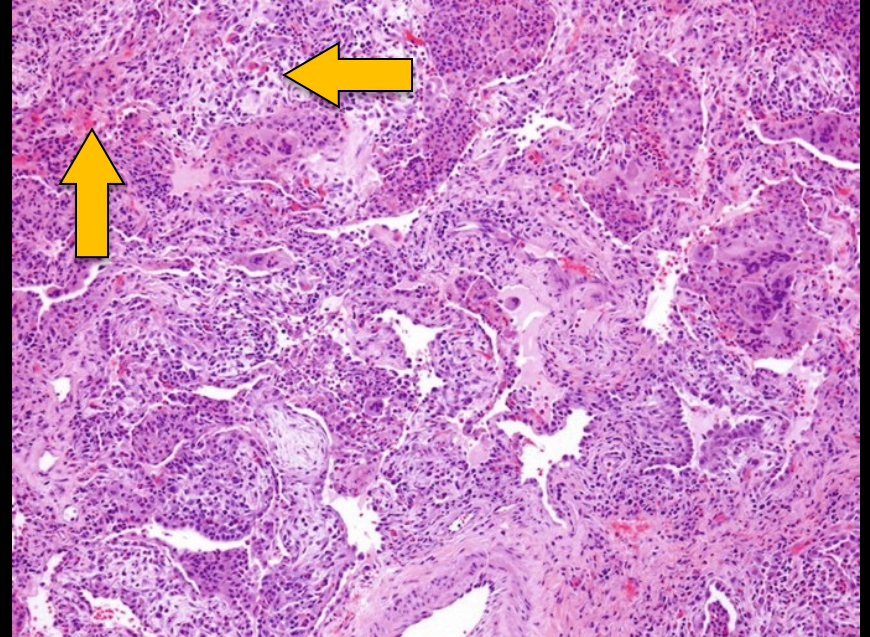
Rheumatoid Arthritis



Multicompartiment involvement suggestive of autoimmune disease

Eosinophilic Pneumonia

- Idiopathic
- Medications
- ABPA
- Parasitic infections
- Hypereosinophilic syndromes
- Eosinophilic granulomatosis with polyangiitis



