Spectrum of Pulmonary Sarcoidosis

Jonathan H. Chung, MD
Professor of Radiology
Chief Quality Officer, Radiology
Section Chief Thoracic Imaging

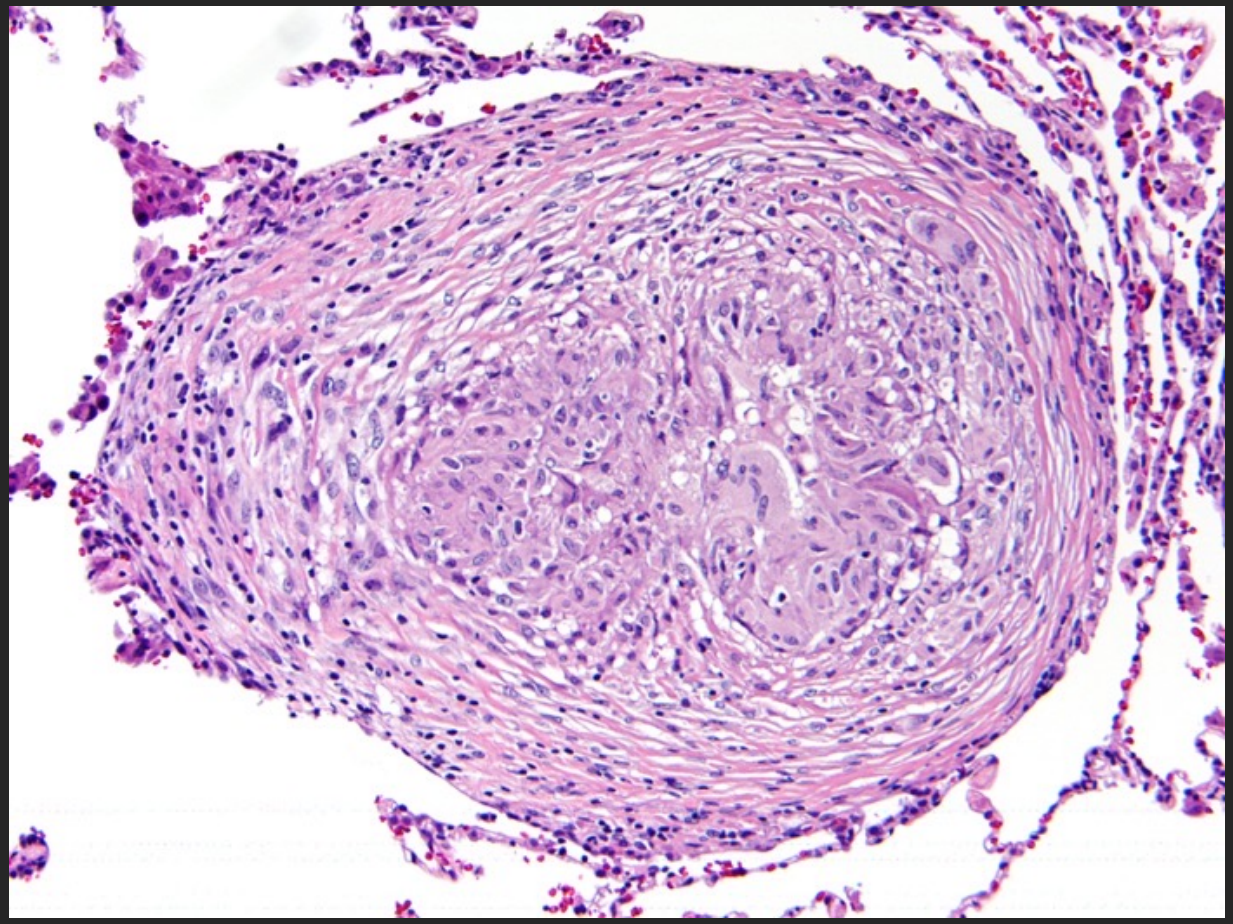
@jonherochung

AT THE FOREFRONT
UChicago Medicine

Introduction

- Sarcoidosis is a systemic inflammatory disease
- Characterized by formation of noncaseating granulomata in tissue
- Complex interplay between genetics and environmental antigens

Introduction



Courtesy of Teri J. Franks, M.D. (Joint Pathology Center)

Introduction

- Incidence varies
  - –Blacks > Northern White Europeans > Others
  - –Female > Male
  - –Nonsmoker > Smoker
- Mortality 2%-4%

Introduction

- Lungs and thoracic lymph nodes most commonly involved
- Skin, CNS, and eyes also commonly involved
- Phenotypes quite variable
- No reliable biomarker

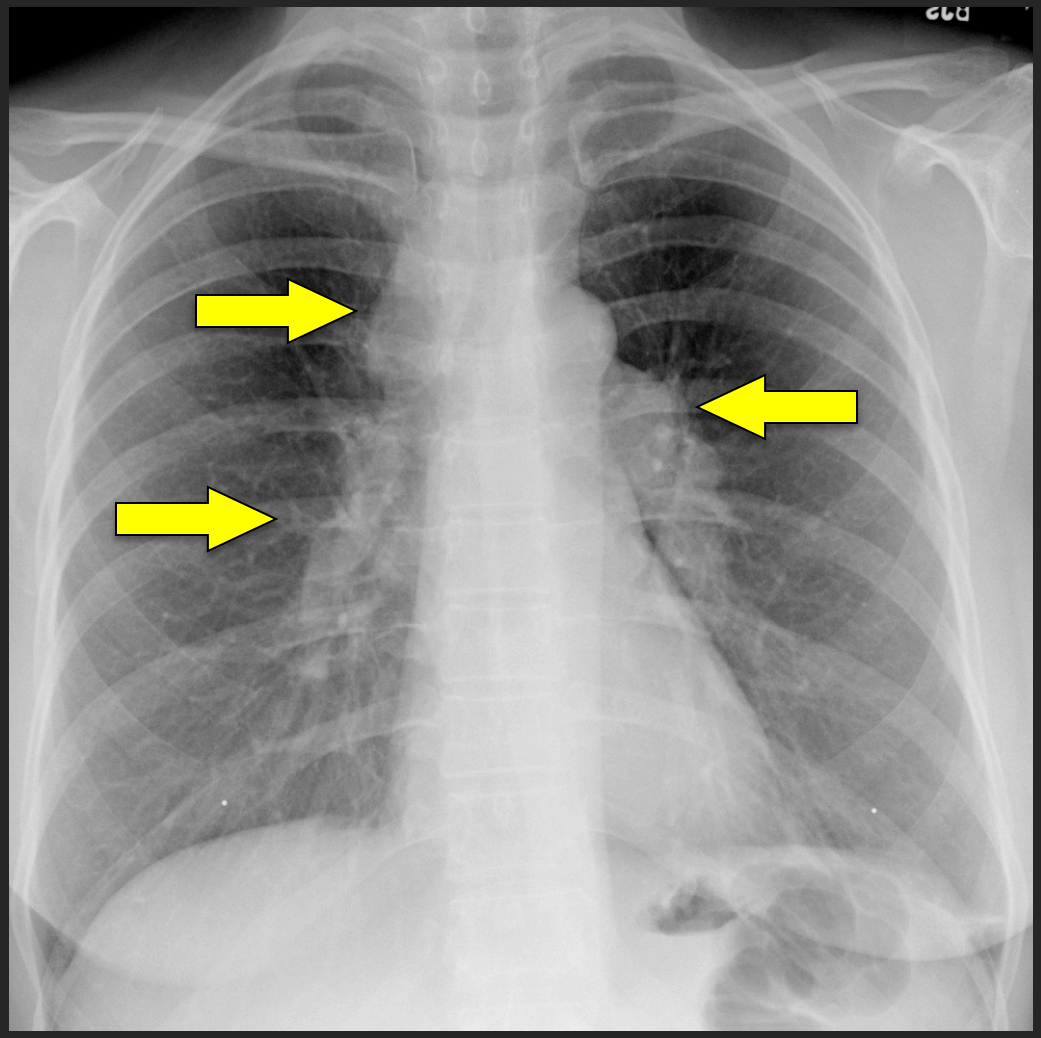
Objectives

- State the common imaging findings of thoracic sarcoidosis
- Illustrate less typical manifestations of sarcoidosis
- List the differential diagnosis for common and uncommon findings of sarcoidosis

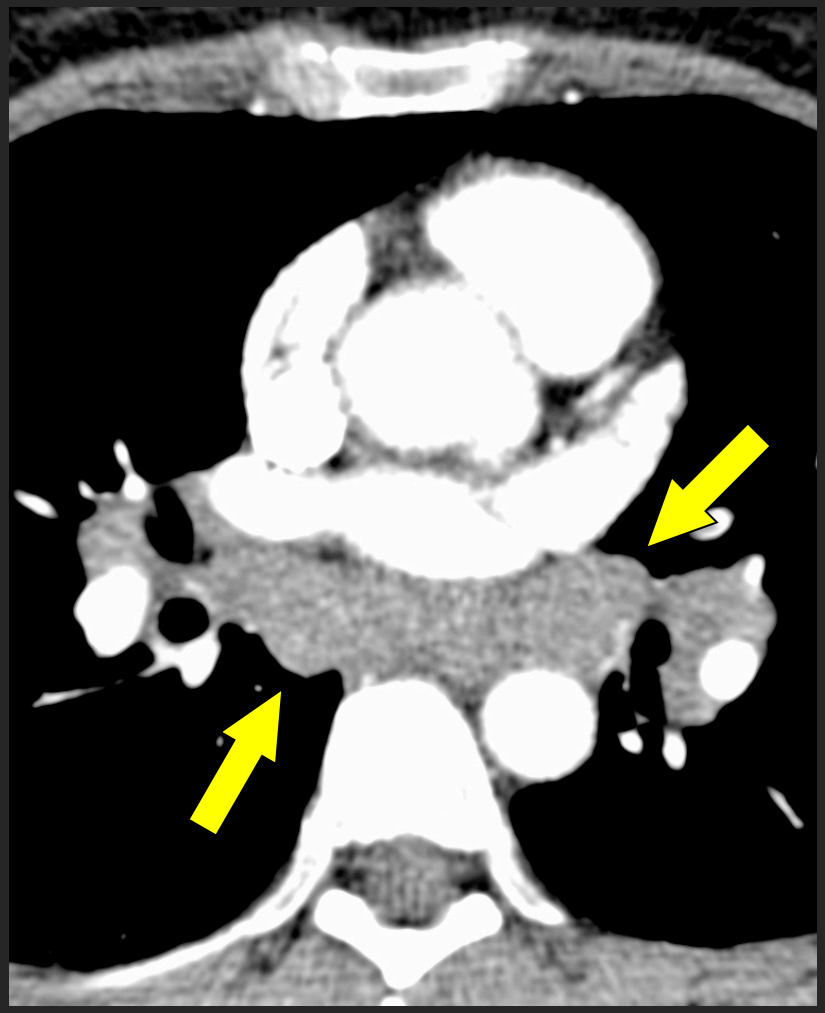
Imaging Findings

- Chest radiograph abnormal in up to 90% of patients
  - Lymphadenopathy 75%-90%
  - Upper lung predominant
    - Small nodules
    - Large nodules or consolidation
    - Fine reticulation
    - Fibrosis
  - Symmetry very common feature

