

Introduction to Chest CT: Basics, Pointers, and Pitfalls

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Introduction to the Chest CT: Learning Objectives

- Overview of how CT scan process works
- Overview of Normal Anatomy
- Case examples of CT in Lung Disease with Radiologist Buzz Phrases demystified
- Will NOT give step-by-step how-to algorithm for CT reading - I am not a radiologist

What is a Chest CT?

- **Rotating multi-array x-ray generators and detectors with “slip-ring” contacts allowing continuous spiral or helical data acquisition**

- **Radiation Dose Variable:**

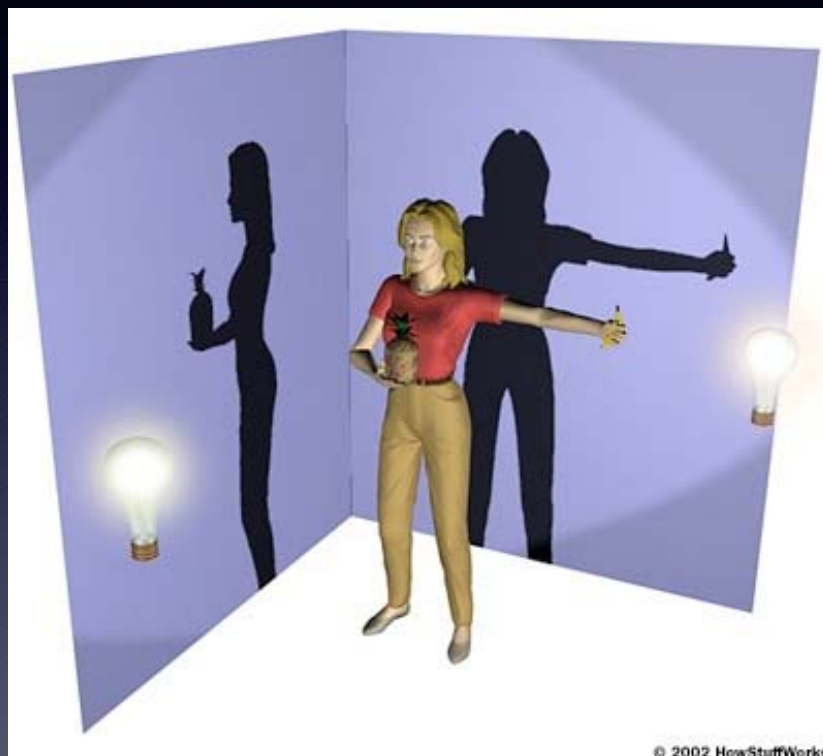
Computed Tomography Chest 7 mSv = 2 years ambient

Computed Tomography Chest Low Dose <1 mSv

Ultra Low Dose CT about = Radiography-Chest 0.1 mSv = 10 days

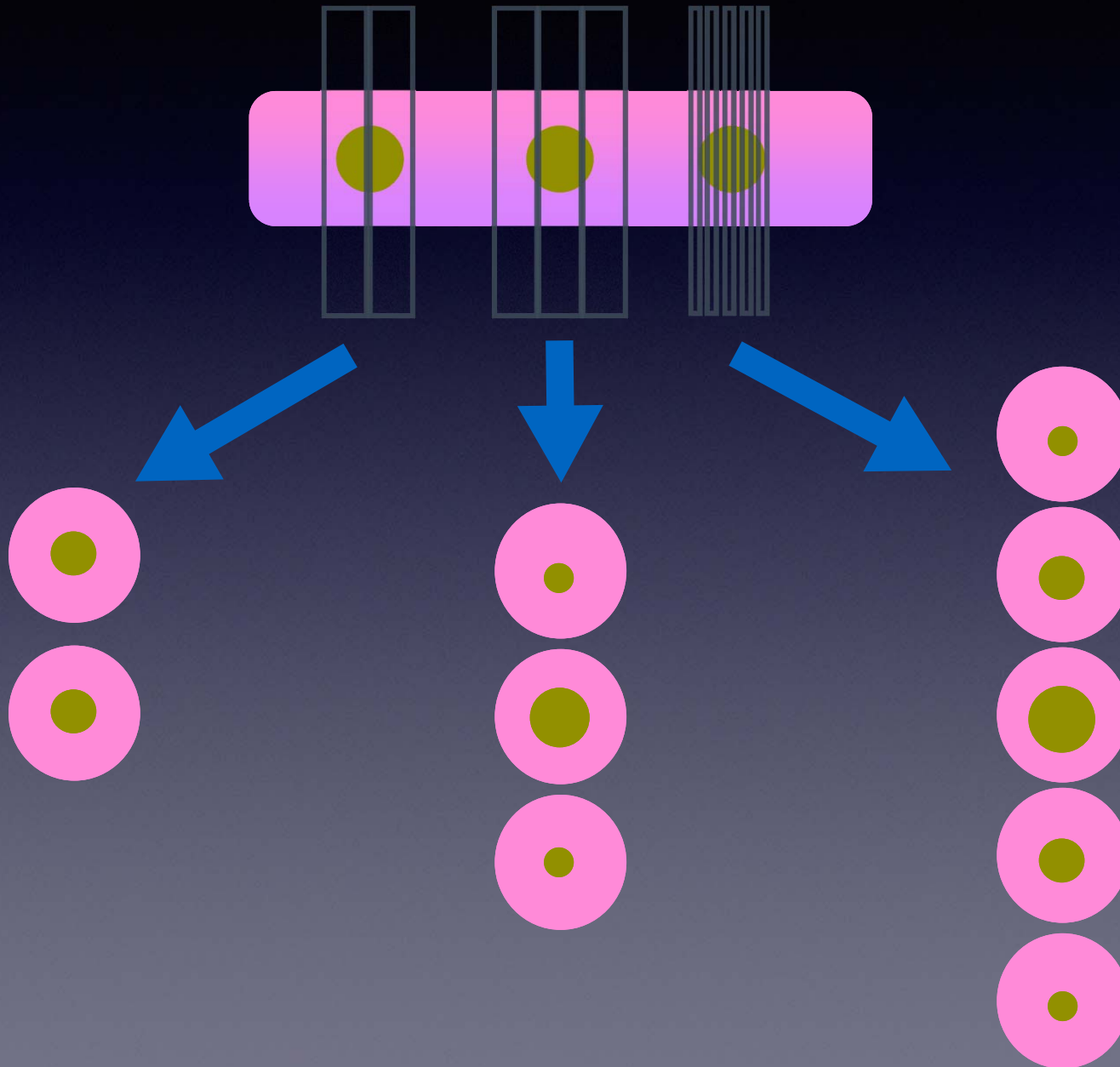
- **Pitch of the spiral determine slice thickness**
- **Computer algorithm rebuilds data in planar reconstructions**

What is a Chest CT?



Reconstitution of image projections from 360° viewing allows for “3D” reconstructions