NSAID

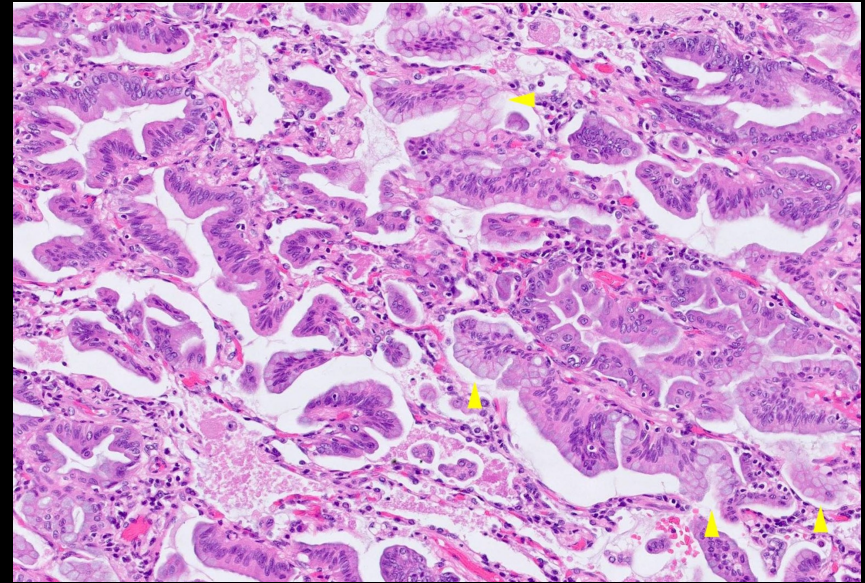


Strongyloides stercoralis

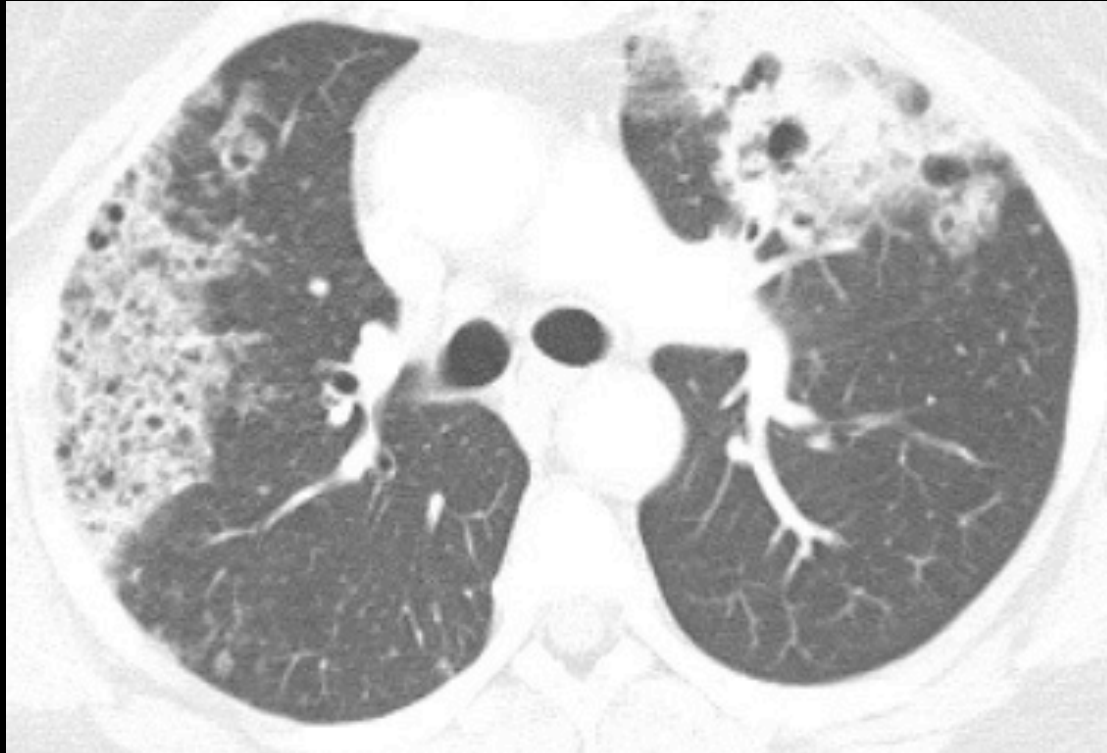


Lung Adenocarcinoma

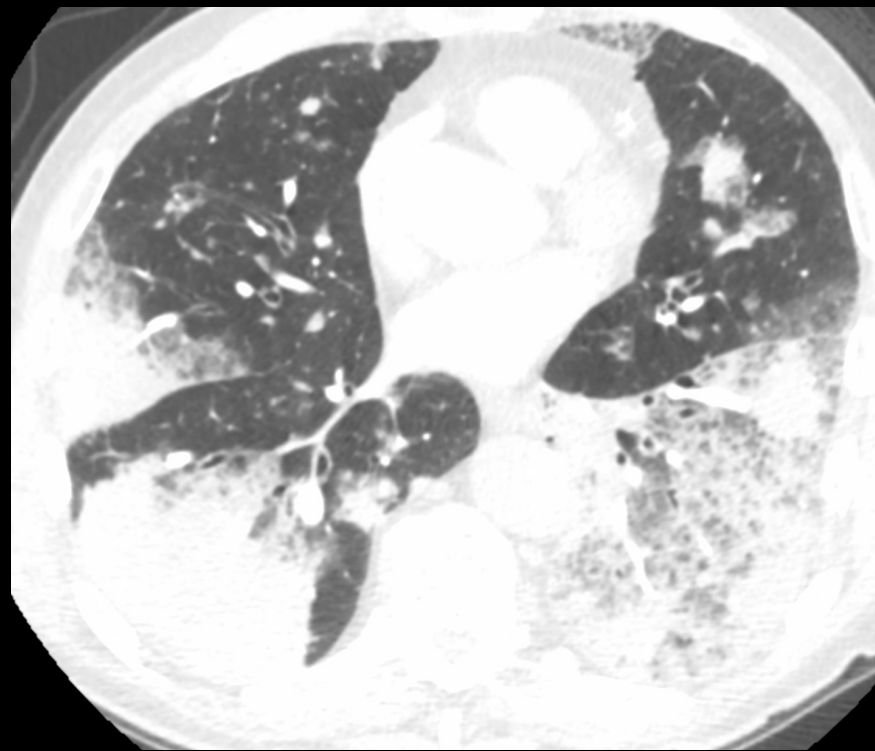
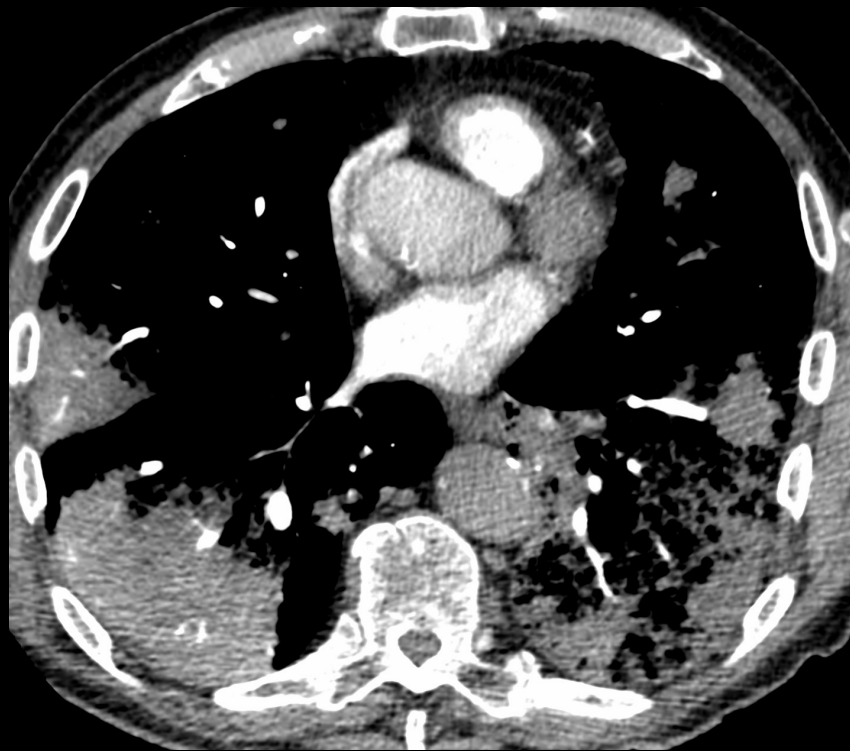
- Most commonly invasive mucinous adenocarcinoma
- Single or multiple areas of consolidation
- Satellite solid and subsolid nodules
- Cystic spaces