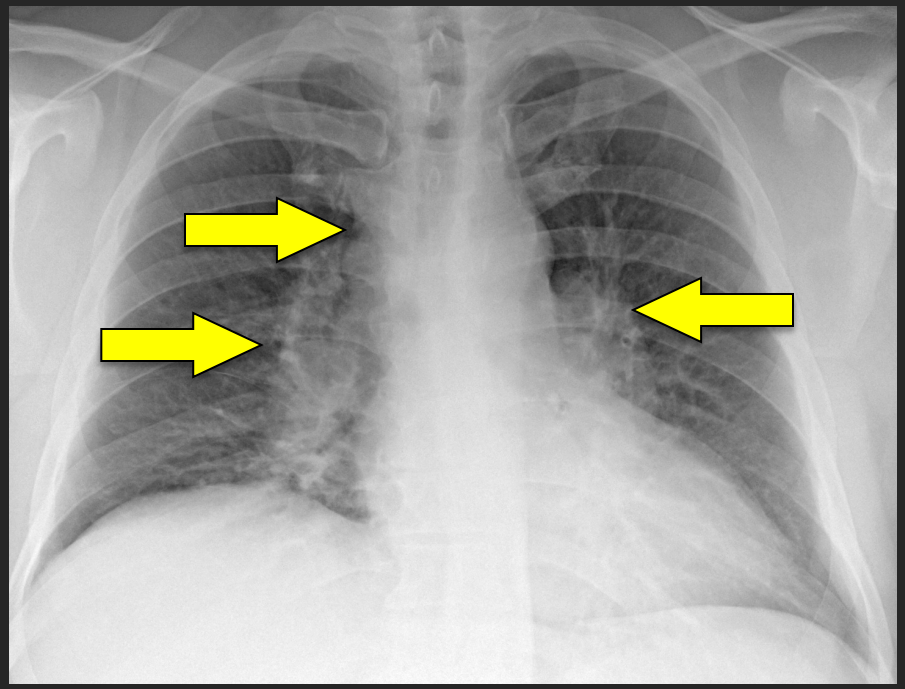
Lymphadenopathy

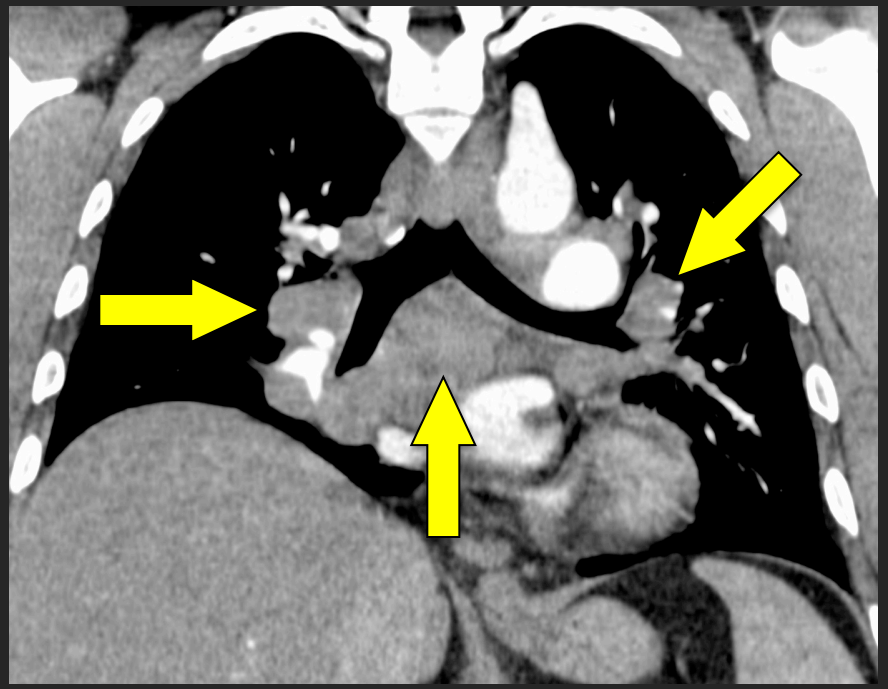


Lymphadenopathy

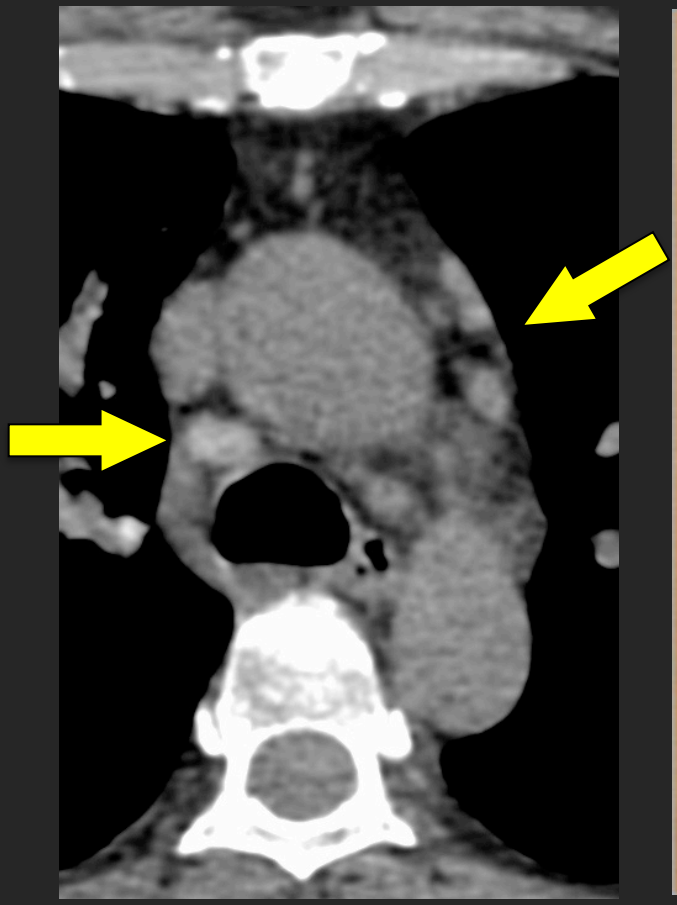


Lymphadenopathy



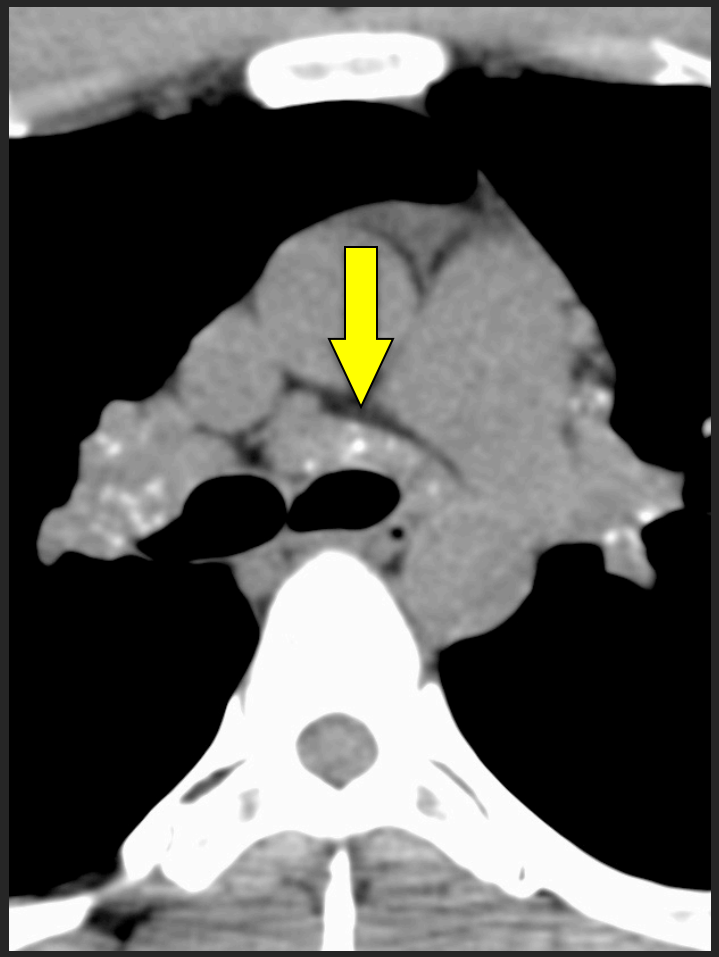


Lymphadenopathy



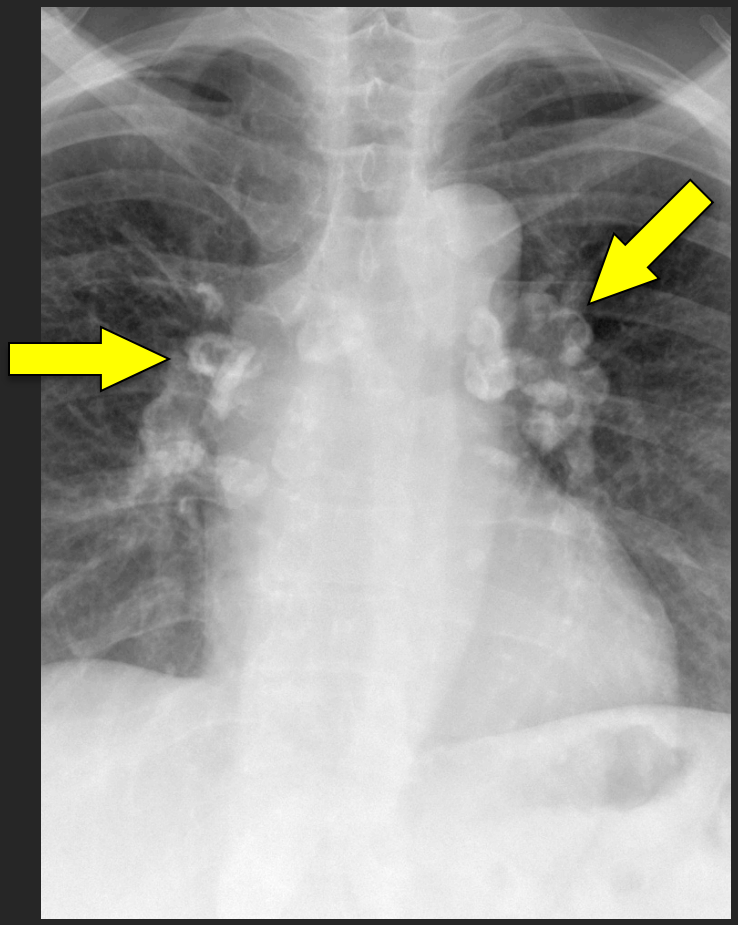
“Icing sugar” lymph nodes

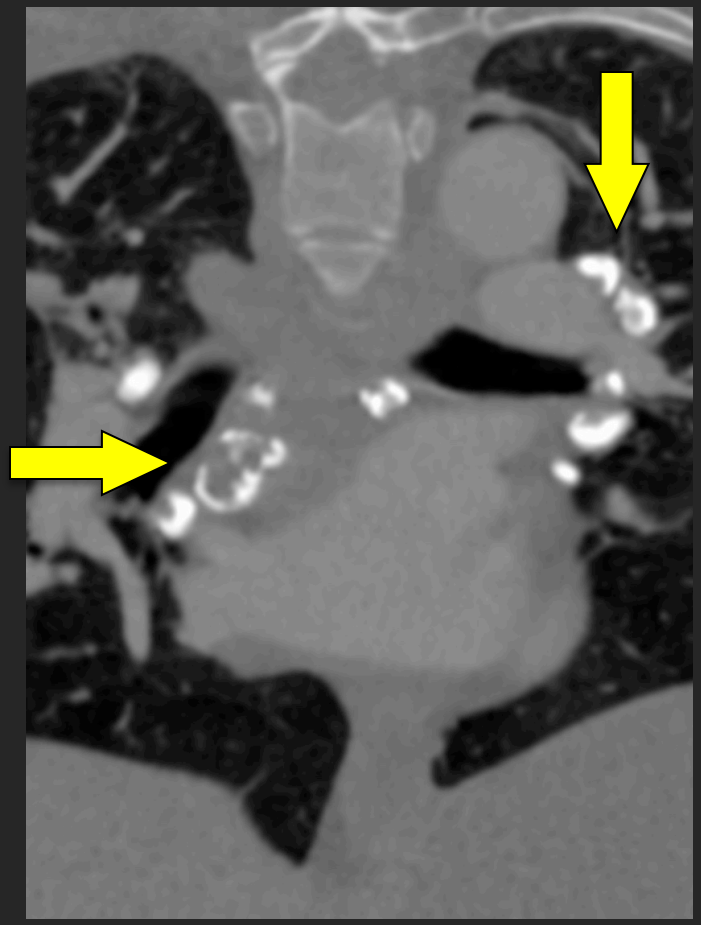
Lymphadenopathy



"Speckled" lymph nodes

Lymphadenopathy



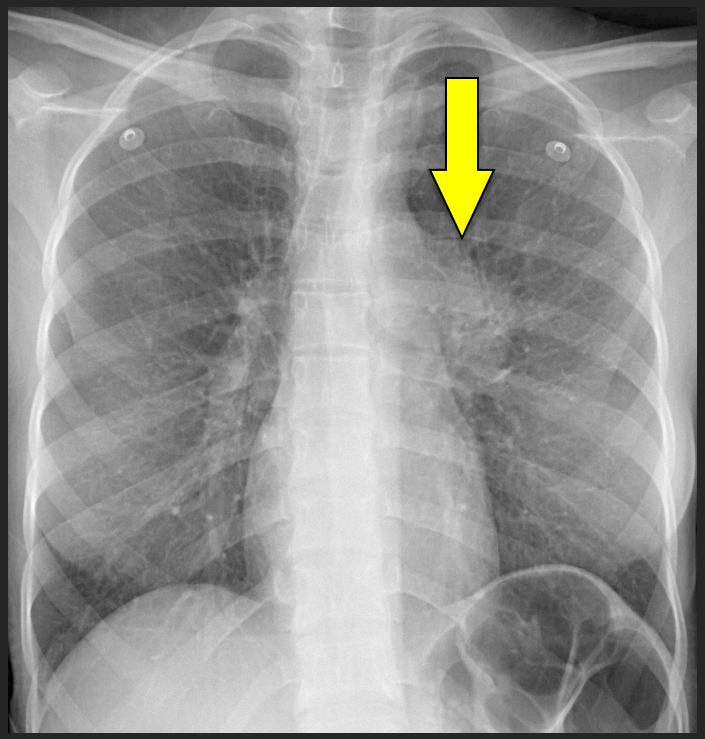


“Egg shell” calcification

Lymphadenopathy

Differential Diagnosis	Imaging Clues	Clinical Clues
Lymphoma	Often involves other lymph nodes	Fever, weight loss, night sweats
Pneumoconiosis (silica, coal, beryllium)	Background of small nodules	Occupational history Most patients asymptomatic
Tuberculosis	Often asymmetric Consolidation Cavities Clusters of small nodules	Fever, weight loss, night sweats Hemoptysis Exposures
Endemic fungal infection (histoplasmosis, coccidioidomycosis)	Usually unilateral Dominant lung nodule or consolidation	Travel history Exposures Few or no symptoms
Metastases	Asymmetric Other tumor sites	Lung Genitourinary tract Melanoma