Slice Thickness Matters



REDDY FOAR MAI CAT SKAN



Normal Chest CT - Mediastinal Windows

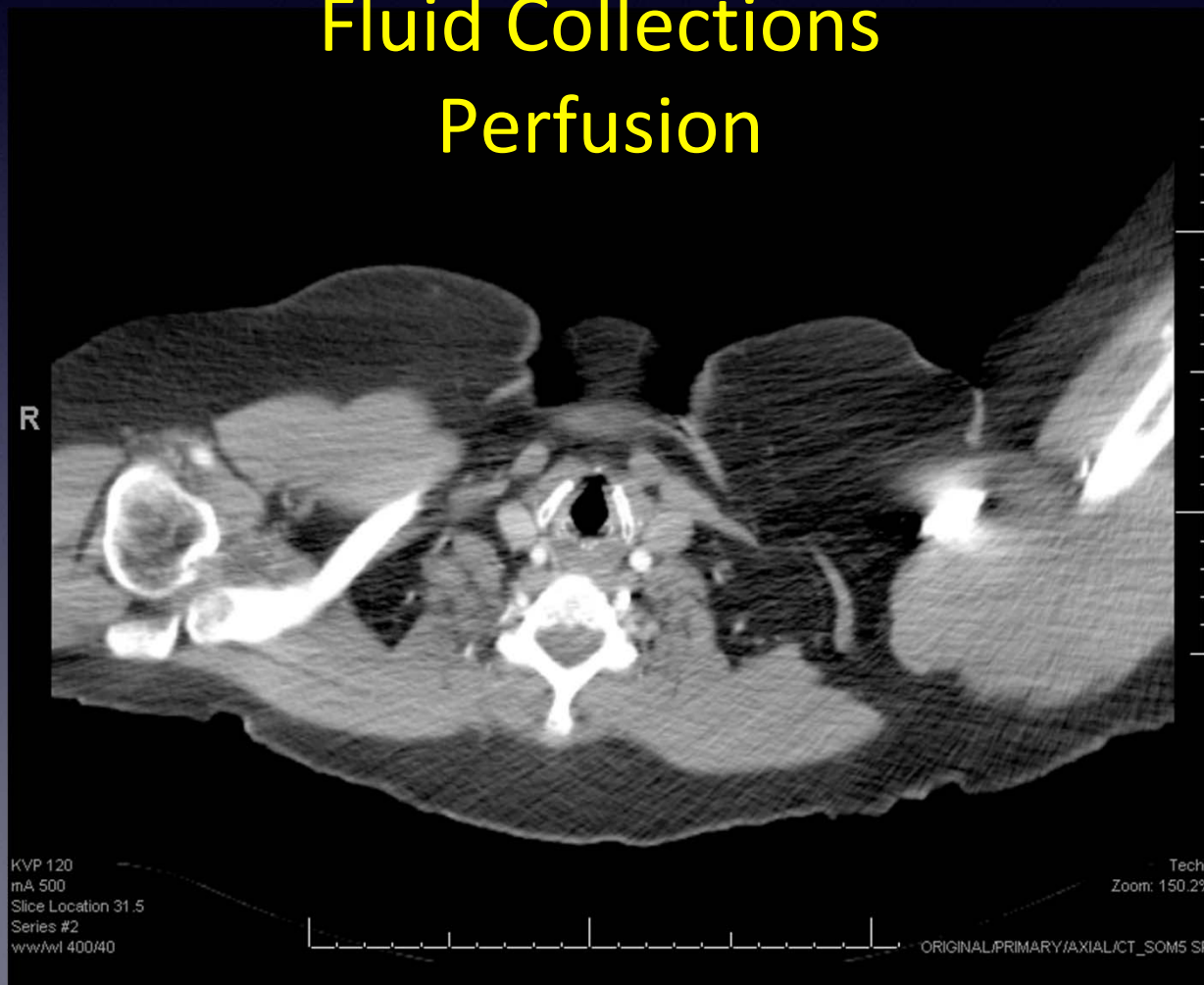
Vessels

Lymph Nodes

Calcification vs Soft Tissue

Fluid Collections

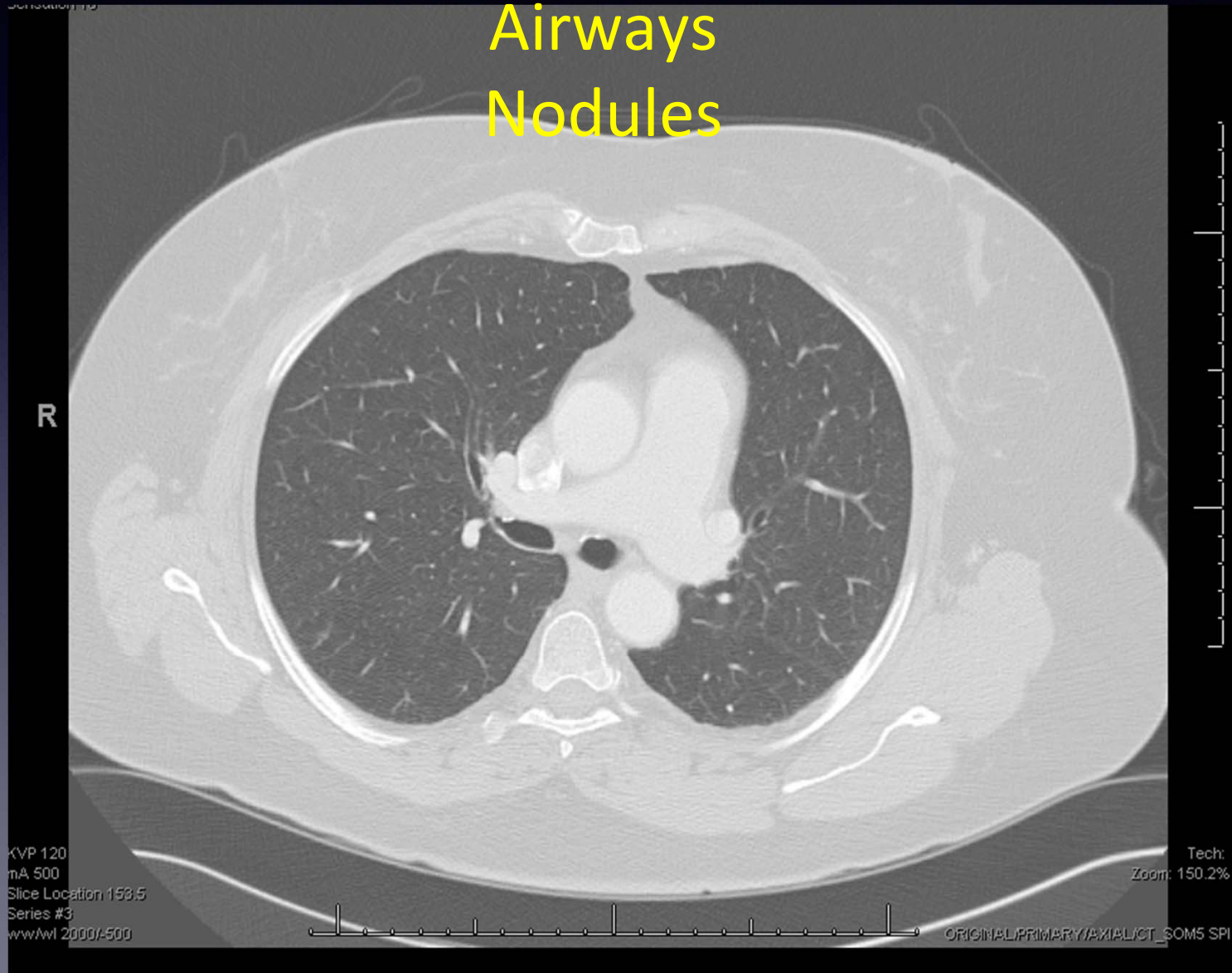
Perfusion



Normal Chest CT Scan - Lung Windows

Lung Parenchyma

Airways
Nodules



What about IV Contrast?

Need Contrast for:

- Looking for thromboembolic disease
- Careful review mediastinal nodal stations
- Determine if structure is perfused - AVM
- Vascular Structure - AAA, anomalies

Do Not Need Contrast for:

- Interstitial Lung Disease
- Bronchiectasis
- Nodule monitoring

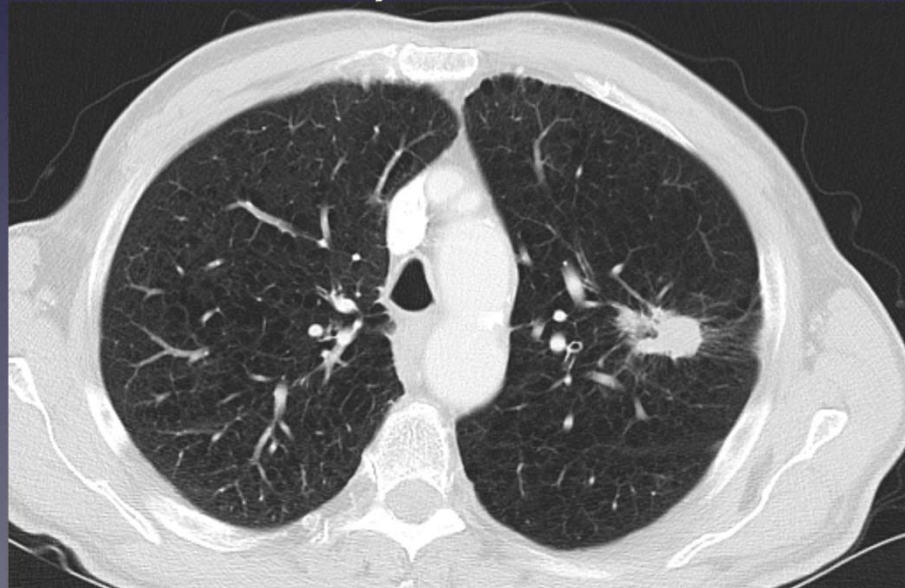
Careful What you Wish For

- In CAD screening CT, up to 25% of cases have incidental nodule/nodes
- In PE CT from ETC, 9% had PE and 24% had nodule or node
- Up to 35% of Chest CT will show thyroid nodule.