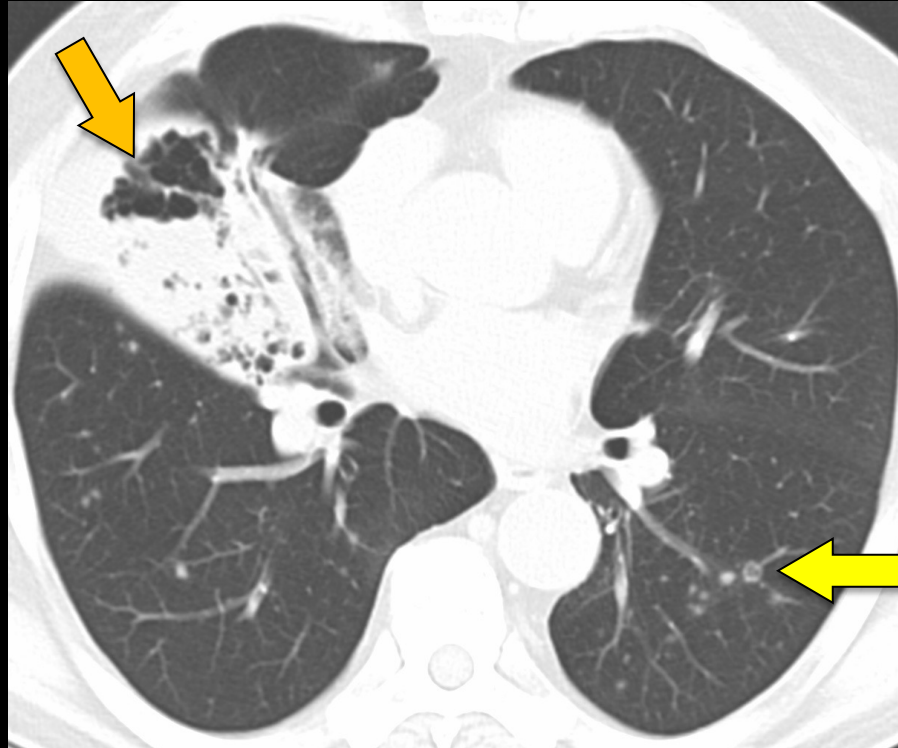
Lung Adenocarcinoma



Lung Adenocarcinoma



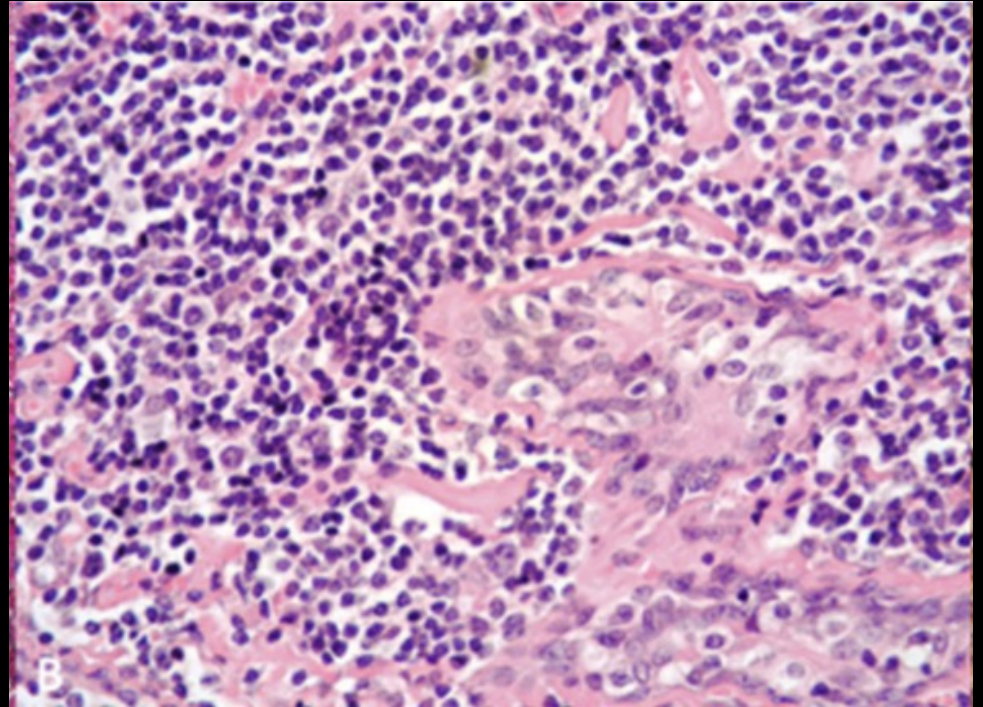
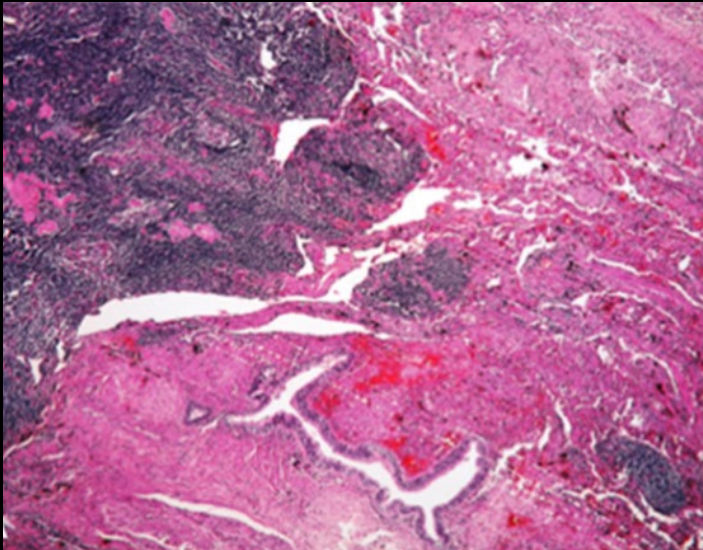
Lung Adenocarcinoma