Lymphadenopathy



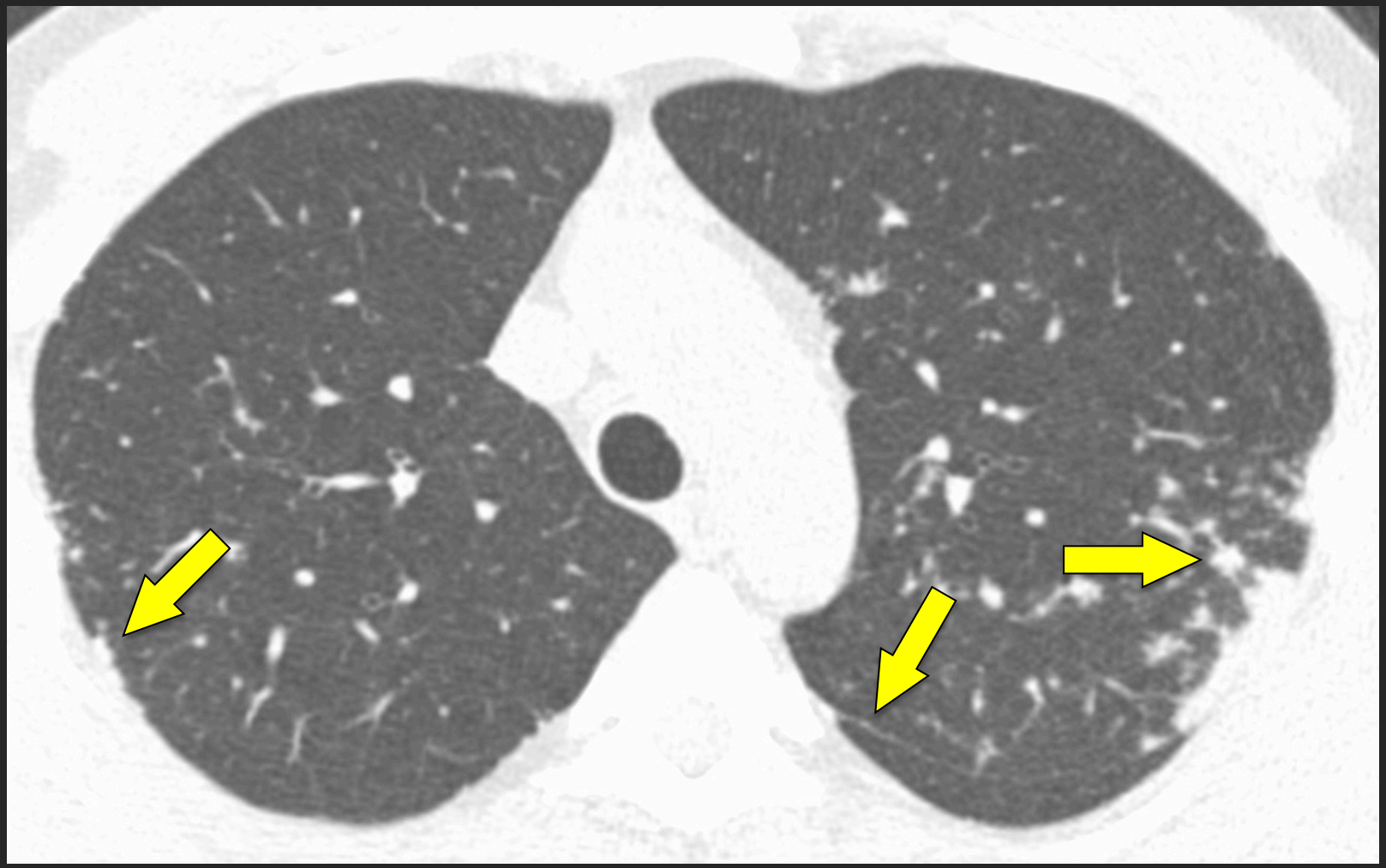
TB
Courtesy of Howard Mann, M.D.
(Salt Lake City, UT)

Chronic lymphocytic leukemia

Small Nodules

- Perilymphatic distribution
  - Pleural surfaces
  - Along bronchovascular bundles
  - Along pulmonary veins
  - Clustering of nodules
- Mid and upper zone predominant

Small Nodules



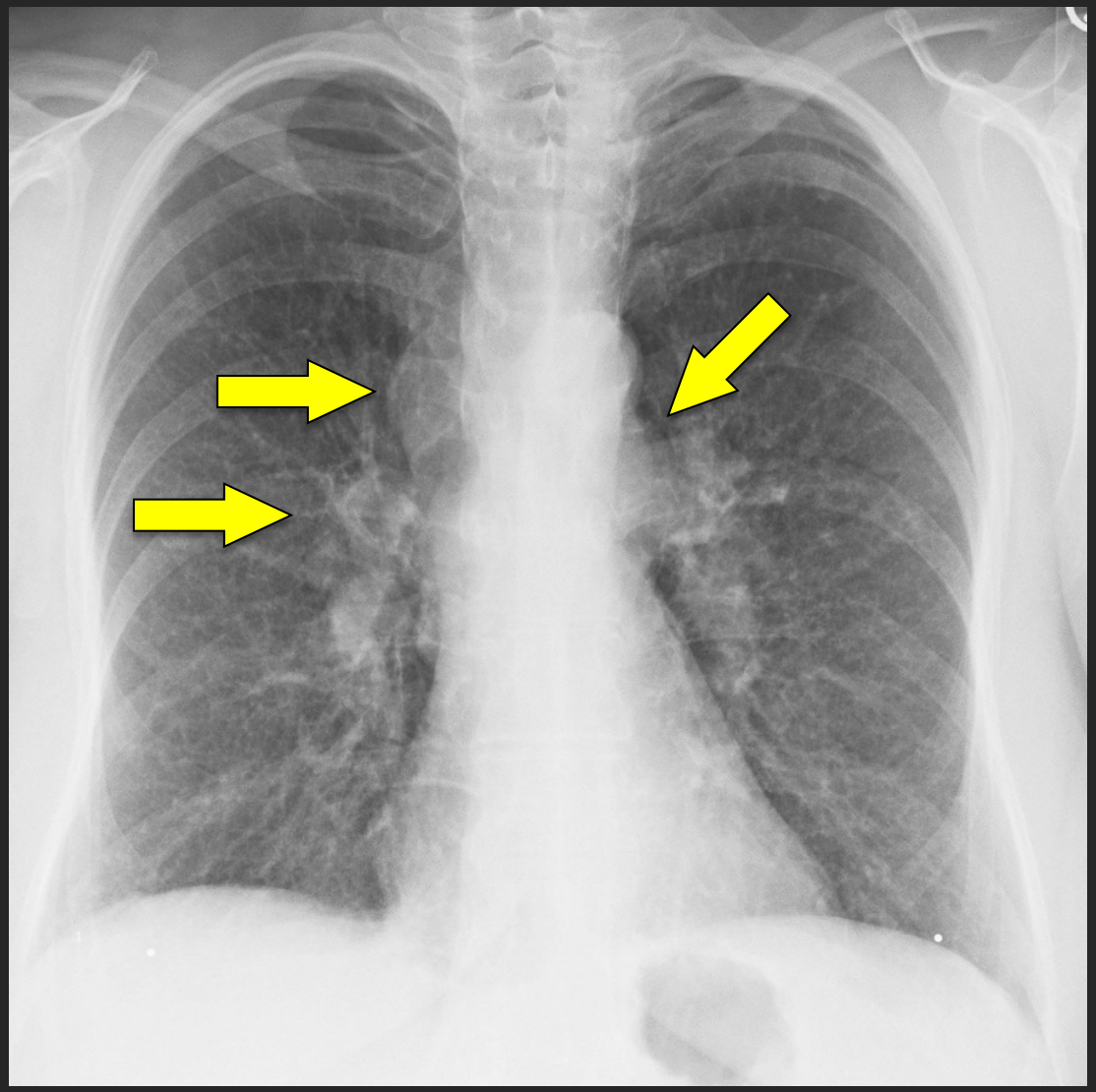
Perilymphatic distribution

Small Nodules

Small Nodules

Perilymphatic distribution

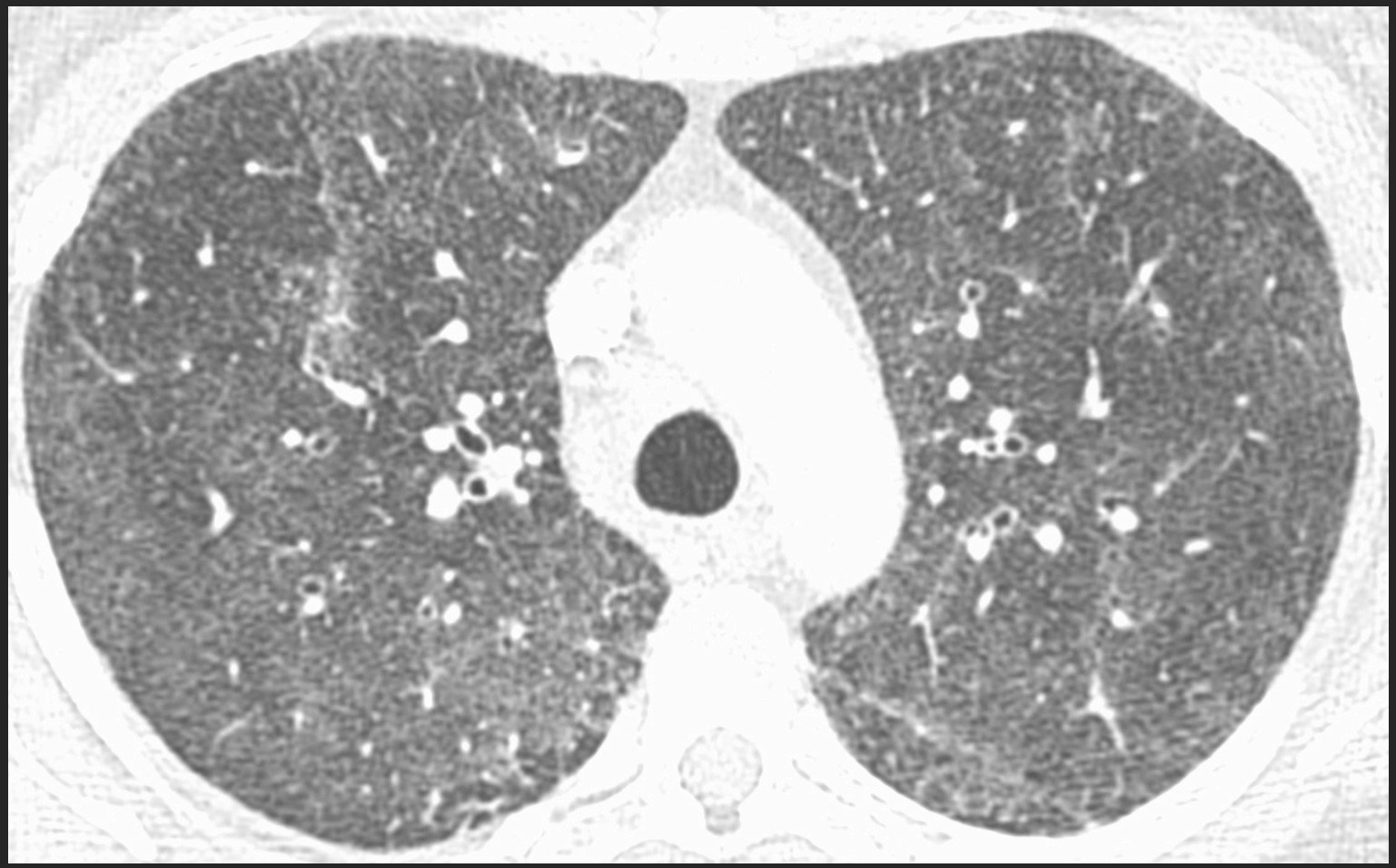
Small Nodules



Small Nodules

Perilymphatic distribution

Small Nodules

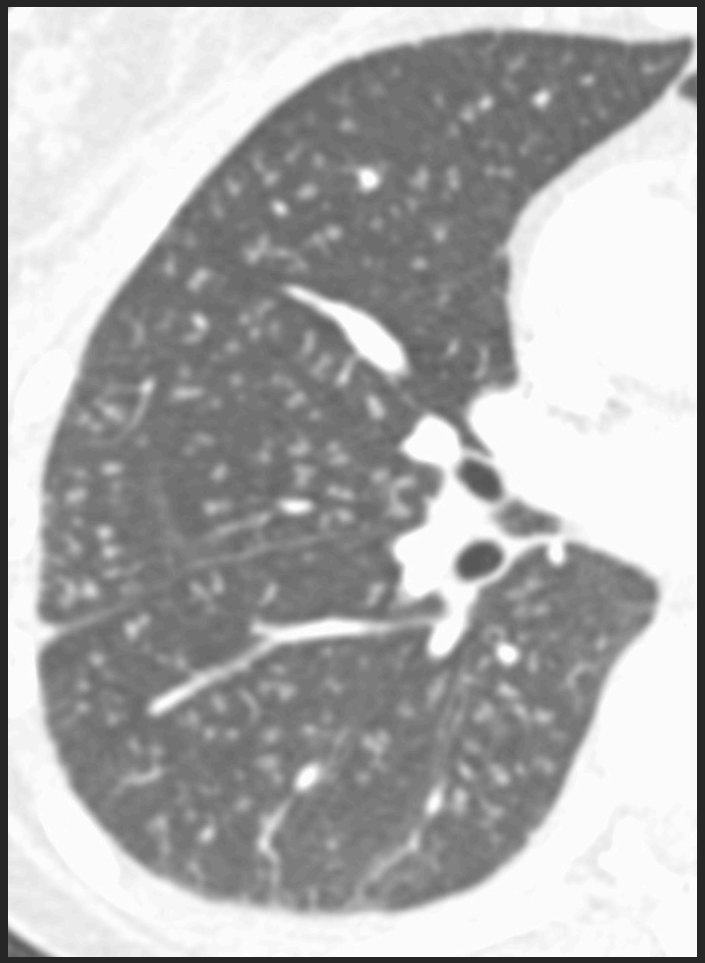


Miliary Pattern

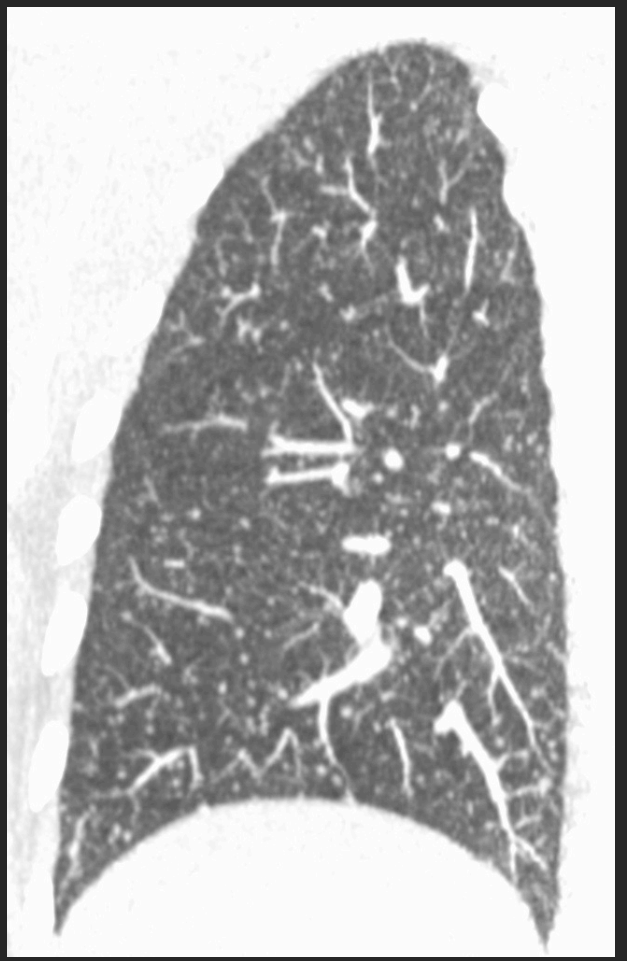
Small Nodules

Differential Diagnosis	Imaging Clues	Clinical Clues
Pneumoconiosis (silica, coal, beryllium)	Background of small nodules	Occupational history Most patients asymptomatic
Tuberculosis	Random distribution Basal predominant	Fever, weight loss, night sweats Immunocompromised
Endemic fungal infection	Random distribution Nodules typically larger	Travel history
Infectious bronchiolitis	Centrilobular Tree-in-bud	Wheezing, cough, fever
Metastases	Random distribution Nodule size more heterogeneous Basal predominant	Weight loss