Chest CT and Nodules

Favor Benign: old/stable, Round, smooth, < 1 cm, stable, dense, satellite nodules

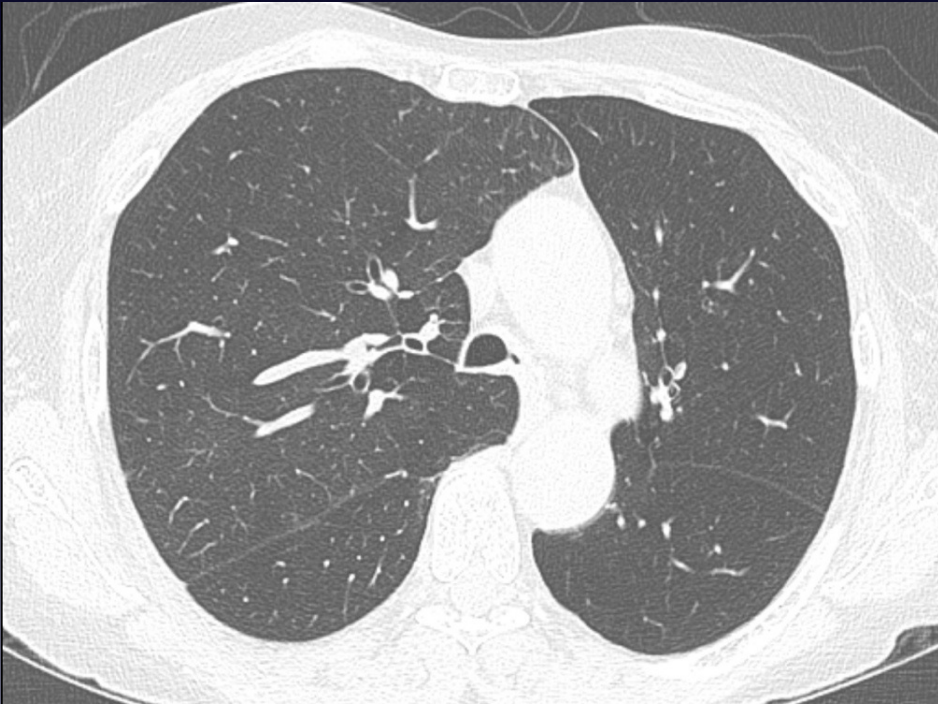
Worrisome for malignant: new, growing, irregular, spiculated, noncalcified, > 2 cm



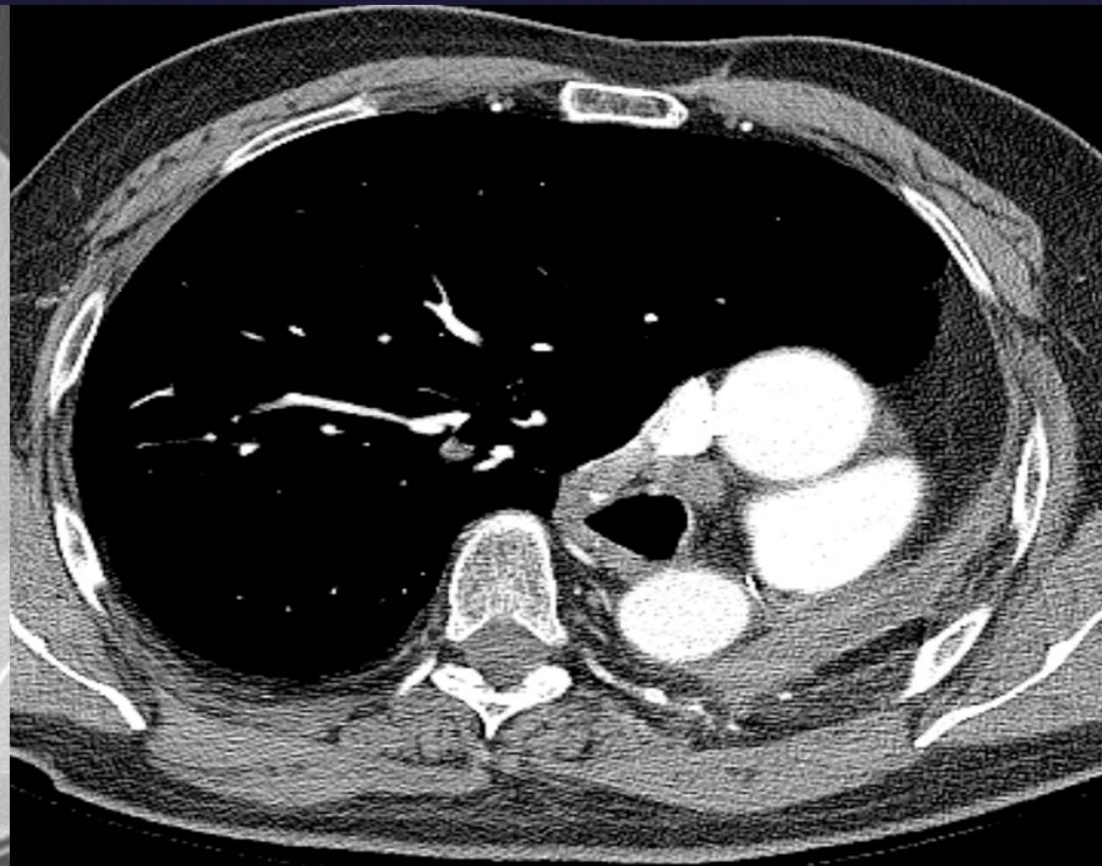
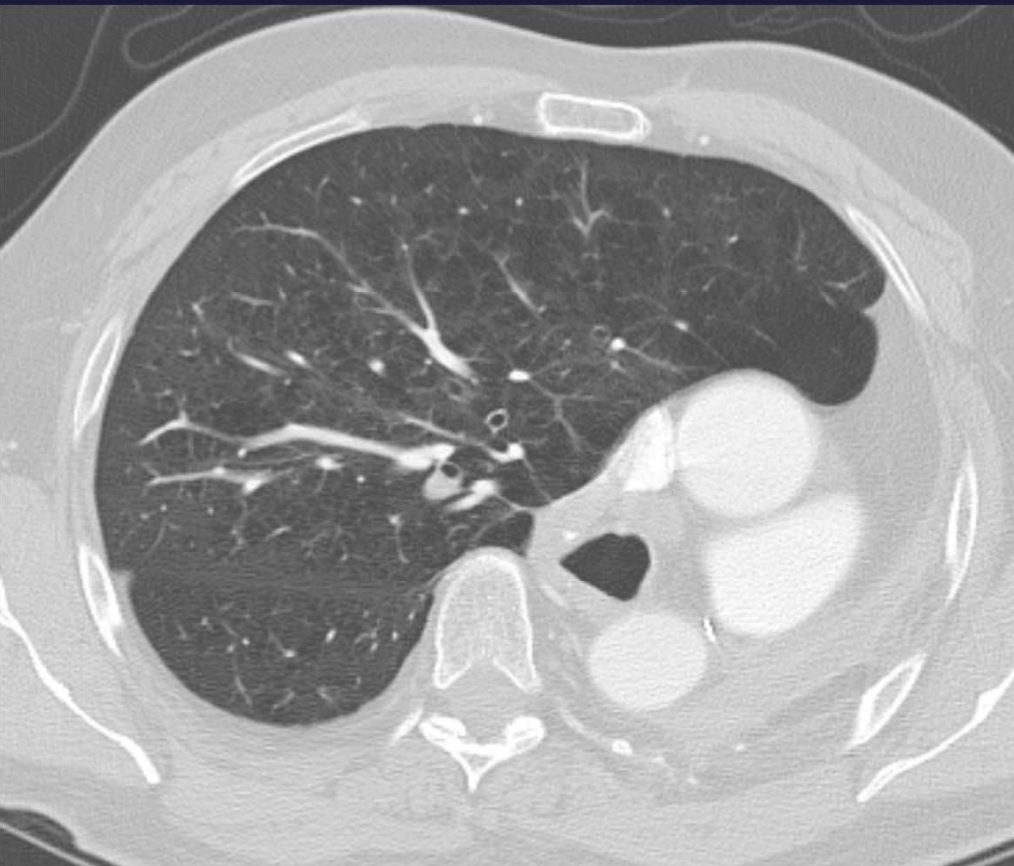
Fleischner Society Guidelines for Managing Incidental Pulmonary Nodules