🔑 Cystic spaces and cystic nodules should suggest adenocarcinoma

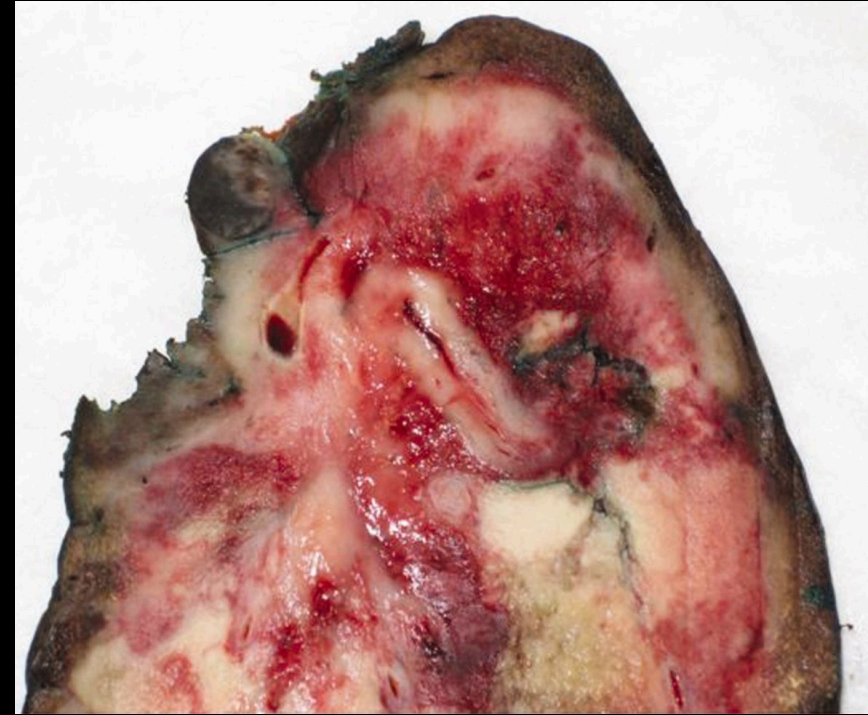
Pulmonary Lymphoma

- Marginal zone
 - Including MALT
- Diffuse large B cell

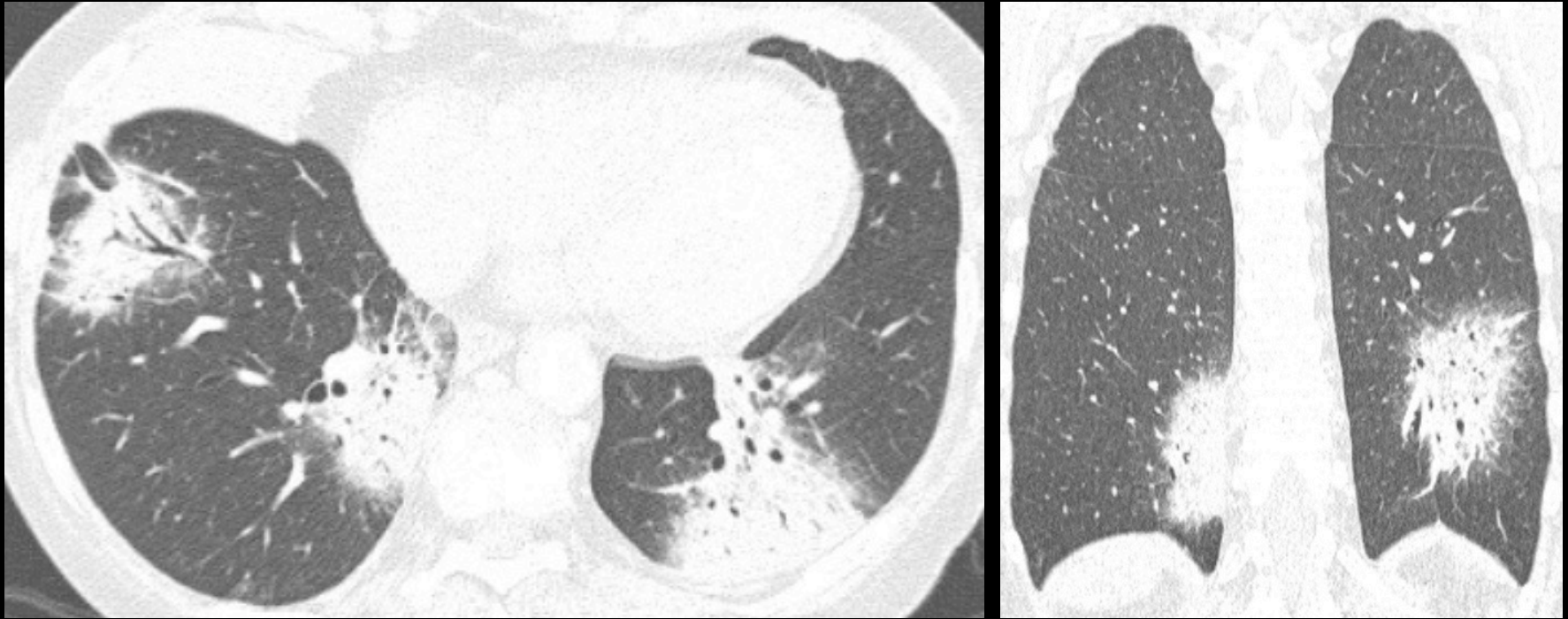


Pulmonary Lymphoma

- Primary
 - Sjögren syndrome
 - HIV
- Secondary
 - Initial presentation
 - Recurrence