Small Nodules



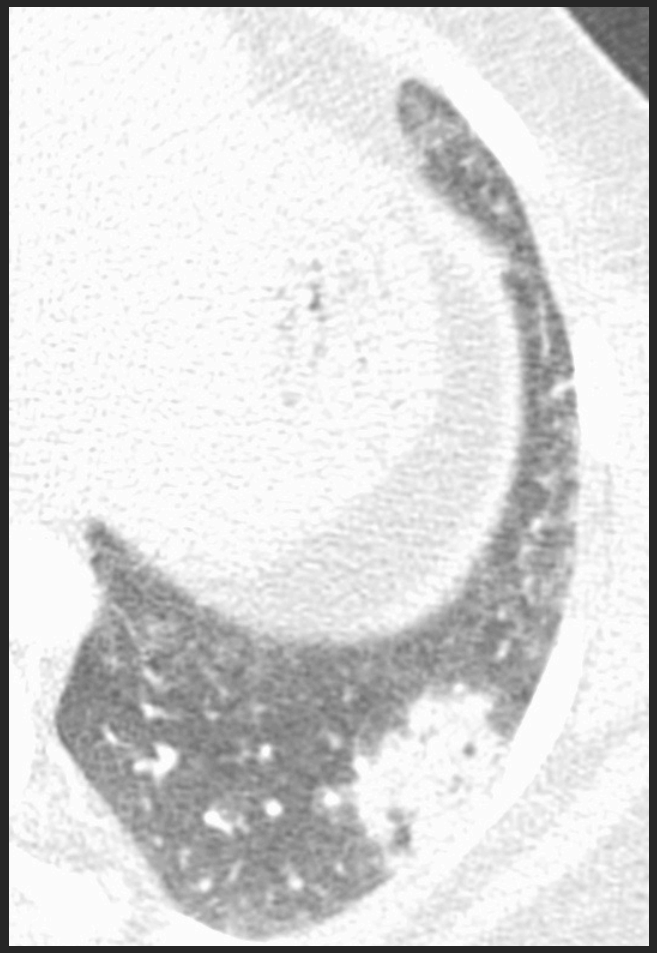
Centrilobular distribution



Random distribution

Large Nodules

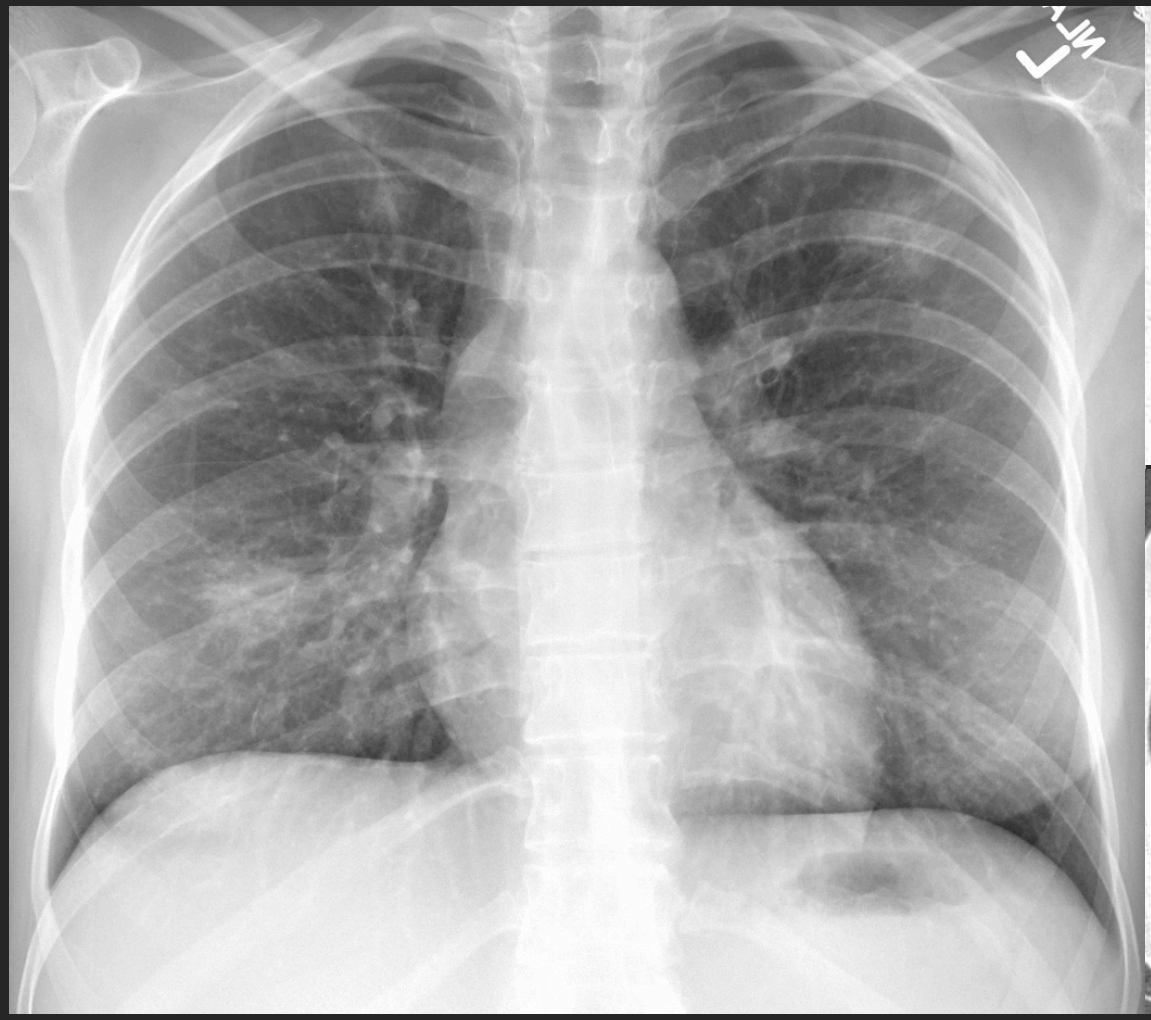
- Occur in <5%
- Consolidative
  - Irregular margins
  - Air bronchograms
- Galaxy Sign
  - Cluster of small nodules
  - Varying density
- Fairy Ring Sign



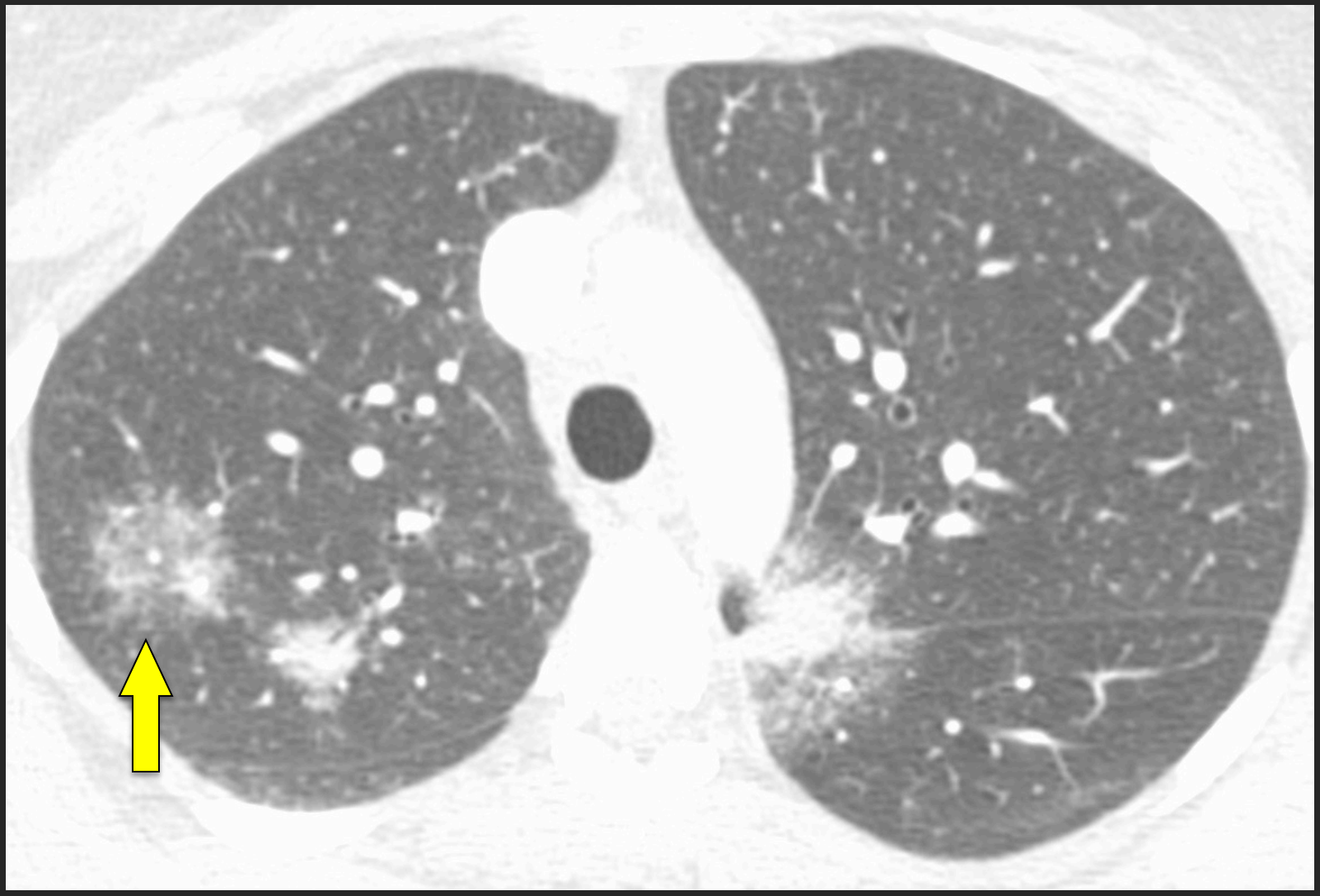
Masslike Consolidation

Previously referred to as “alveolar sarcoidosis”

Galaxy Sign



Galaxy Sign



Fairy Ring Sign

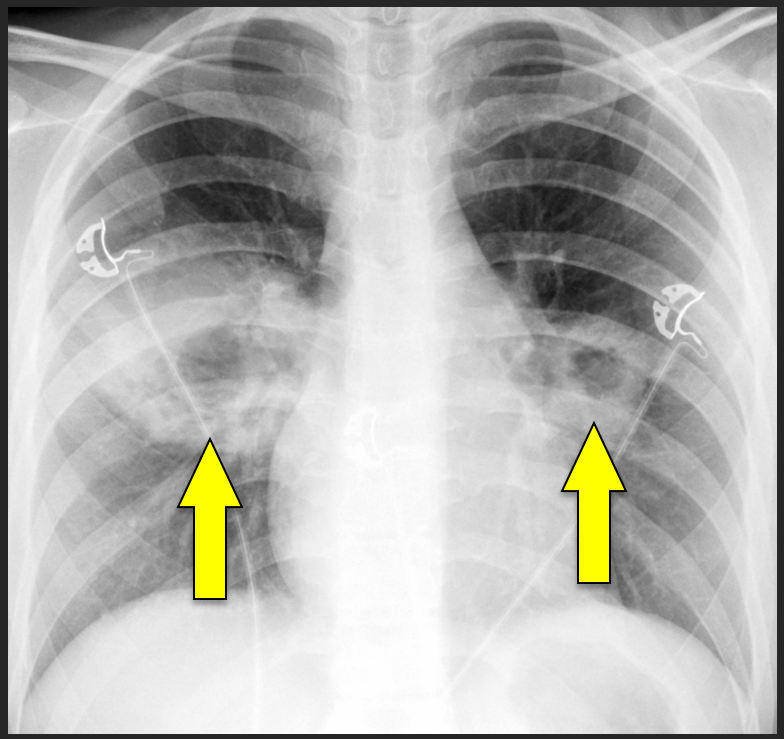
Courtesy of Travis Henry, M.D.
(Durham, NC)