<https://doi.org/10.1148/rg.2018180017>

Chest & Airways



Chest CT & Airways



Chest CT and COPD

COPD is a clinical diagnosis based on symptoms with abnormal physiology

Emphysema can be diagnosed on CT

Centrilobular vs Paraseptal vs Bullous

Upper lobe predominant - smoking

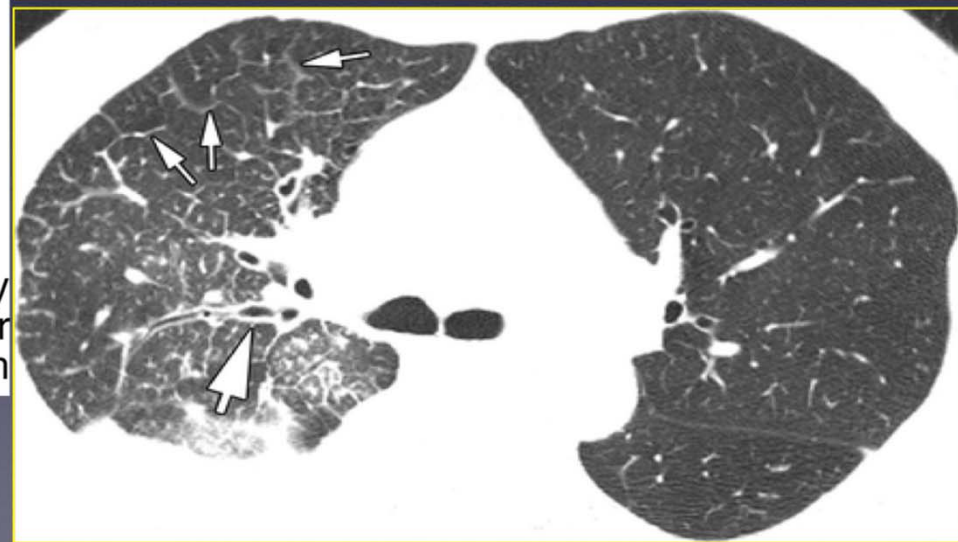
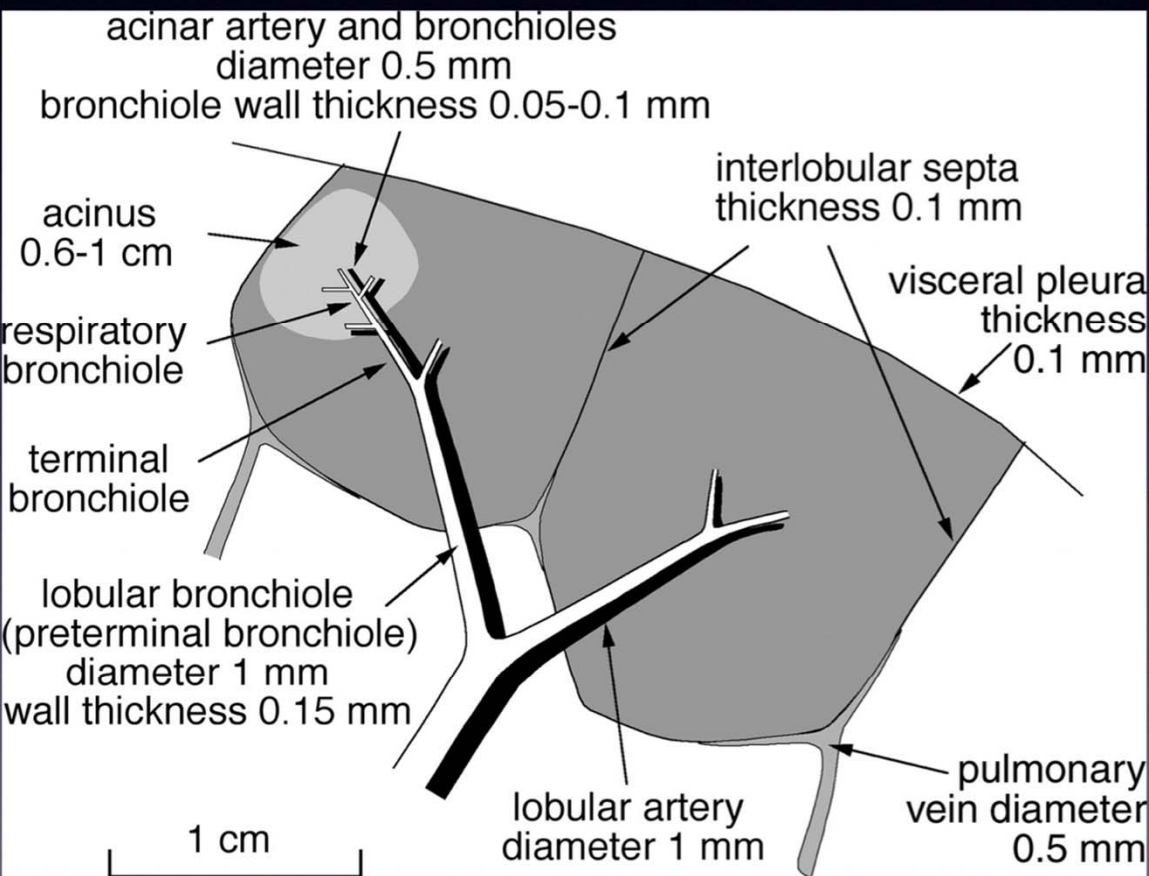
Lower lobe predominant - Alpha-1 AT deficiency

Chest CT scan and ILD

- CT scan patterns of parenchymal lung disease correlate with histopathology.
 - Reticulation = septal thickening \neq fibrosis
 - Honeycombing, traction, absence of ground glass favors a UIP-like pattern
 - Ground glass, lack of architectural distortion favors NSIP pattern
 - Infiltrates with air bronchograms favor organizing pneumonia