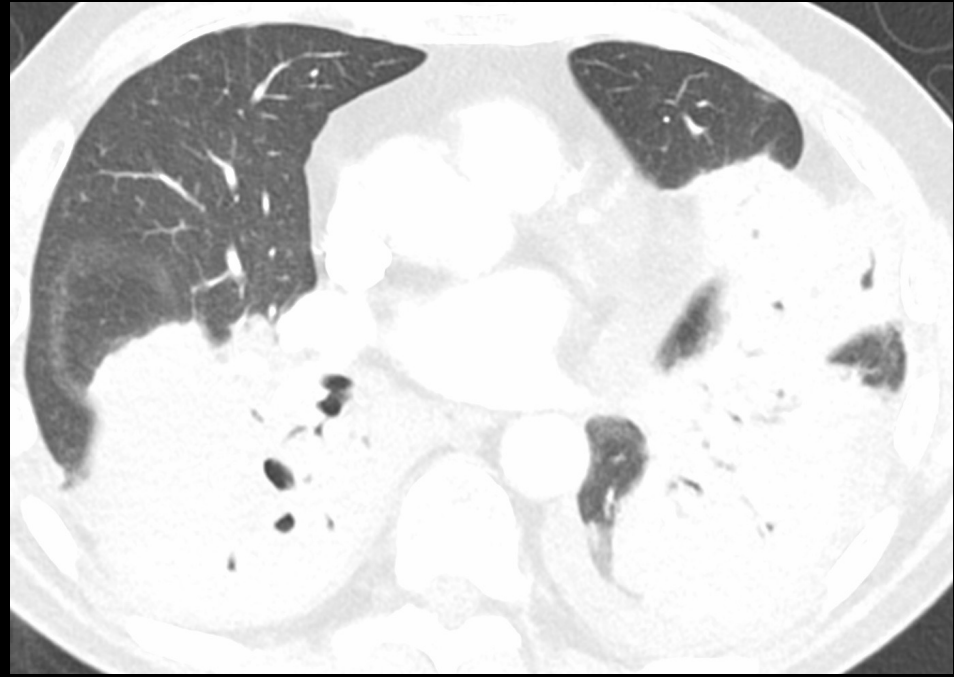
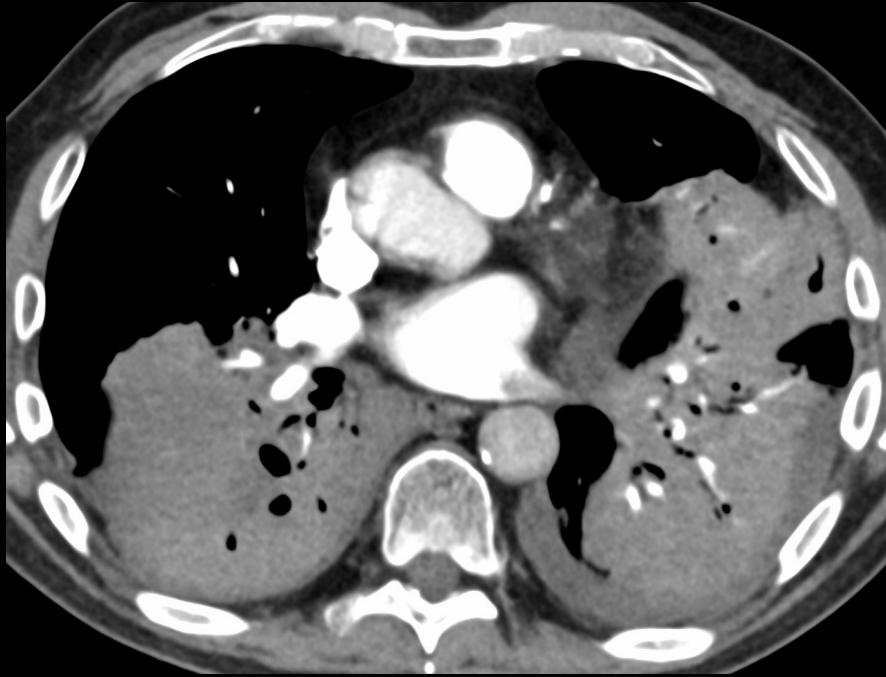


MALT Lymphoma



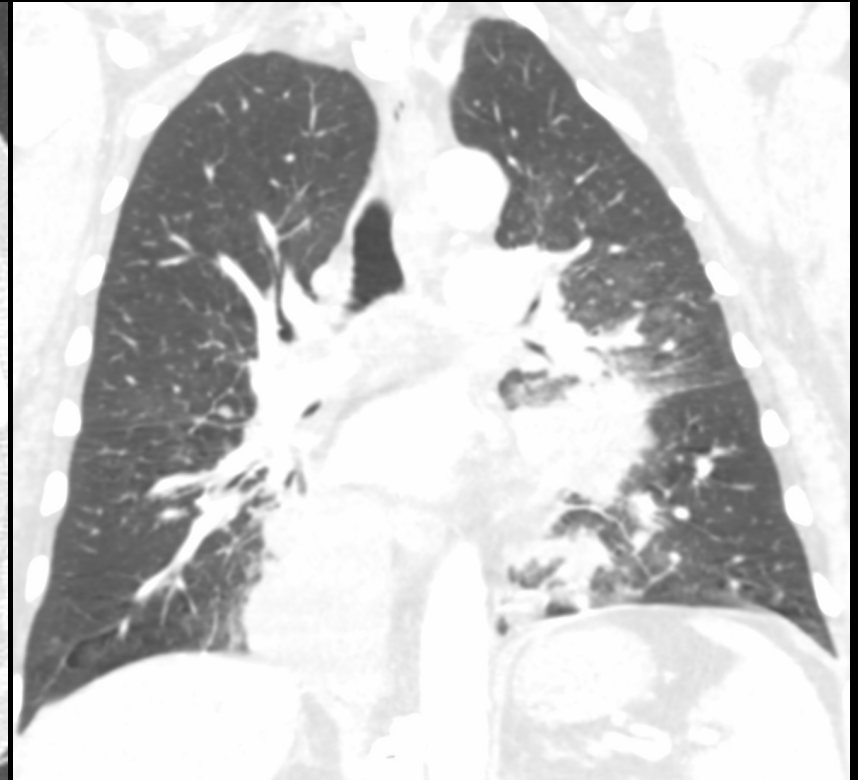
🔑 Lymphoma should be considered in patients with Sjögren syndrome or HIV