Wikipedia.org

Large Nodules

Differential Diagnosis	Imaging Clues	Clinical Clues
Community acquired infectious pneumonia	Pleural effusion	Fever, cough, leukocytosis
Organizing pneumonia	Atoll signs usually without micronodules Perilobular thickening	Drug exposure Collagen-vascular disease Infection
Lymphoma	Ground-glass margins Small nodules often absent	Asymptomatic or “B” symptoms
Granulomatosis with polyangiitis	Cavitation Surrounding lung opacity	Sinonasal or kidney involvement, c-ANCA
Metastases	Air bronchograms usually absent Basal predominant	Weight loss Other sites of disease

Large Nodules



Granulomatosis with polyangiitis

MALT lymphoma

Organizing Pneumonia

Unusual Manifestations

- Asymmetry
- “Ground-glass opacity”
- Unusual lymphadenopathy
- Necrotizing sarcoid granulomatosis

Asymmetry

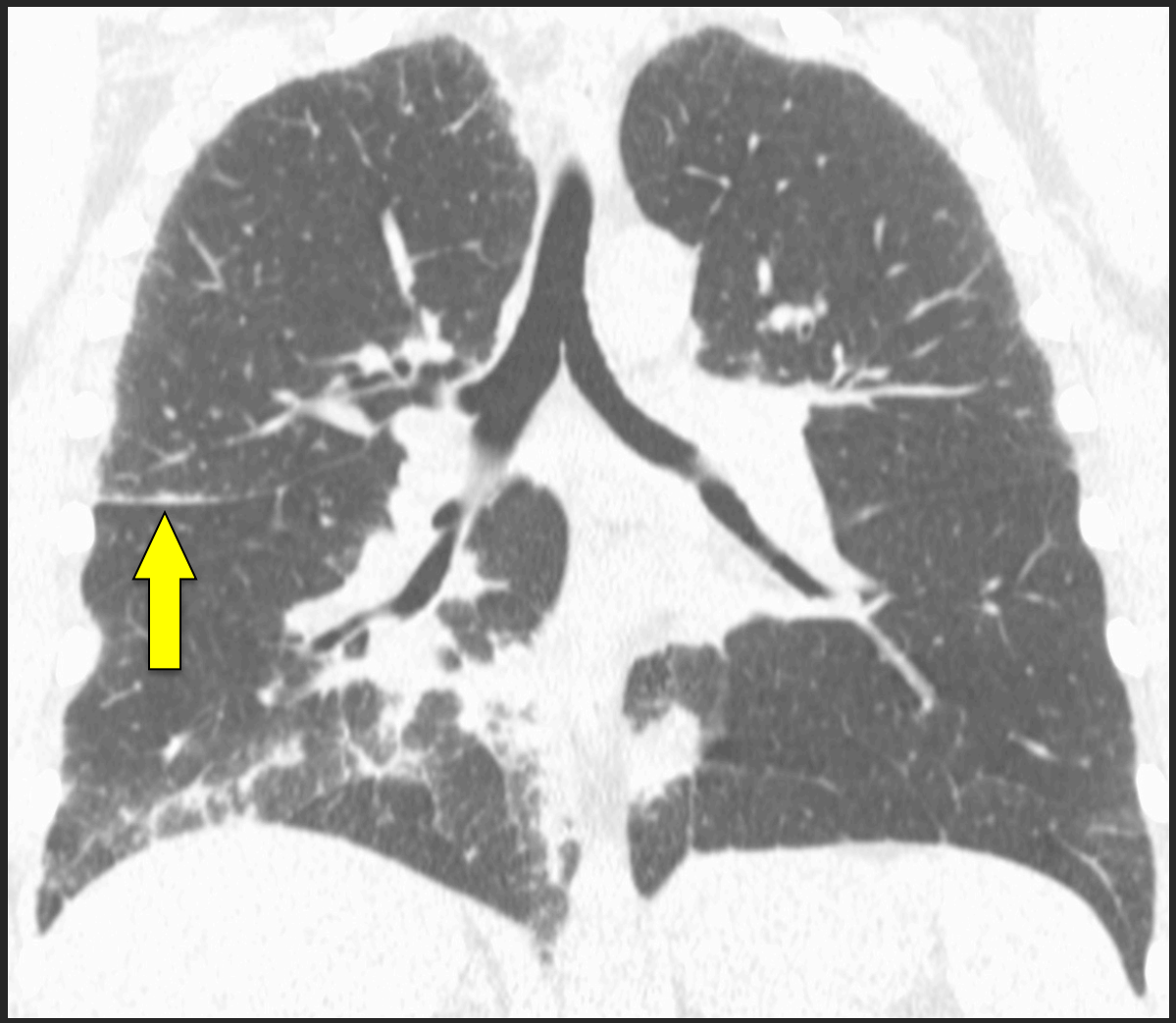
Asymmetric perilymphatic nodules

Asymmetry

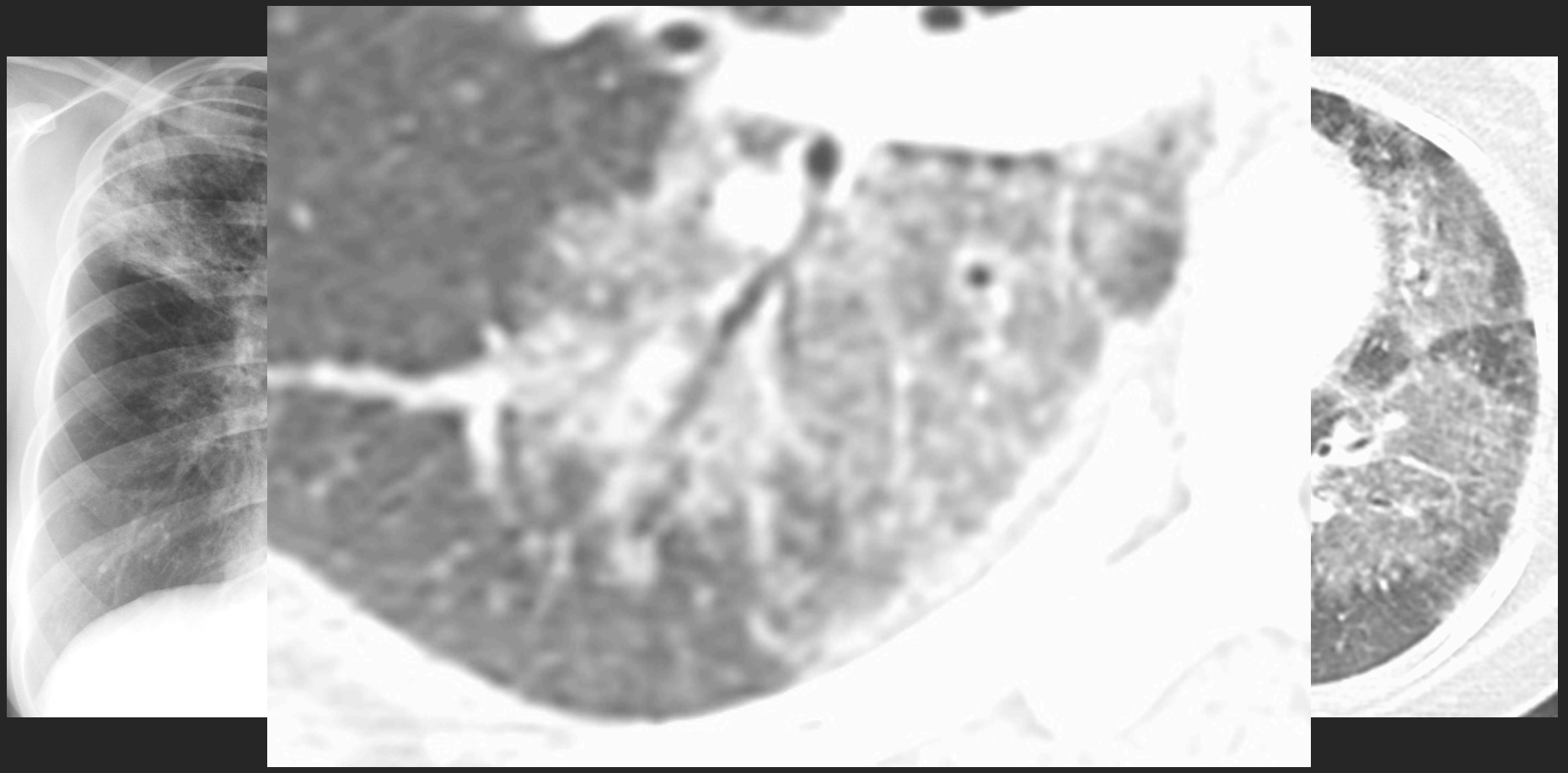
Asymmetry

Nodular septal thickening mimicking lymphangitic carcinomatosis

Asymmetry



“Ground-Glass Opacity”

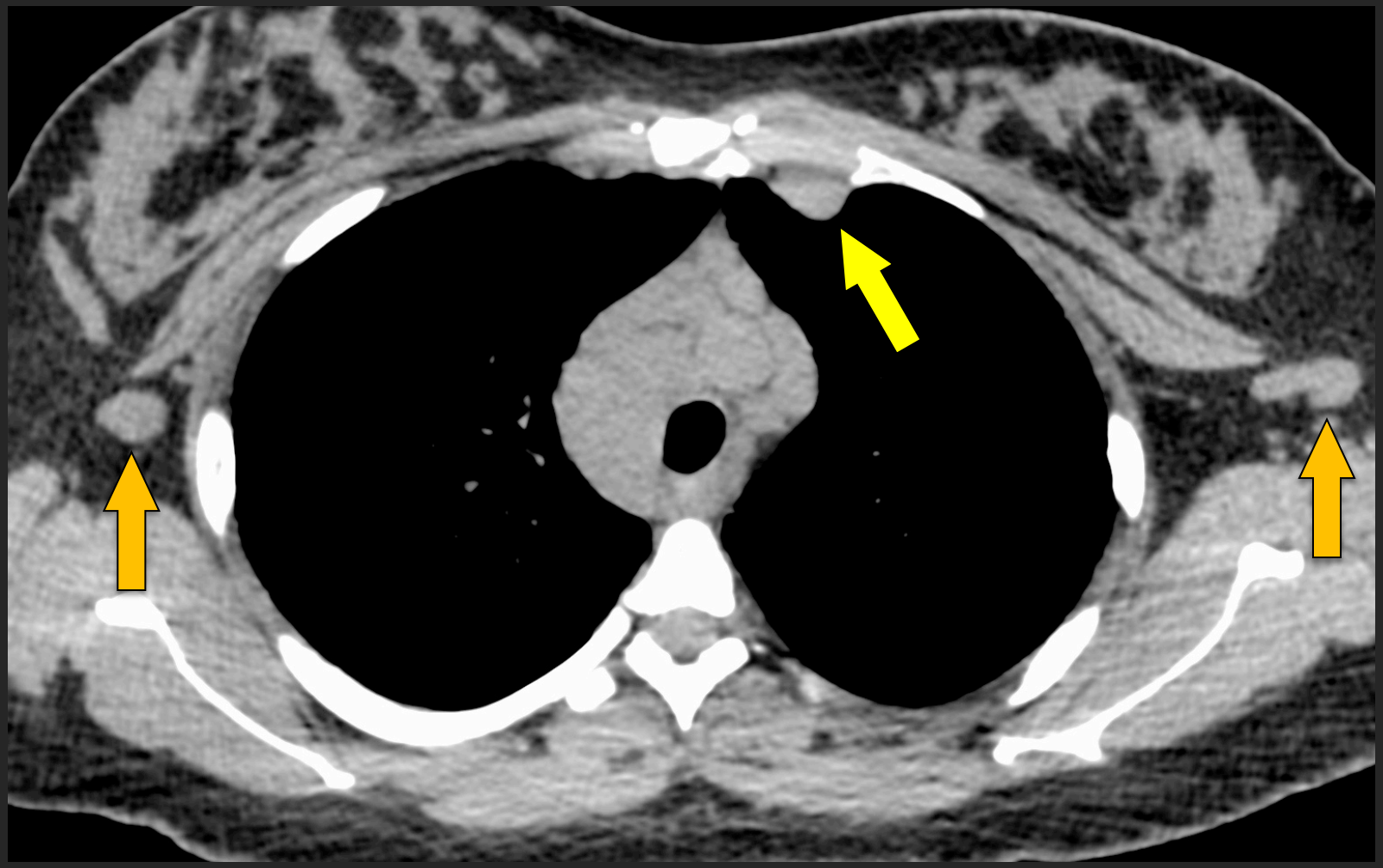


Subtle nodular texture

“Ground-Glass Opacity”