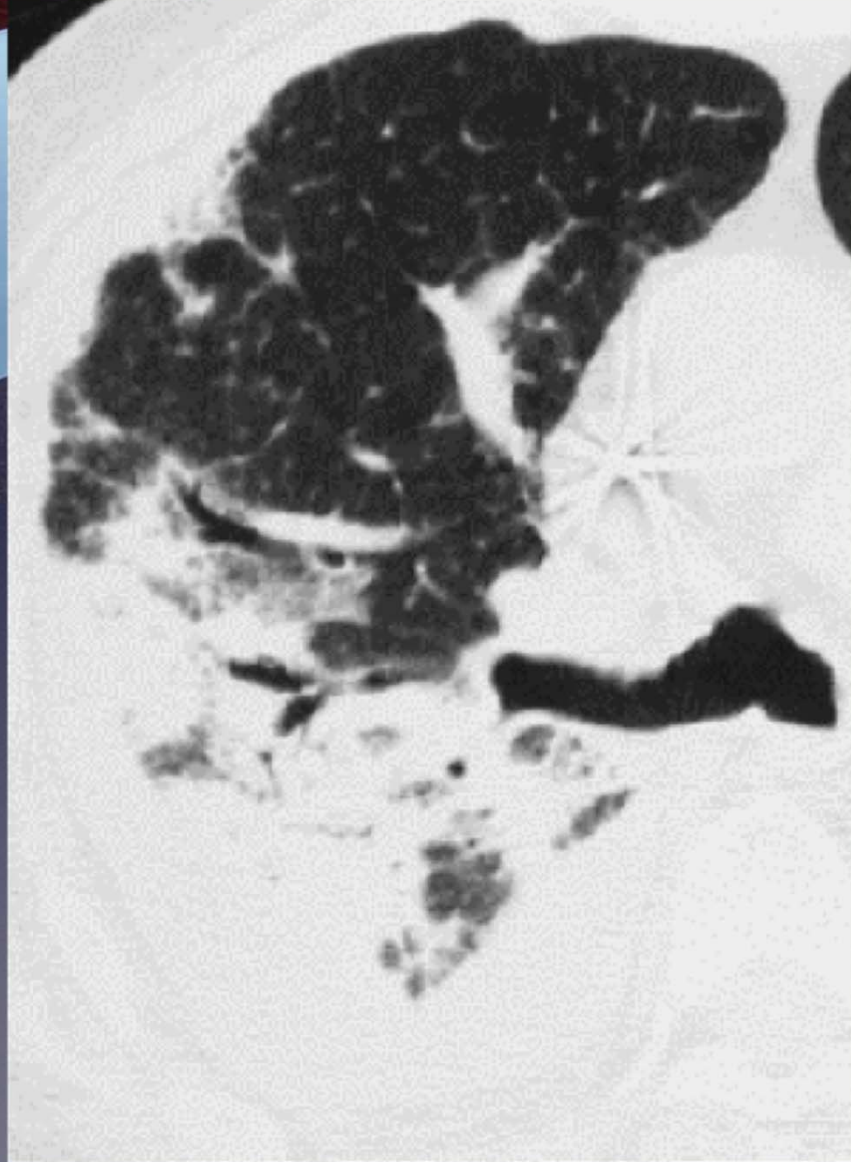
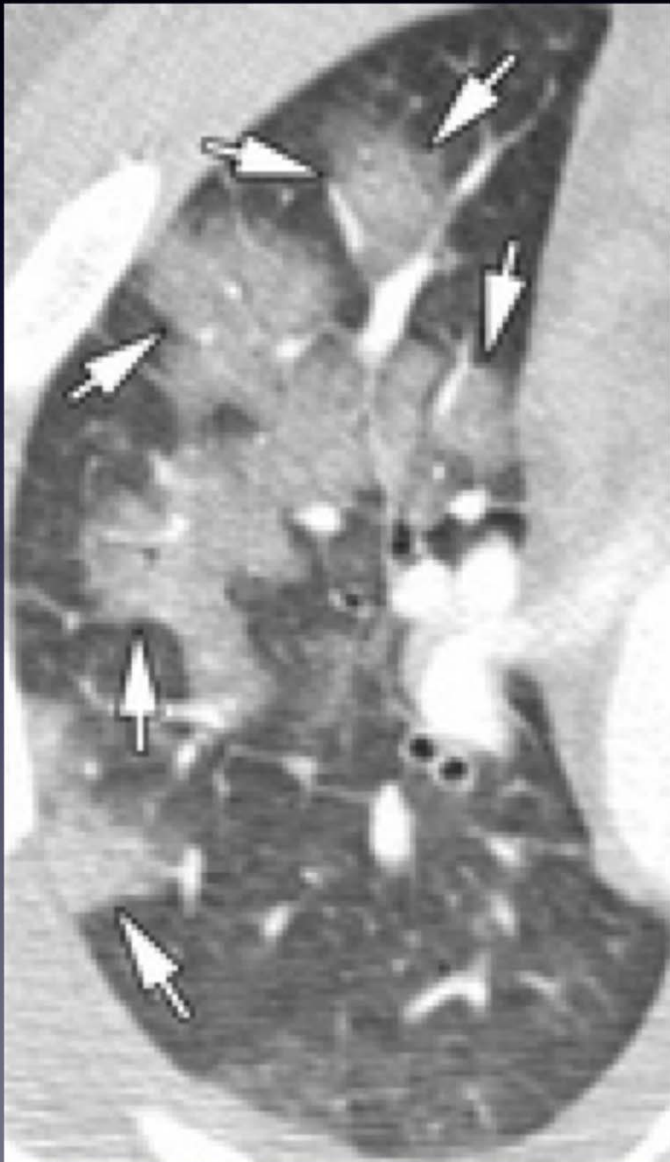
Always must interpret CT in context