MALT Lymphoma



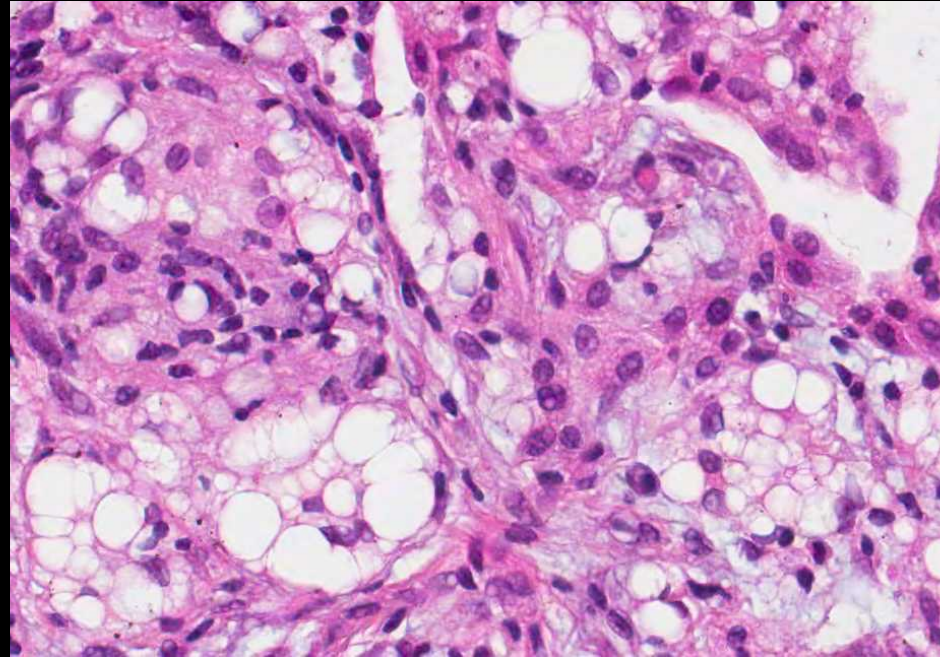
🔑 Lymphoma should be considered in patients with Sjögren syndrome or HIV

DLBC Lymphoma

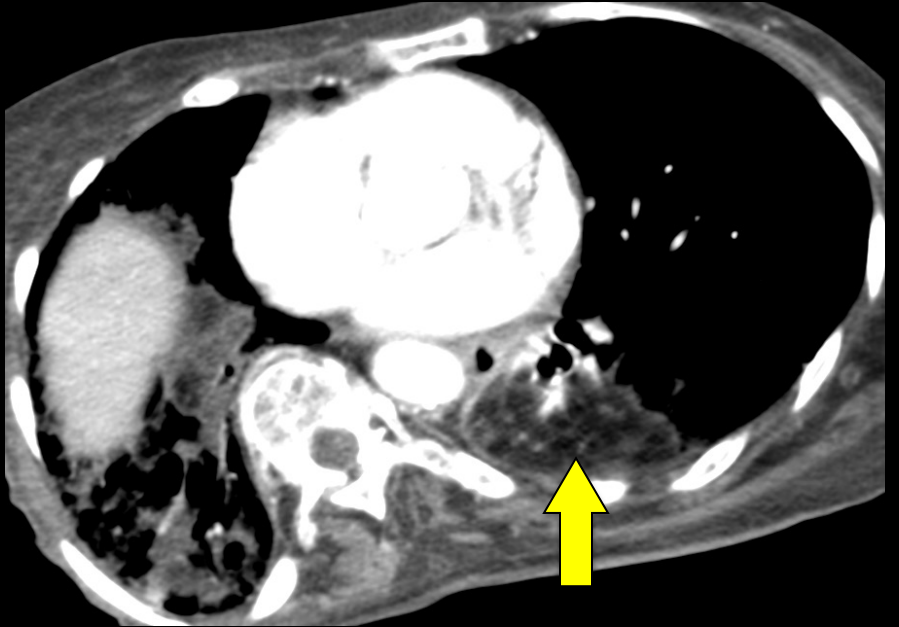
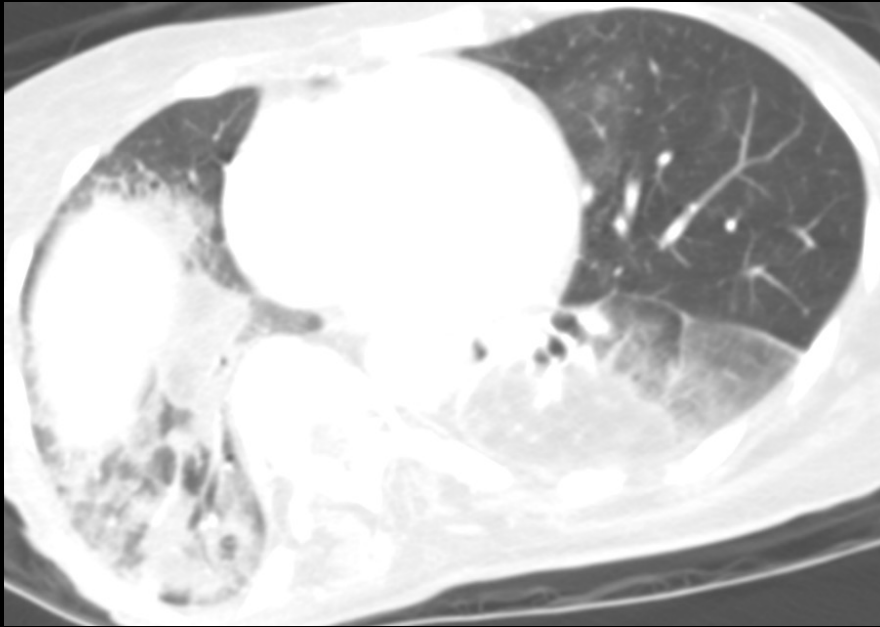


Lipoid Pneumonia

- Aspiration of lipid containing agents
 - Mineral oil
 - Vapor rubs
- Children
- Debilitated patients