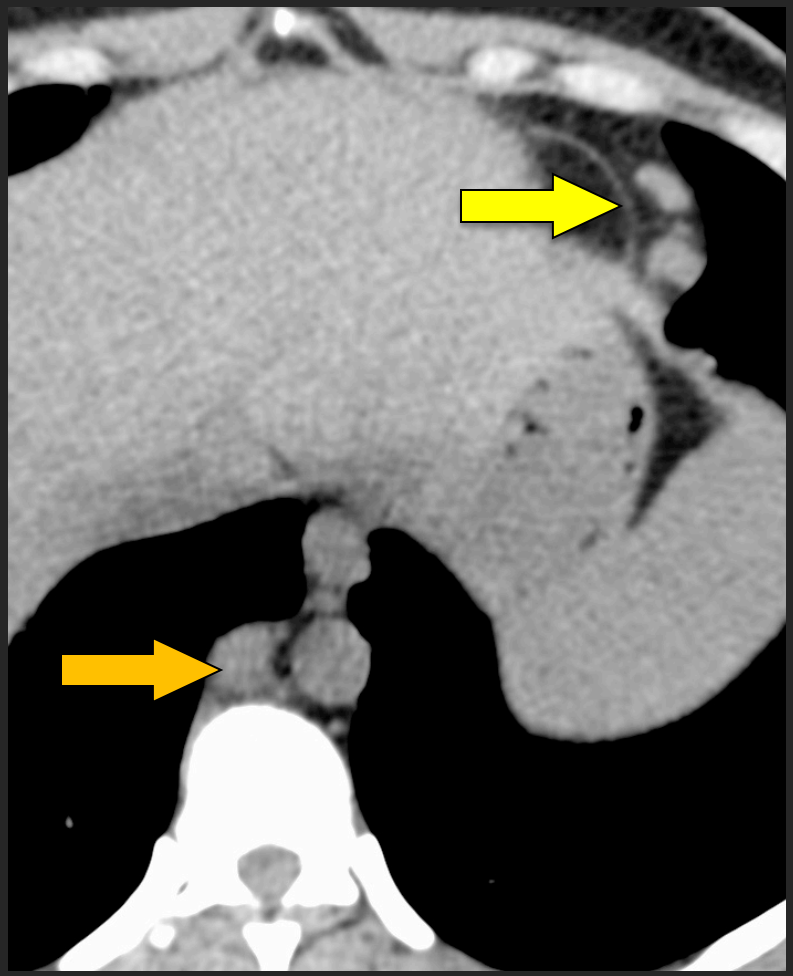
Subtle nodular texture

Unusual Lymphadenopathy



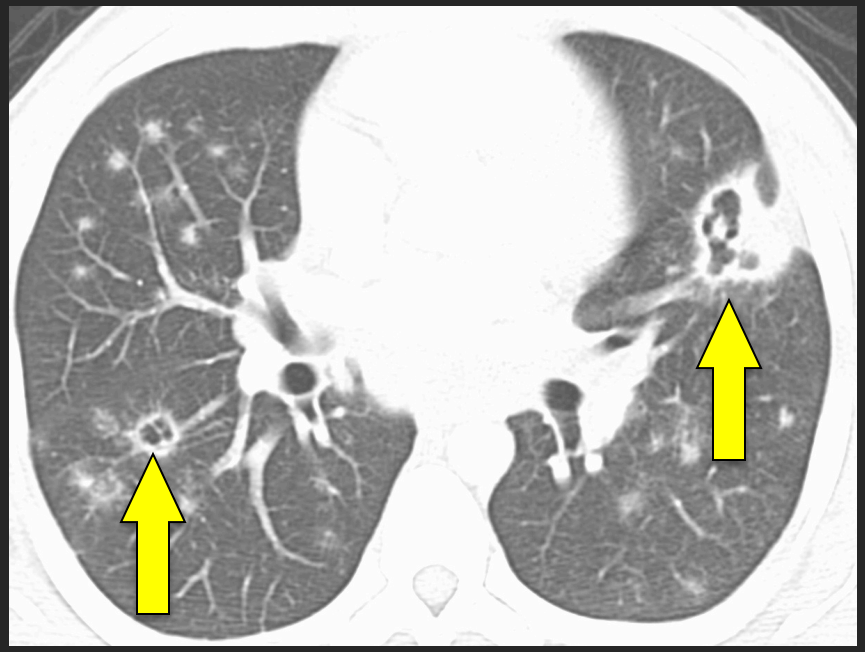
Axillary and internal mammary

Unusual Lymphadenopathy



Pericardiophrenic and lower mediastinal

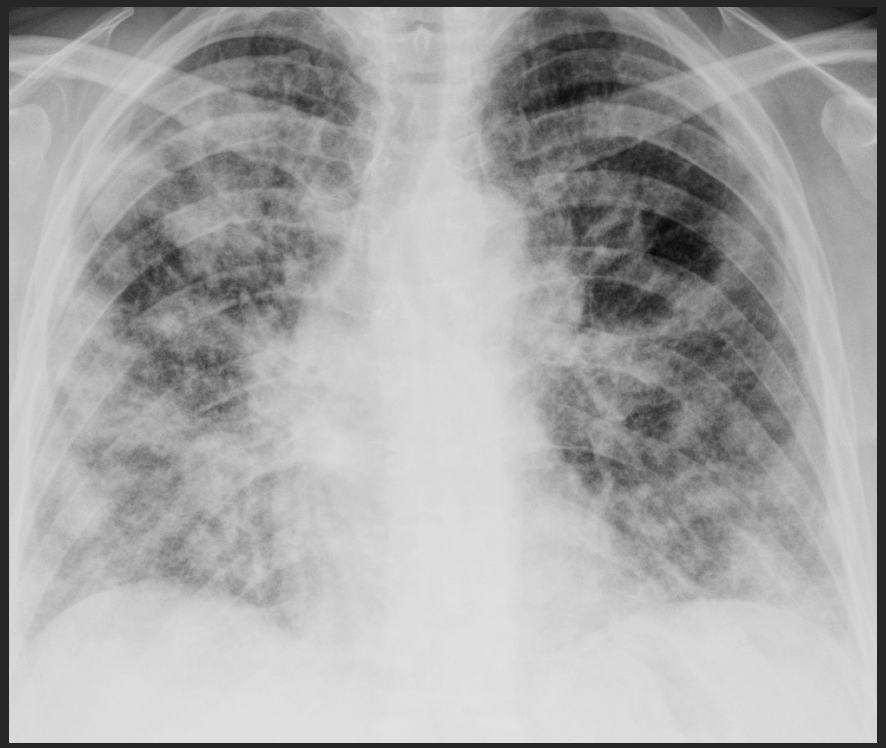
Necrotizing Sarcoid Granulomatosis

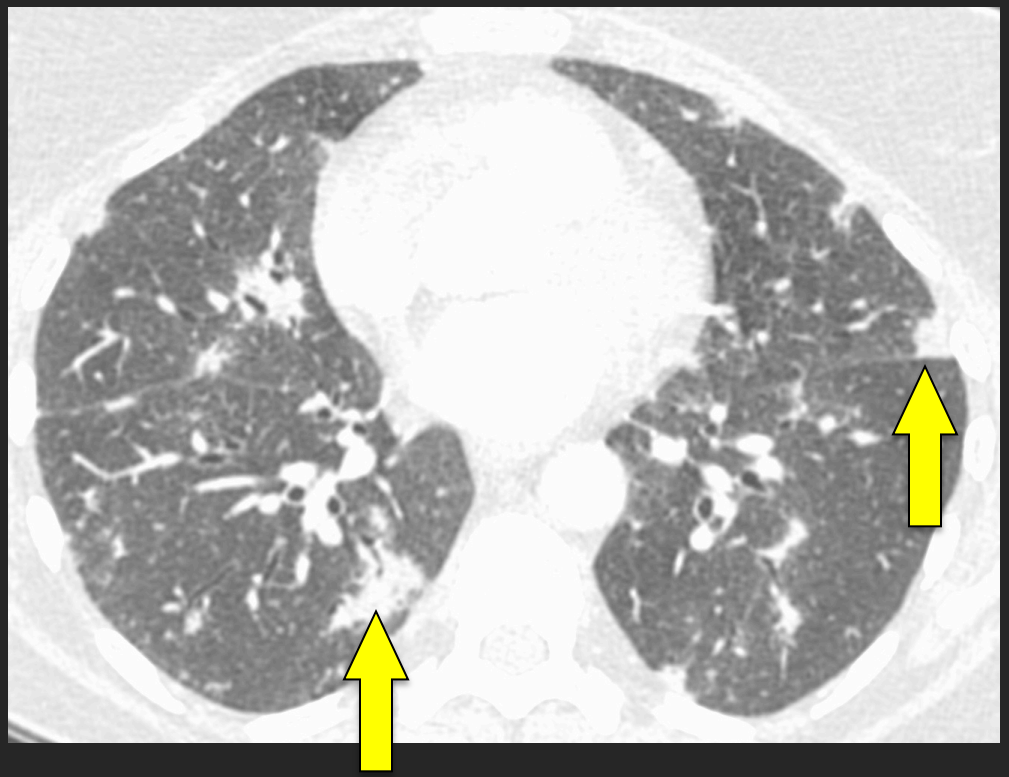


Cavities

CT halo sign

Necrotizing Sarcoid Granulomatosis





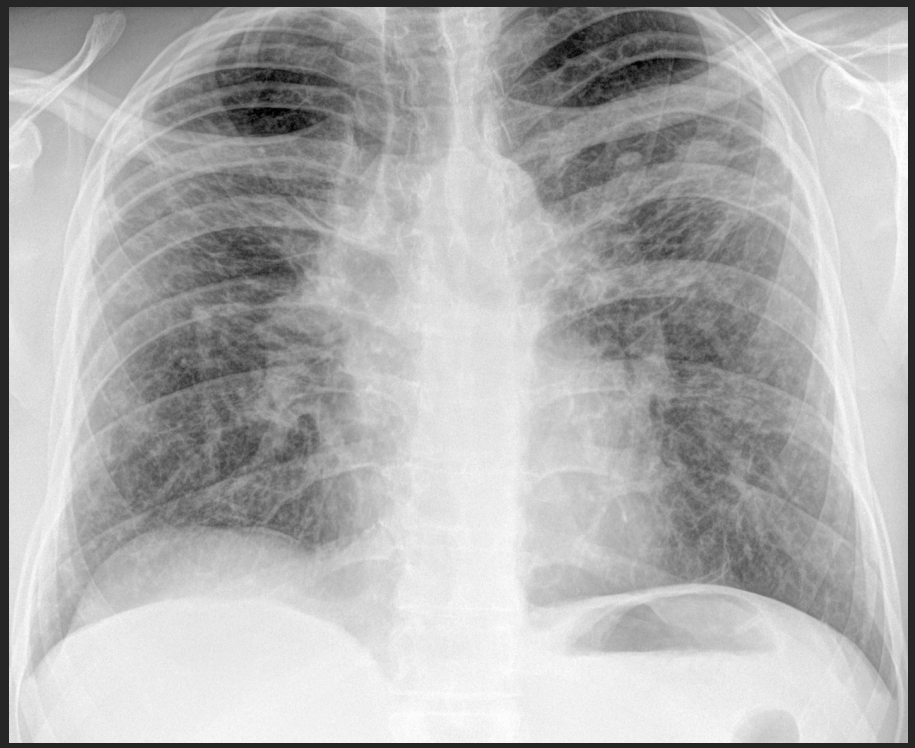
Organizing pneumonia like appearance

Complications

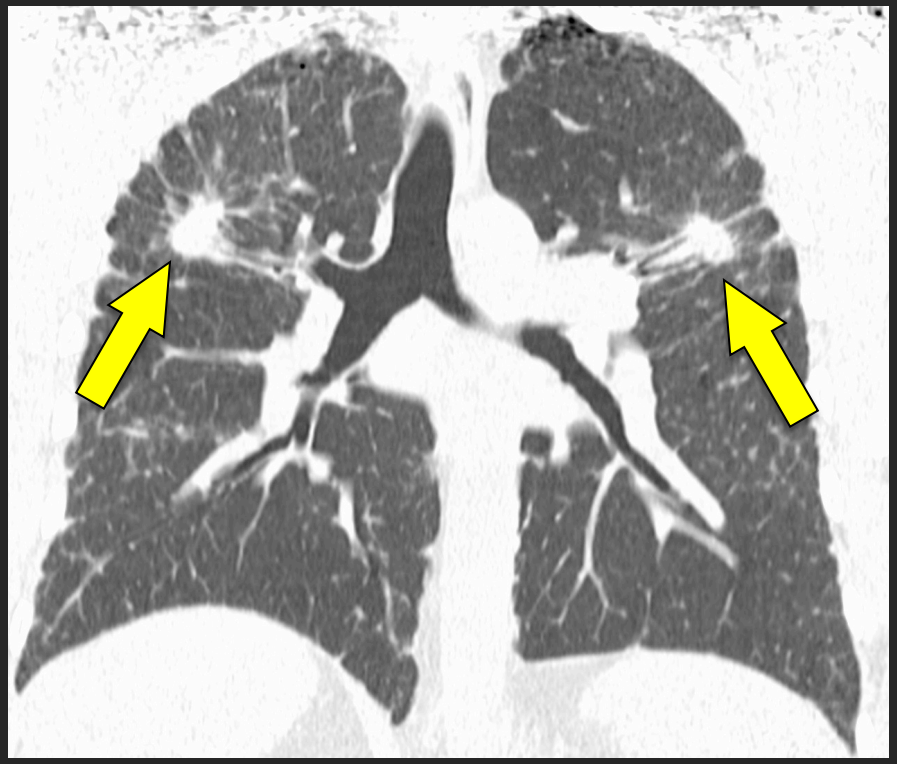
- Lung fibrosis
- Cavitation
- Aspergilloma
- Mediastinal fibrosis
- Pulmonary vein stenosis
- Pulmonary hypertension
- Airway stenosis