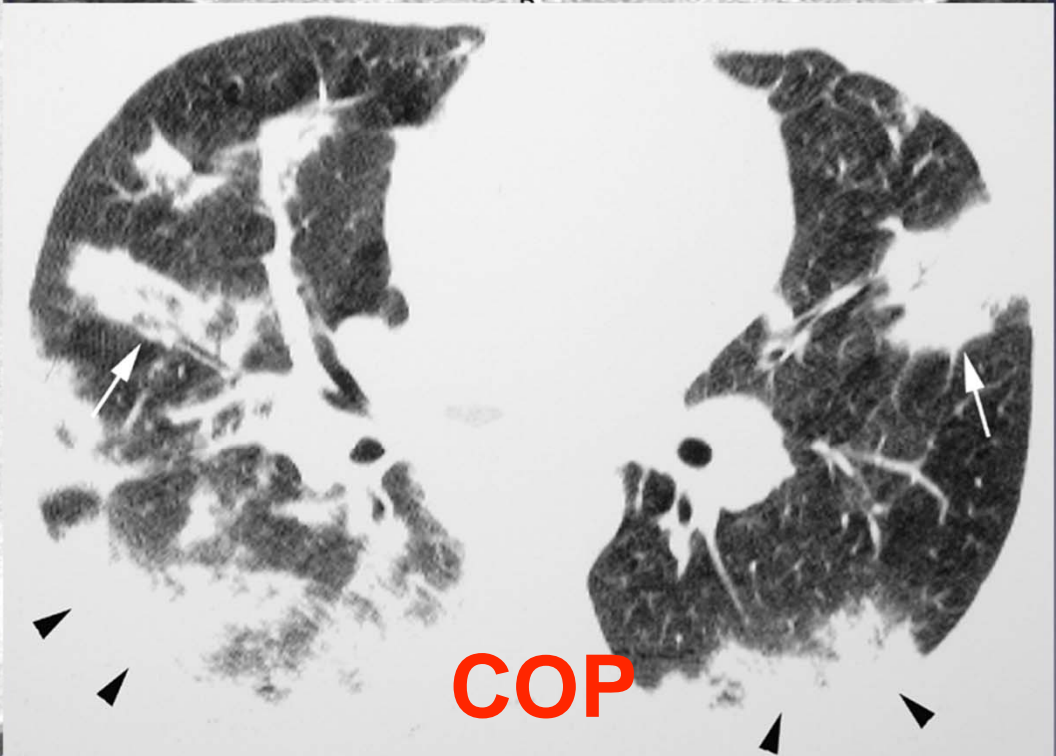
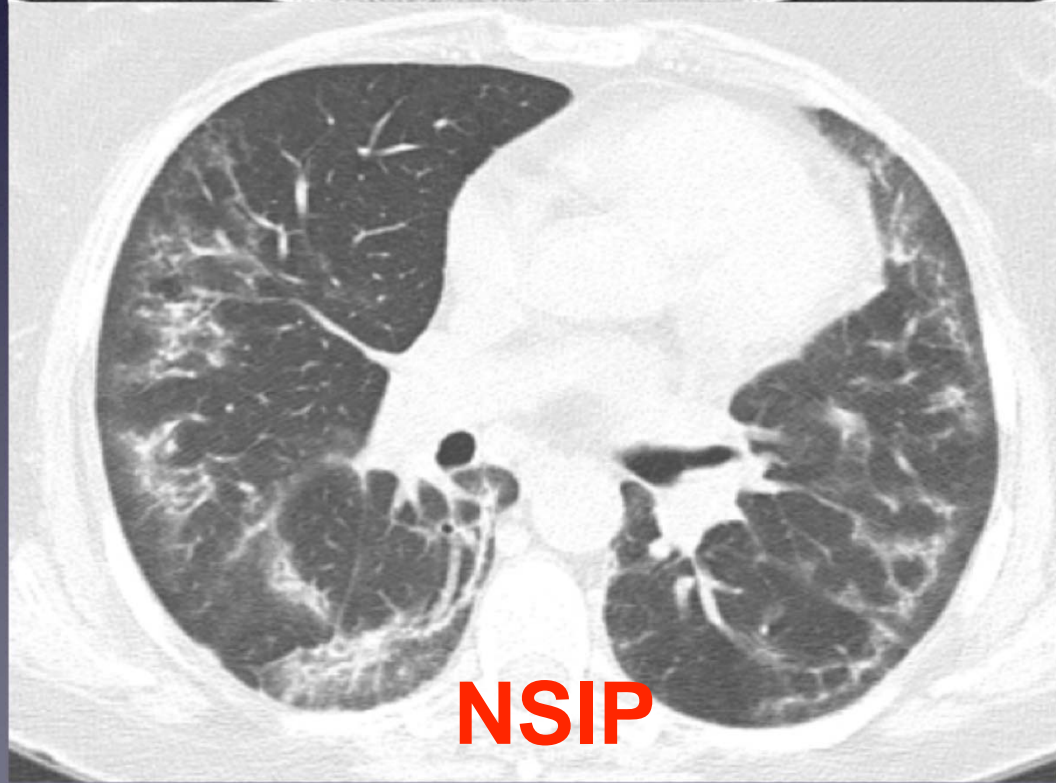
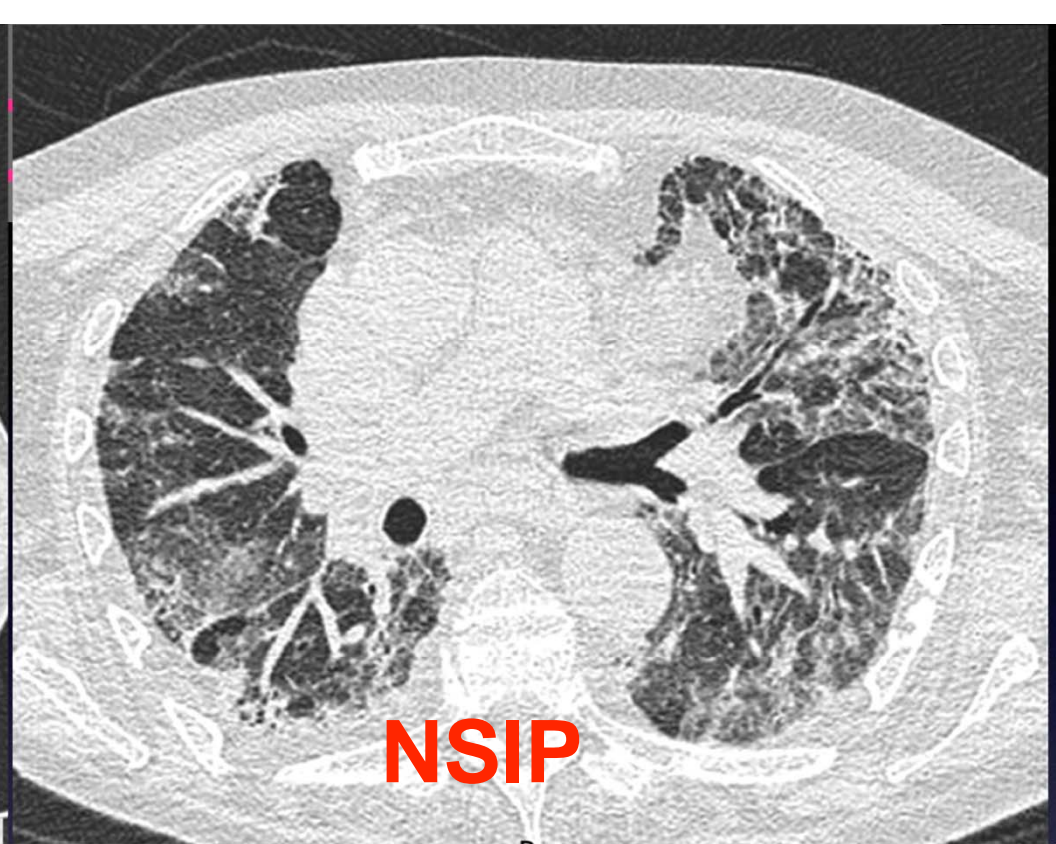
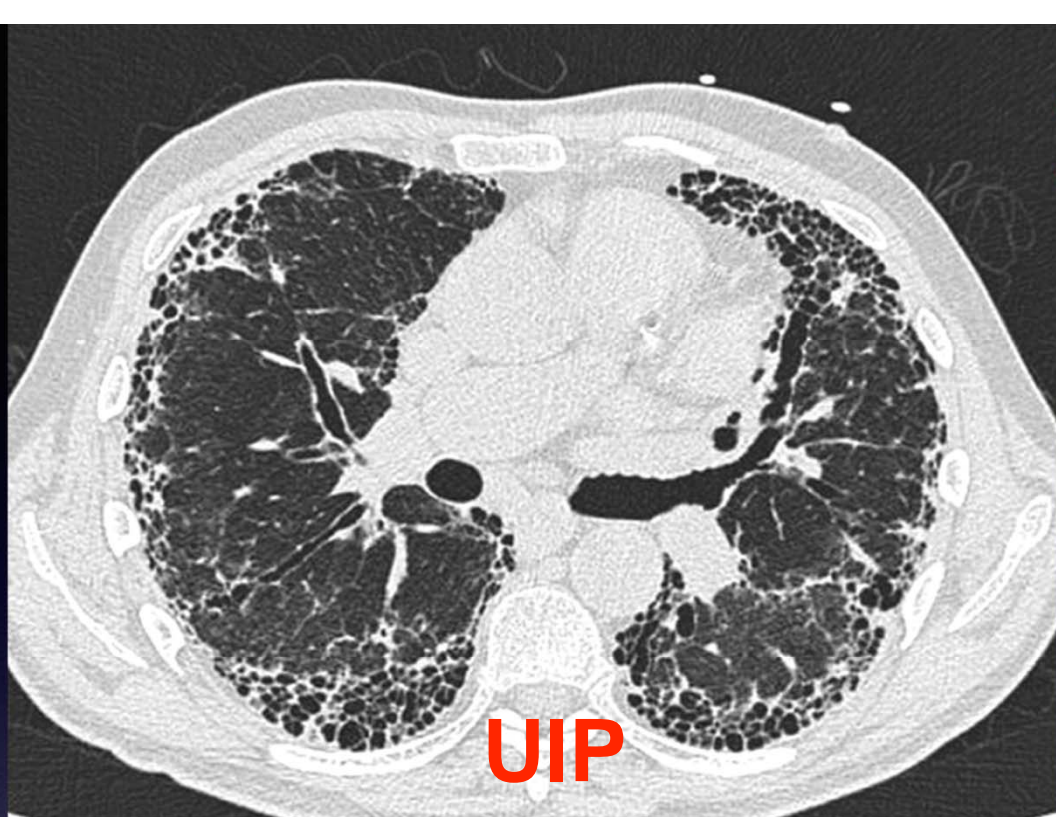
CT scan and Reticulation



Accentuation of interlobular septae is the basis for a “reticular” pattern.