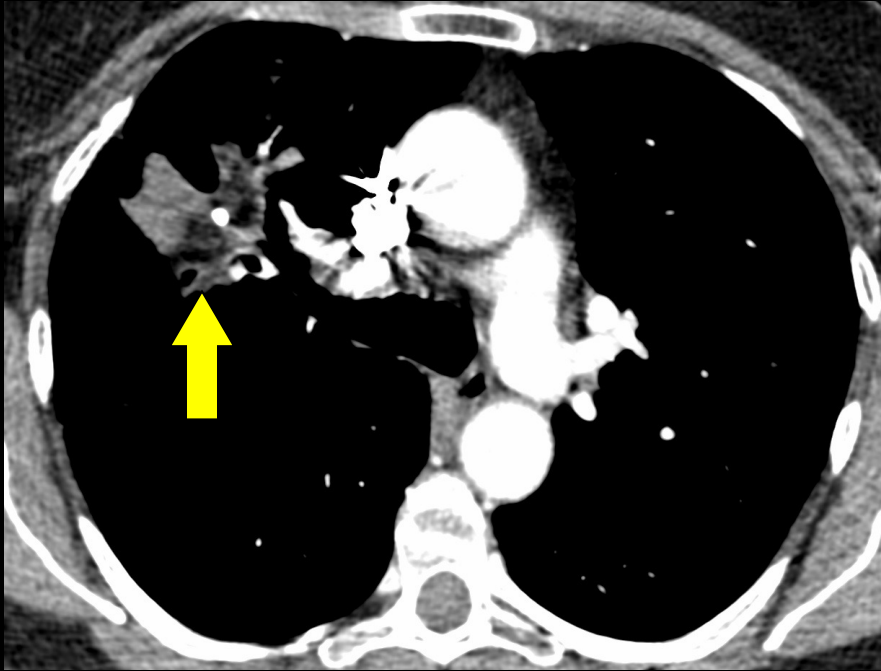


Lipoid Pneumonia



🔑 Fat attenuation is suggestive of lipoid pneumonia

Lipoid Pneumonia

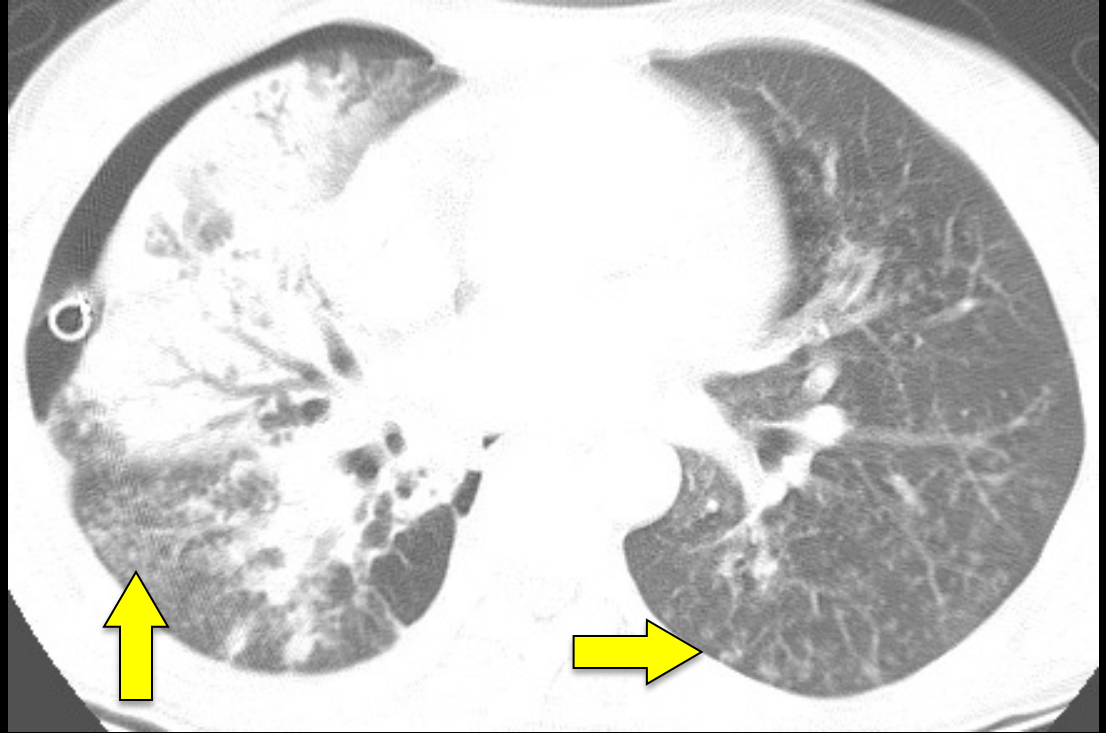


🔑 Consolidation typically hypermetabolic on FDG-PET/CT

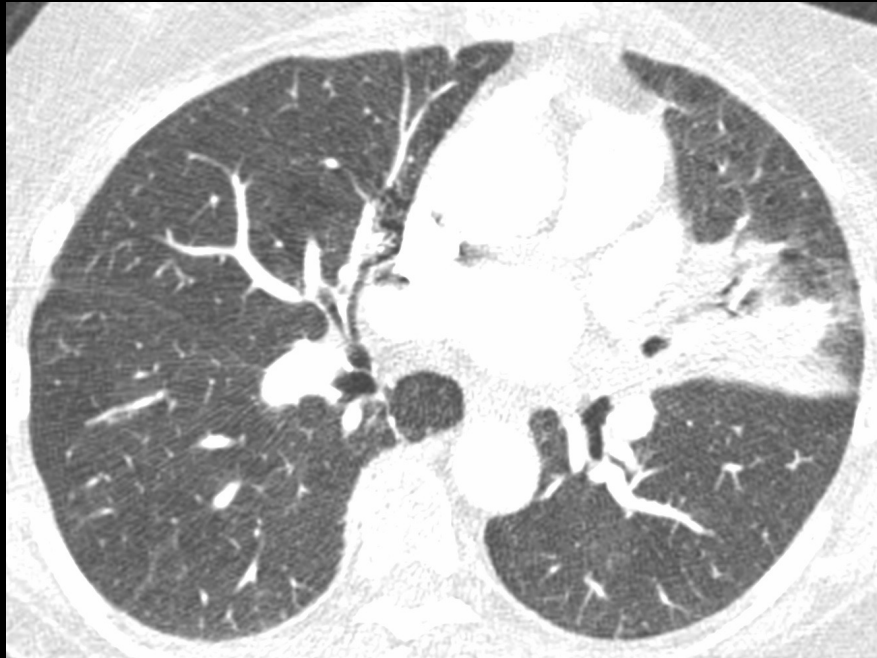
Chronic Infection

- Mycobacteria: *M. tuberculosis* *M. avium* complex (MAC), rapid growers (*M. chelonae*, *M. abscessus*)
- Fungus: *Coccidioides*, *Blastomyces*, *Histoplasma*
- Bacteria: *Actinomyces*, *Nocardia*