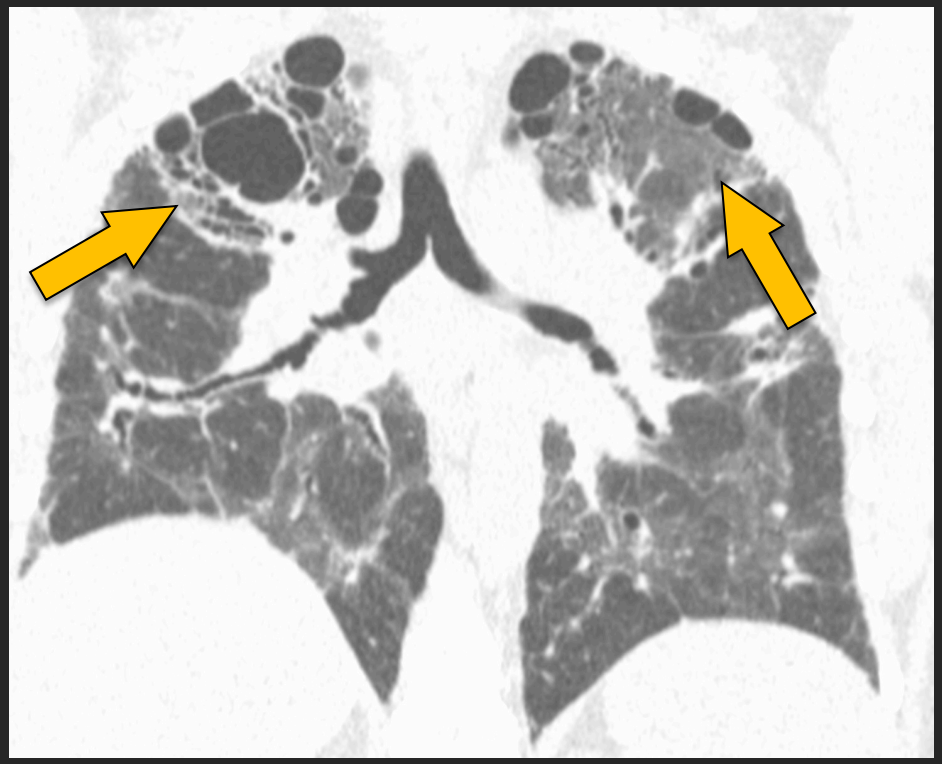
Lung Fibrosis

- Affects up to 20% of patients
- More common in Blacks
- Upper lung and peribronchial predominant



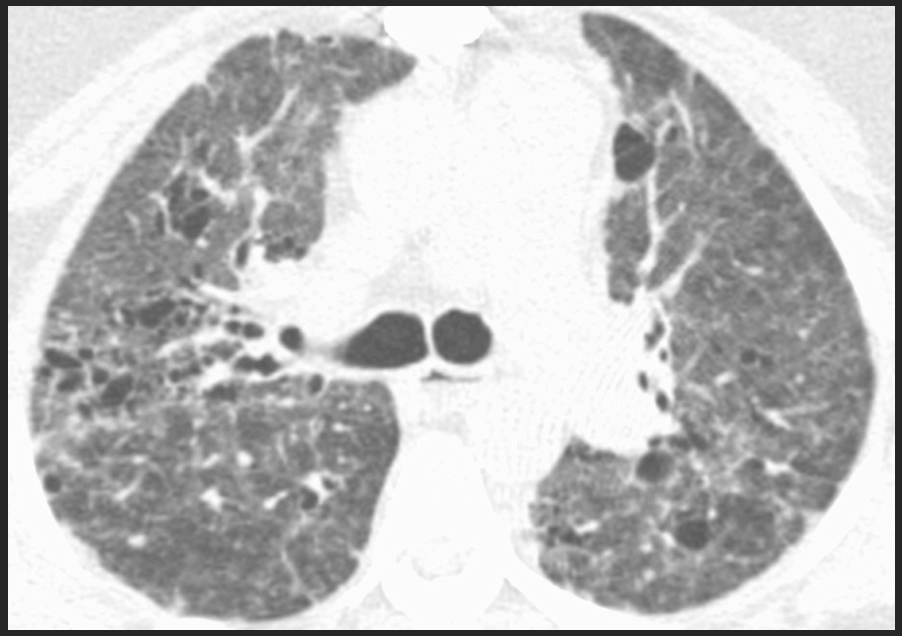
Lung Fibrosis





Lung Fibrosis

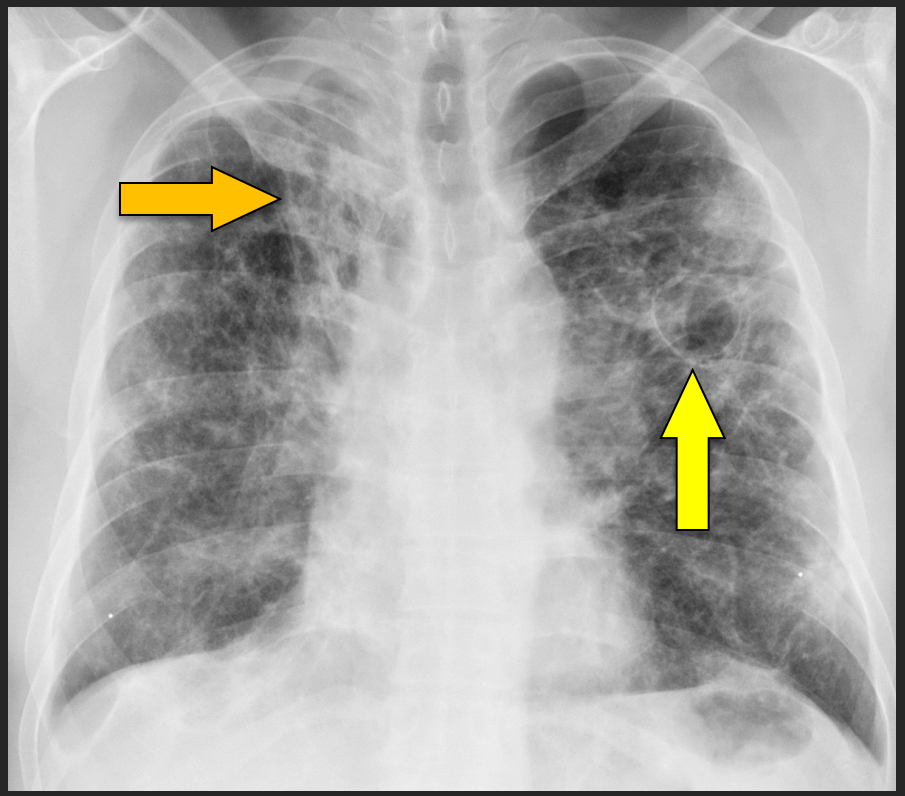
Lung Fibrosis

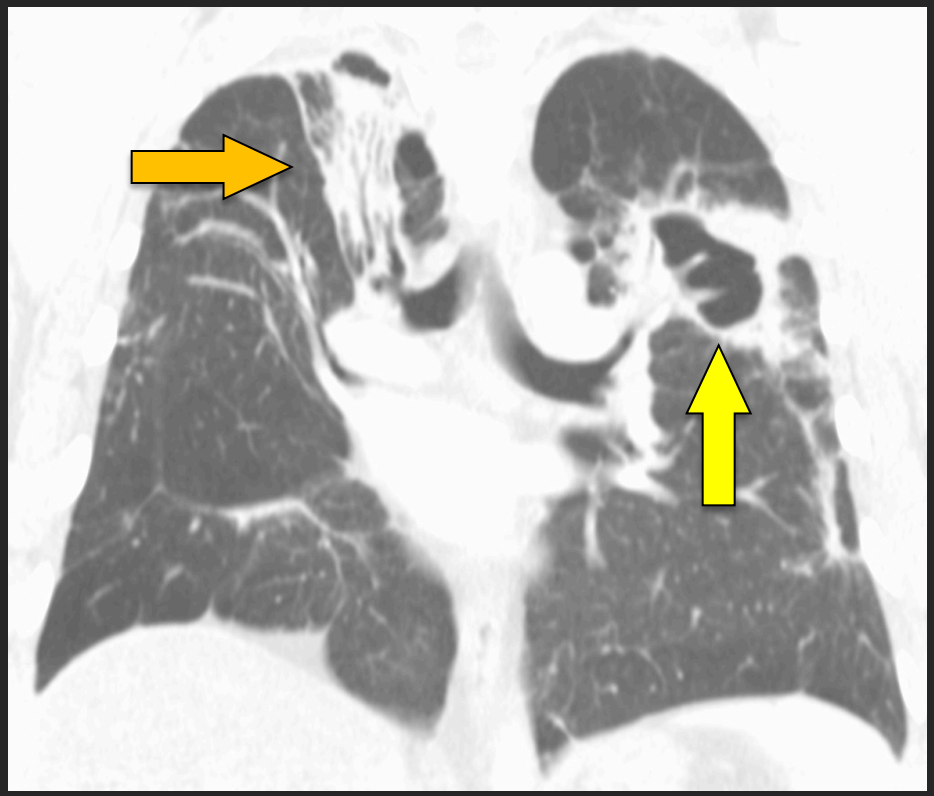


Cavitation

- Affects up to 2% of patients
- Typically occurs with lung fibrosis
- Unilateral > bilateral
- Patients may present with hemoptysis

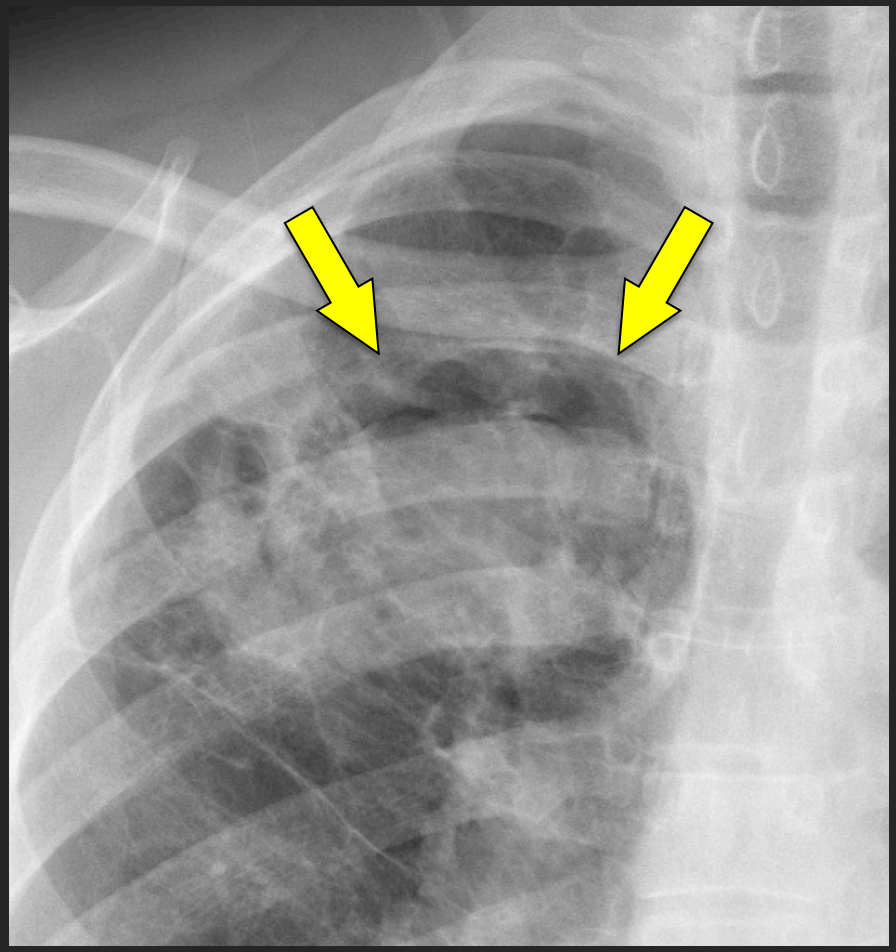
Cavitation





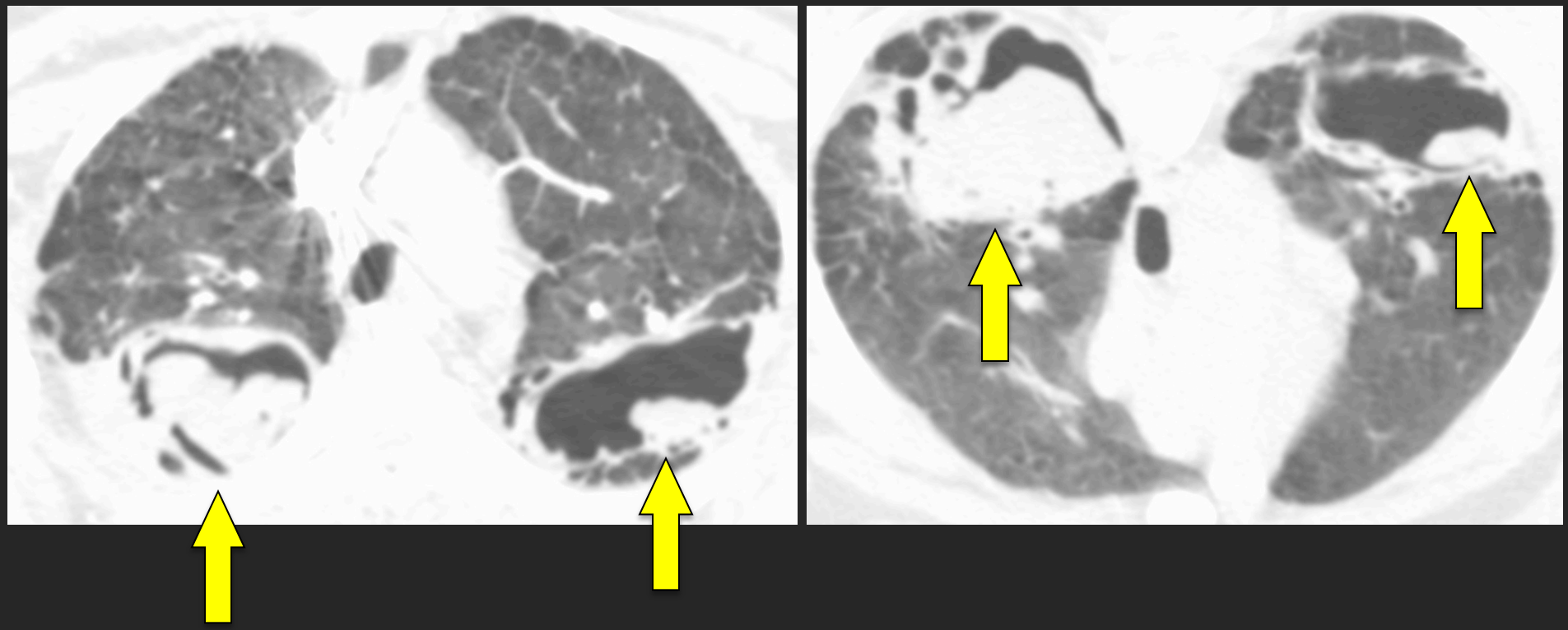
Aspergilloma

- Accumulation of fungal hyphae, mucus, and cellular debris in pre-existing cavity
- Heterogeneous mass layering in cavity with surrounding crescent of air (Monod sign)