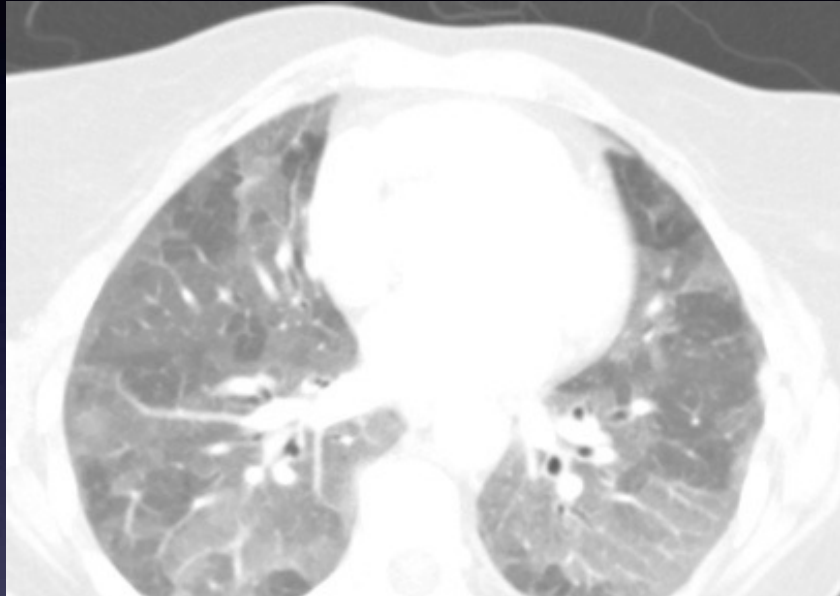
Ground glass vs. Consolidation - degree of density



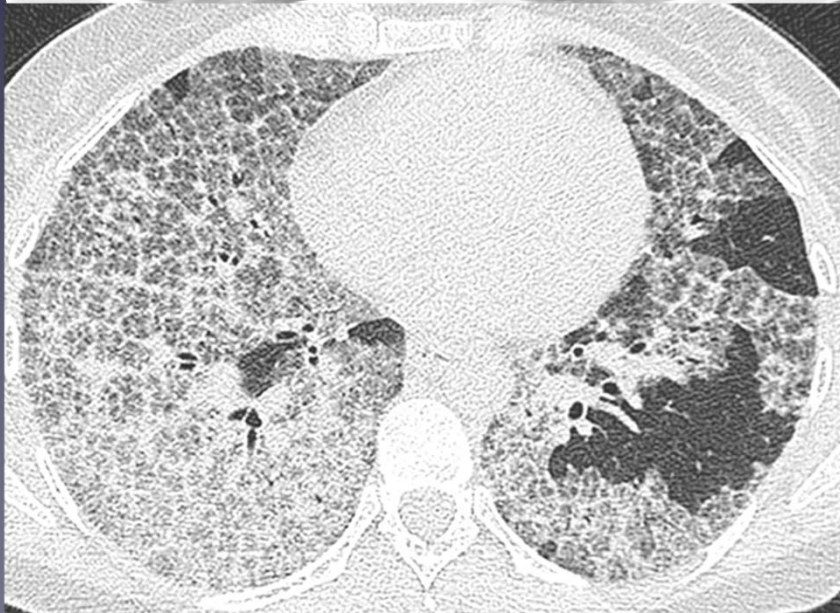


Head Cheese vs. Crazy Paving

How thick are your septae?

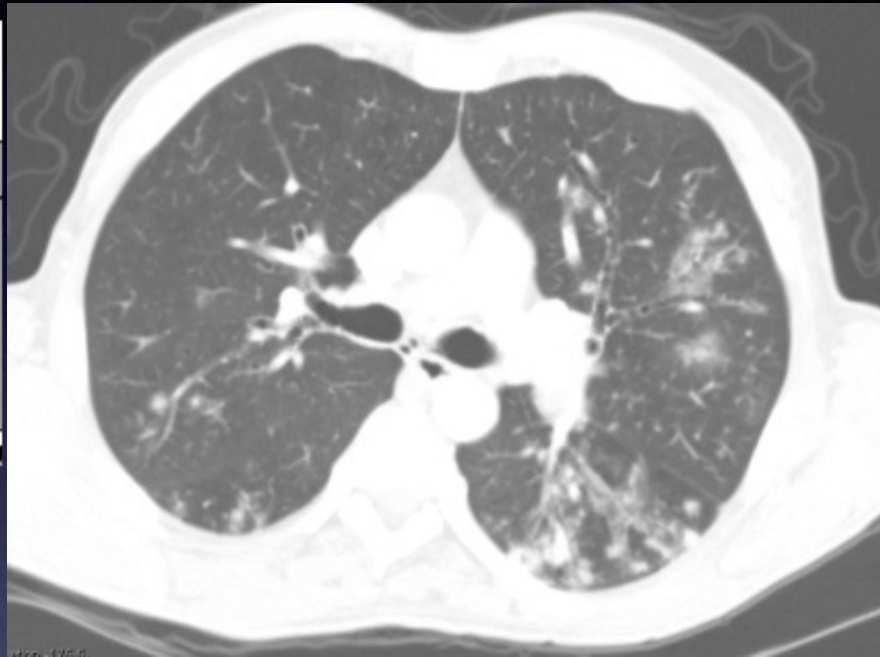
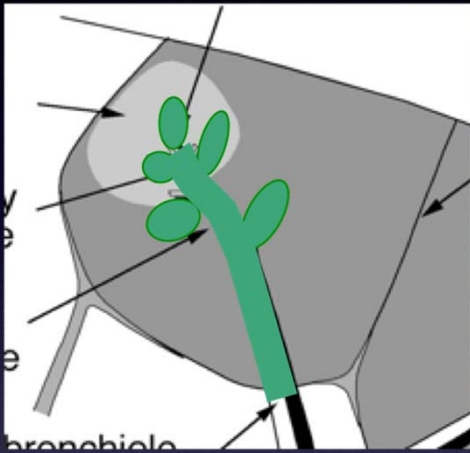