Tuberculosis



M. avium complex



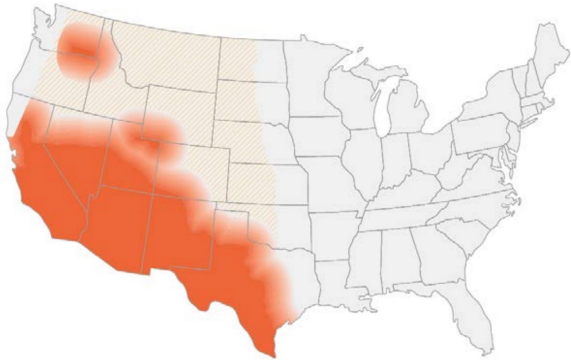
Blastomycosis



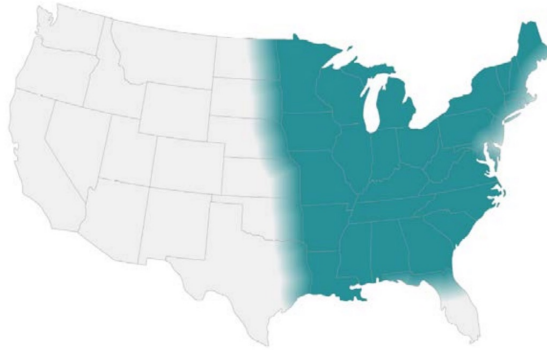
🔑 Travel history and exposures can help consider infection

Endemic Fungal Infections of US

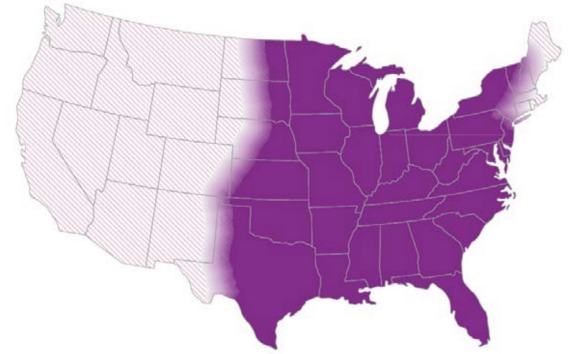
Coccidioidomycosis (Valley fever)



Blastomycosis



Histoplasmosis



Sarcoidosis

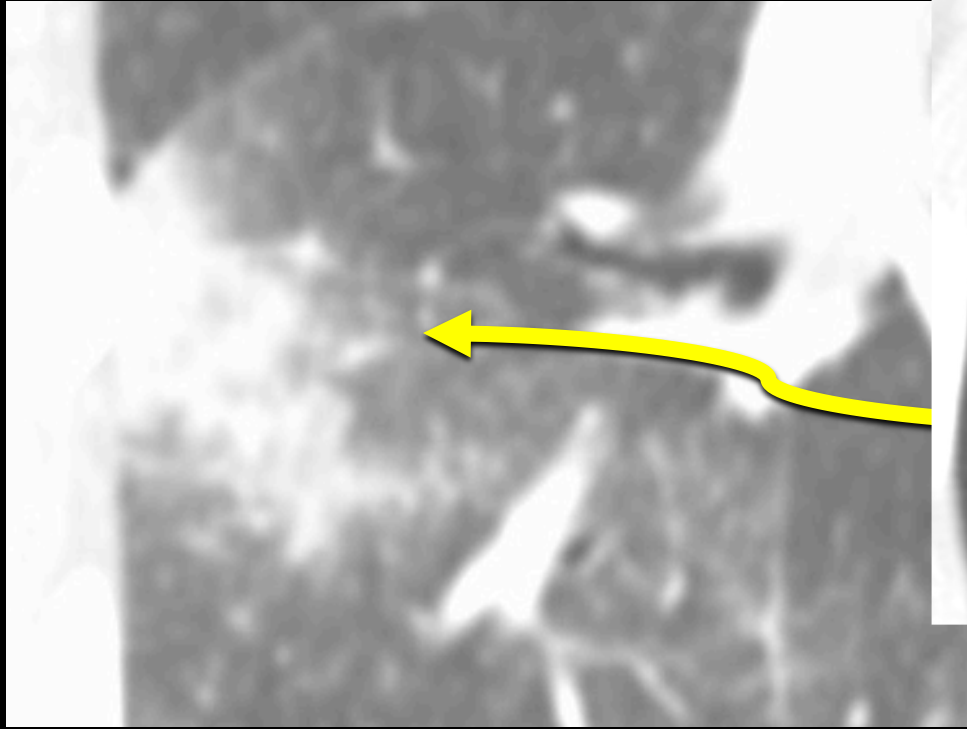
- Small nodules most common manifestation
- Coalescence of small nodules can form larger masses
- Consolidative opacities previously referred to as “alveolar” sarcoidosis



Sarcoidosis



Sarcoidosis



🔑 Galaxy sign highly suggestive of sarcoidosis

Summary

- Differential diagnosis of lung consolidation depends on acuity of illness
- Feature that may help limit differential diagnosis
 - Attenuation
 - Internal changes
 - Satellite lesions
- Metabolic imaging not usually helpful



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