Monod sign

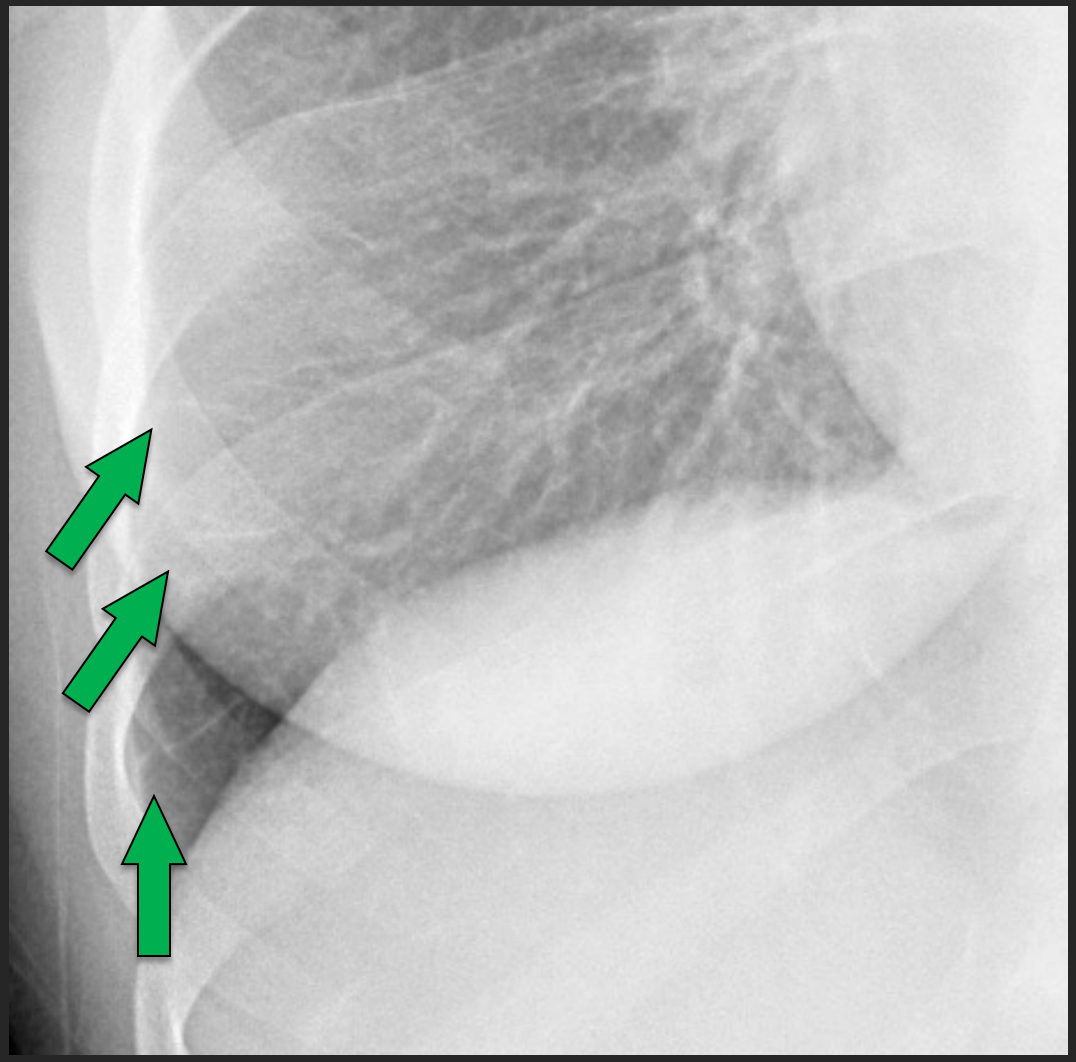
Aspergilloma

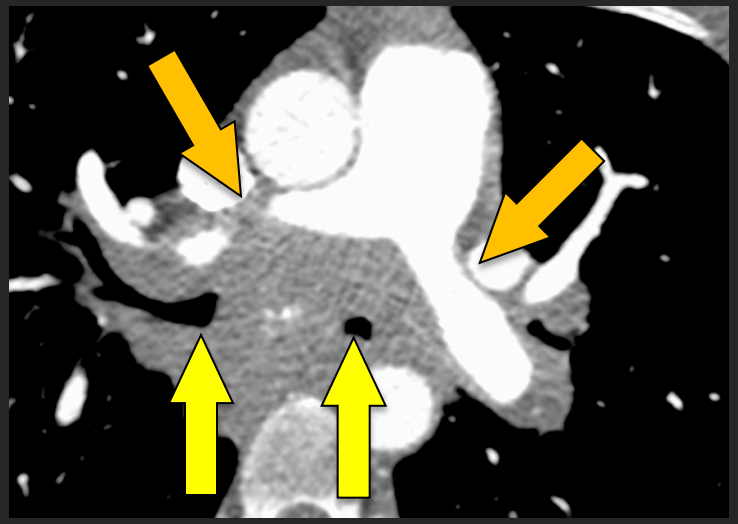


Mediastinal Fibrosis

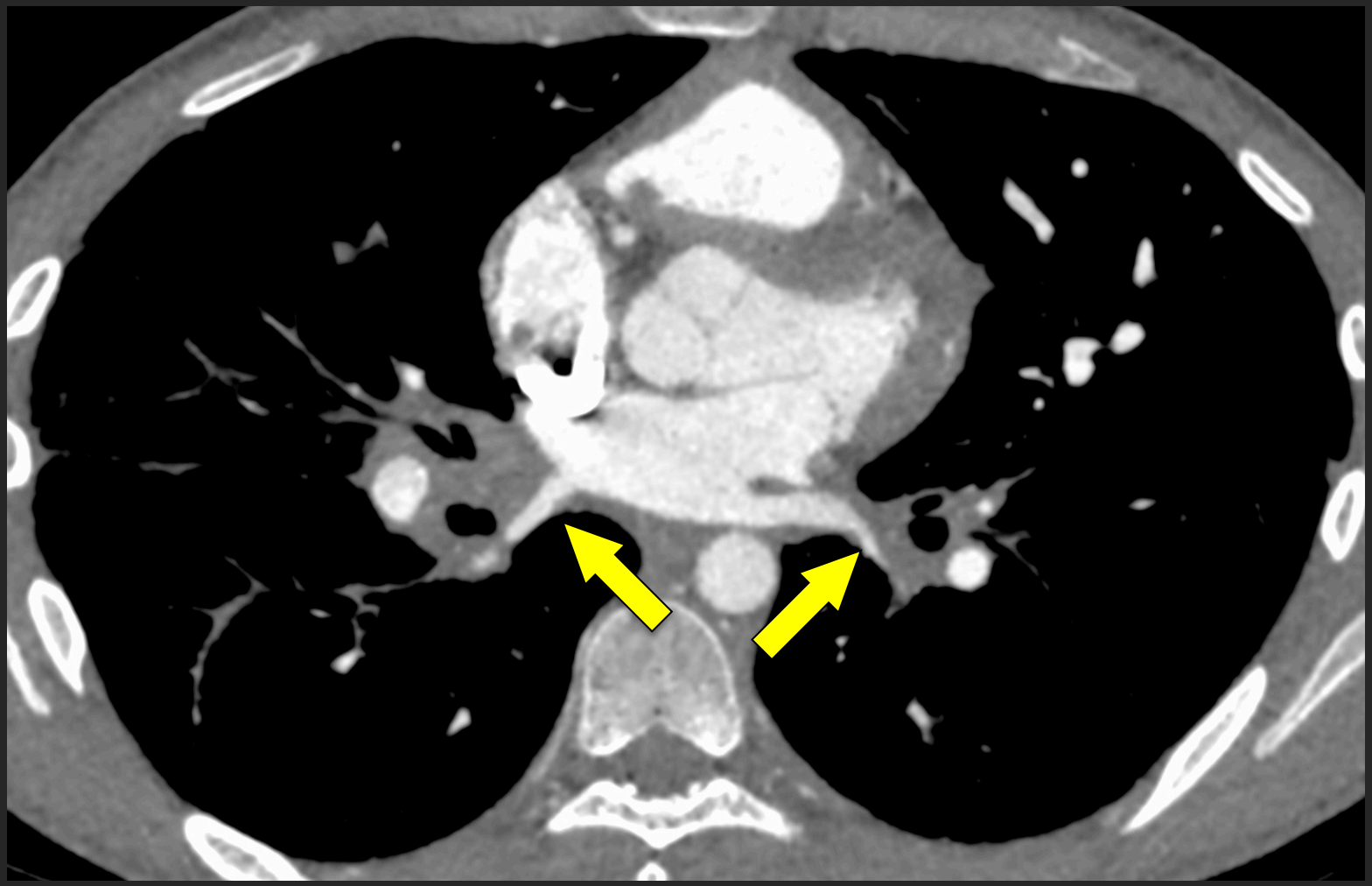
- Rare complication of sarcoidosis
- Large confluent fibrotic mass
- Mass effect on airways and vasculature

Mediastinal Fibrosis



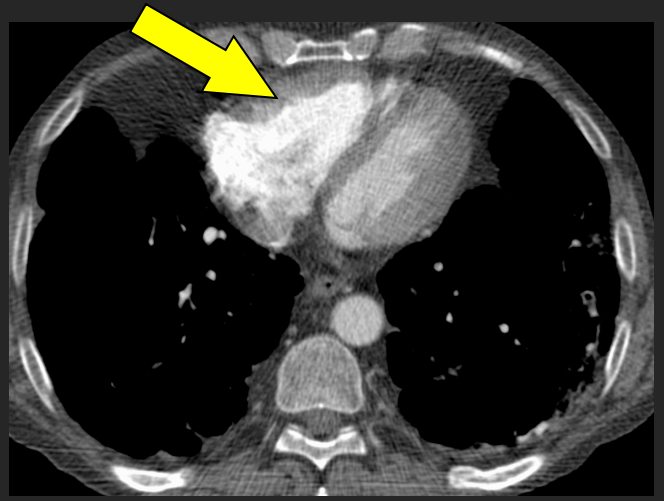


Pulmonary Vein Stenosis

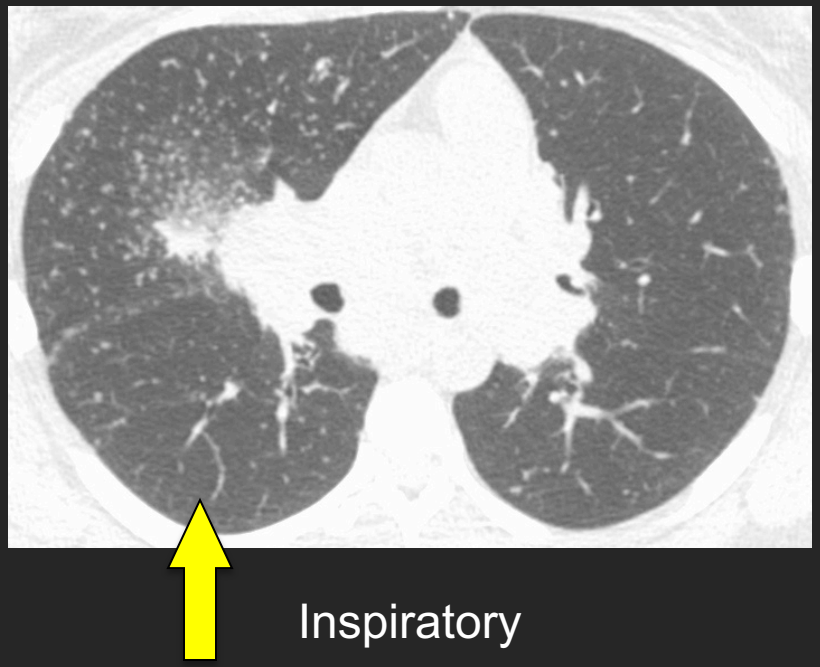


Courtesy of J. David Godwin, M.D. (Seattle, WA)

Pulmonary Hypertension



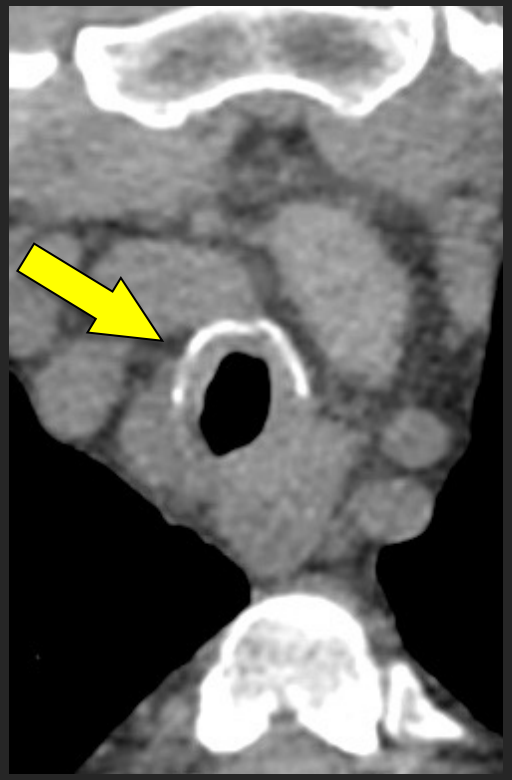
Airway Involvement



Inspiratory

Expiratory

Airway Involvement



Summary

- Sarcoidosis is a common diffuse lung disease with protean manifestations
- CT can be useful in distinguishing features of sarcoidosis from those of other diffuse lung diseases
- Sarcoidosis is ultimately a diagnosis of exclusion

Thank You

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