Hypersensitivity
Pneumonitis



Pulmonary Alveolar
Proteinosis

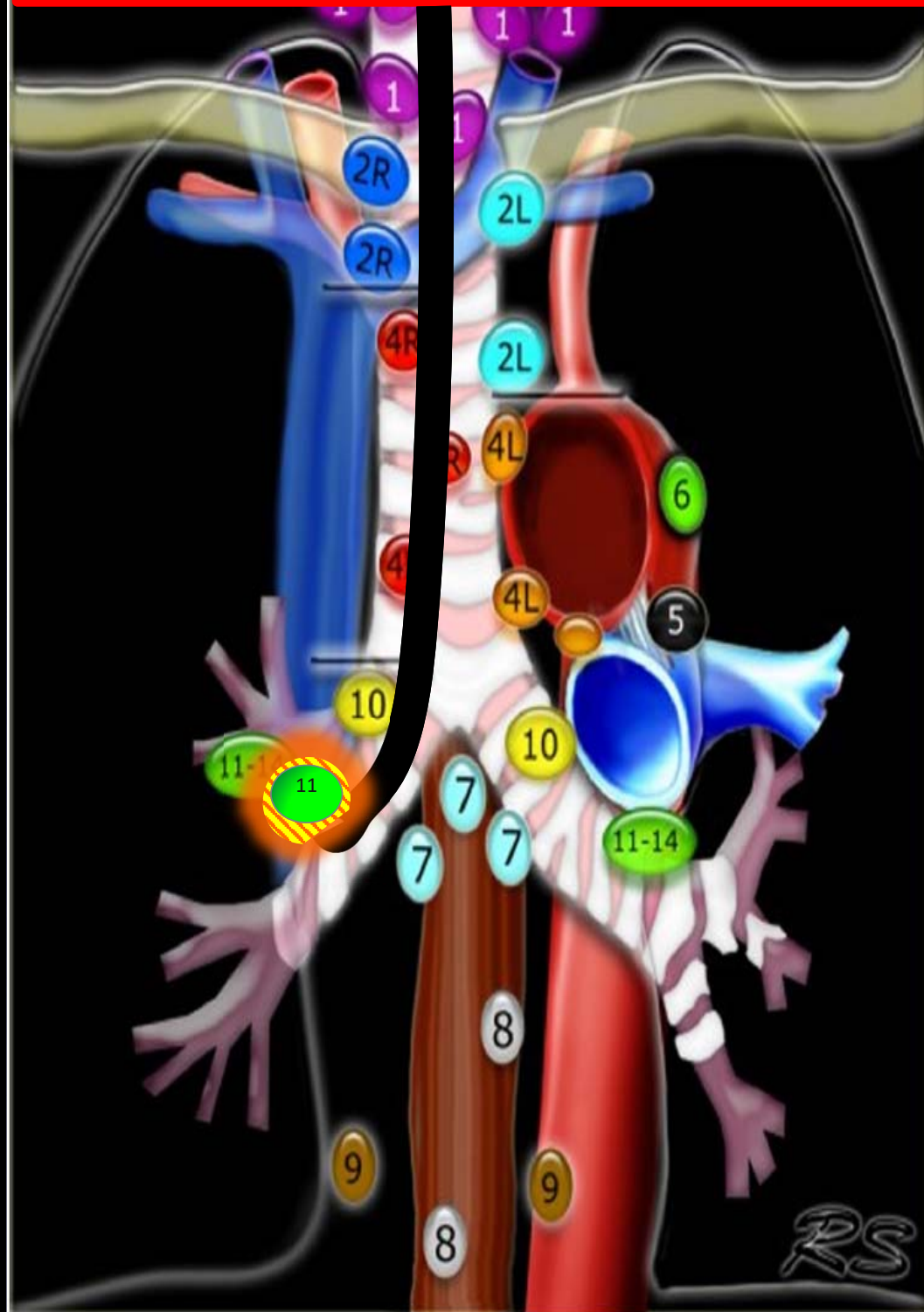
What is this tree-in-bud stuff?



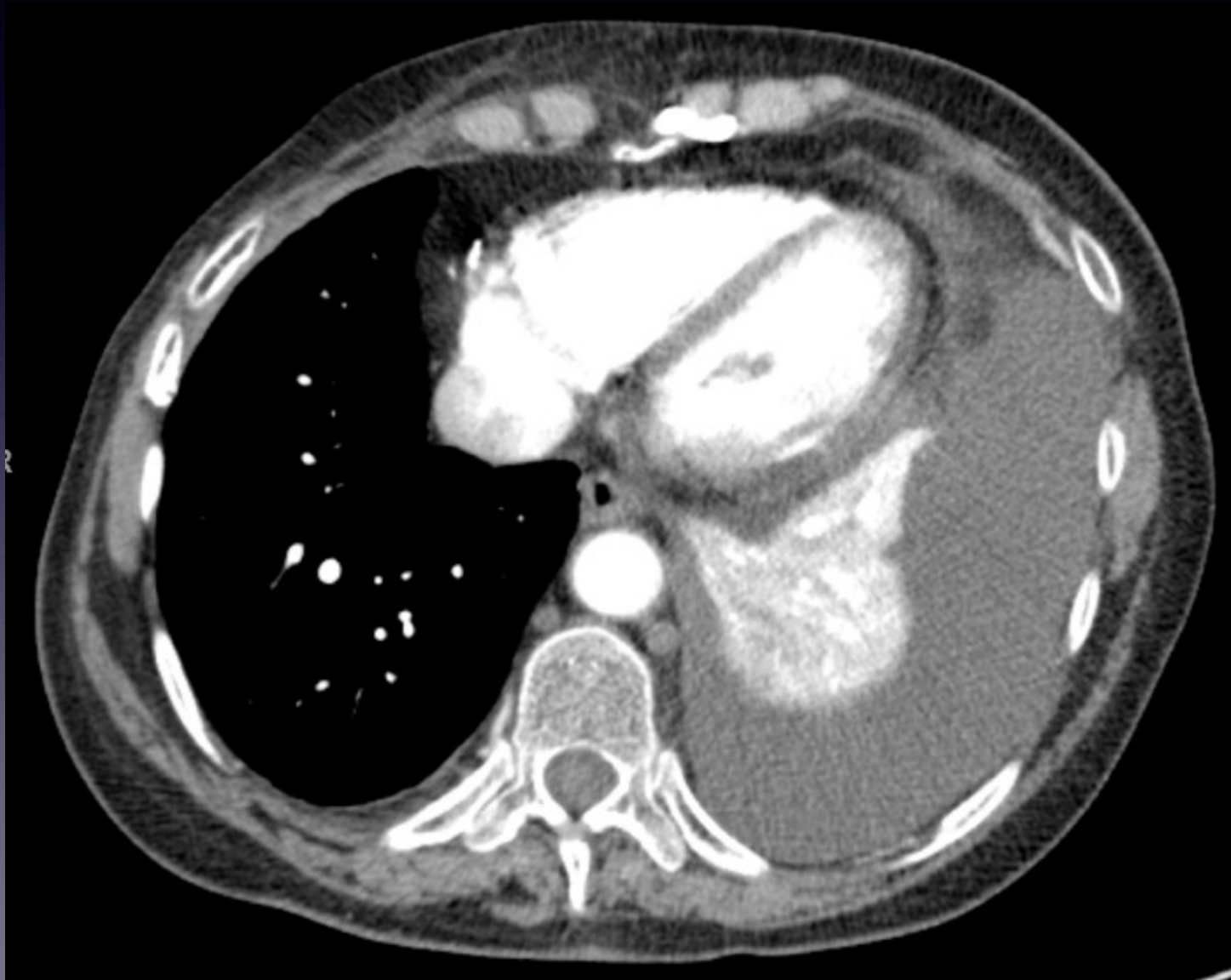
Mediastinal Nodes



EndoBronchial Ultrasound (EBUS)



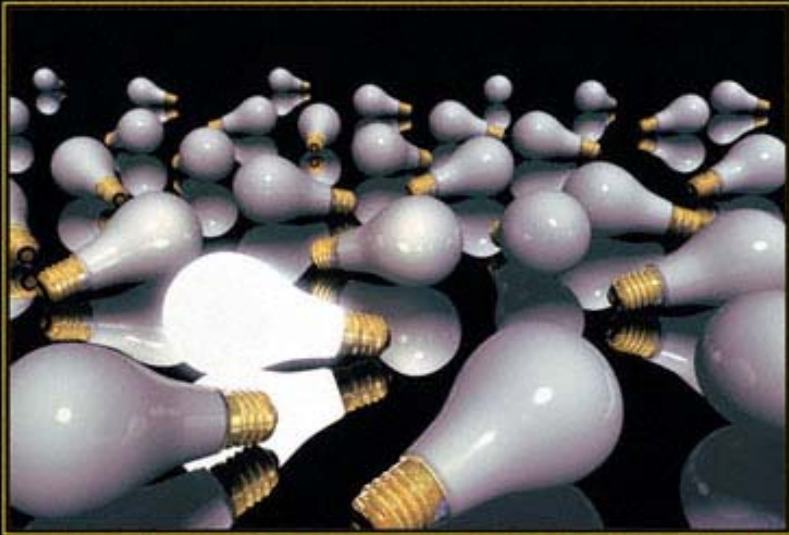
Pleural Effusion



Chest CT Scanning

- Phenomenal evolving technology that allows for detailed imaging of anatomy.
- Imaging patterns correlate with pathophysiology - no histologic vision yet.
- Measurable cost and risks - high rate of incidental findings that lead to more of each.
- Worth getting to know your radiologist as interpretation continues to have an “art” component that improves with wisdom.

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CLUELESSNESS

THERE ARE NO STUPID QUESTIONS,
BUT THERE ARE A LOT OF INQUISITIVE IDIOTS.

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IDIOCY

NEVER UNDERESTIMATE THE POWER OF STUPID PEOPLE IN LARGE GROUPS.

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