High Resolution CT of the Chest

Technique, Anatomy & Terminology

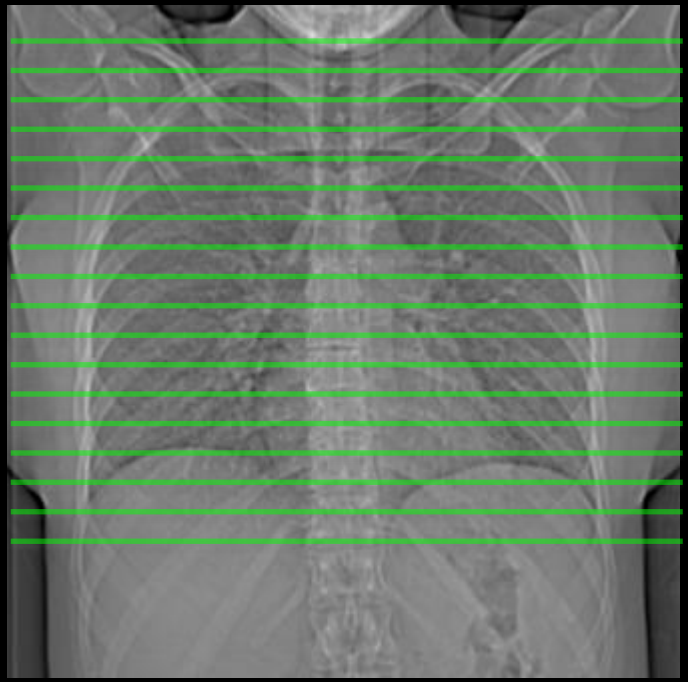
American College of Radiology™

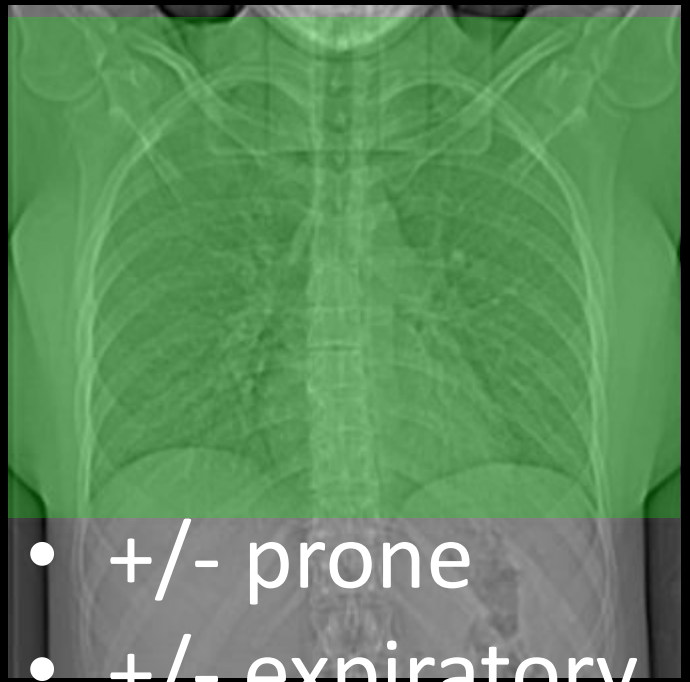
We Have No Relevant Disclosures

HRCT: Technique

- No “perfect” protocol
- Varies

Sequential vs. Volumetric





- +/- prone
- +/- expiratory

HRCT: Technique

- Volumetric helical scan
- Thin slices (1.0 – 1.25 mm)
- Sharp reconstruction kernel
- 100-140 kVp (size)
- Variable mA (automatic exposure control)
- Sagittal and coronal MPRs*
- 8-10 mm axial MIPs*

* Only possible with volumetric

HRCT: Technique

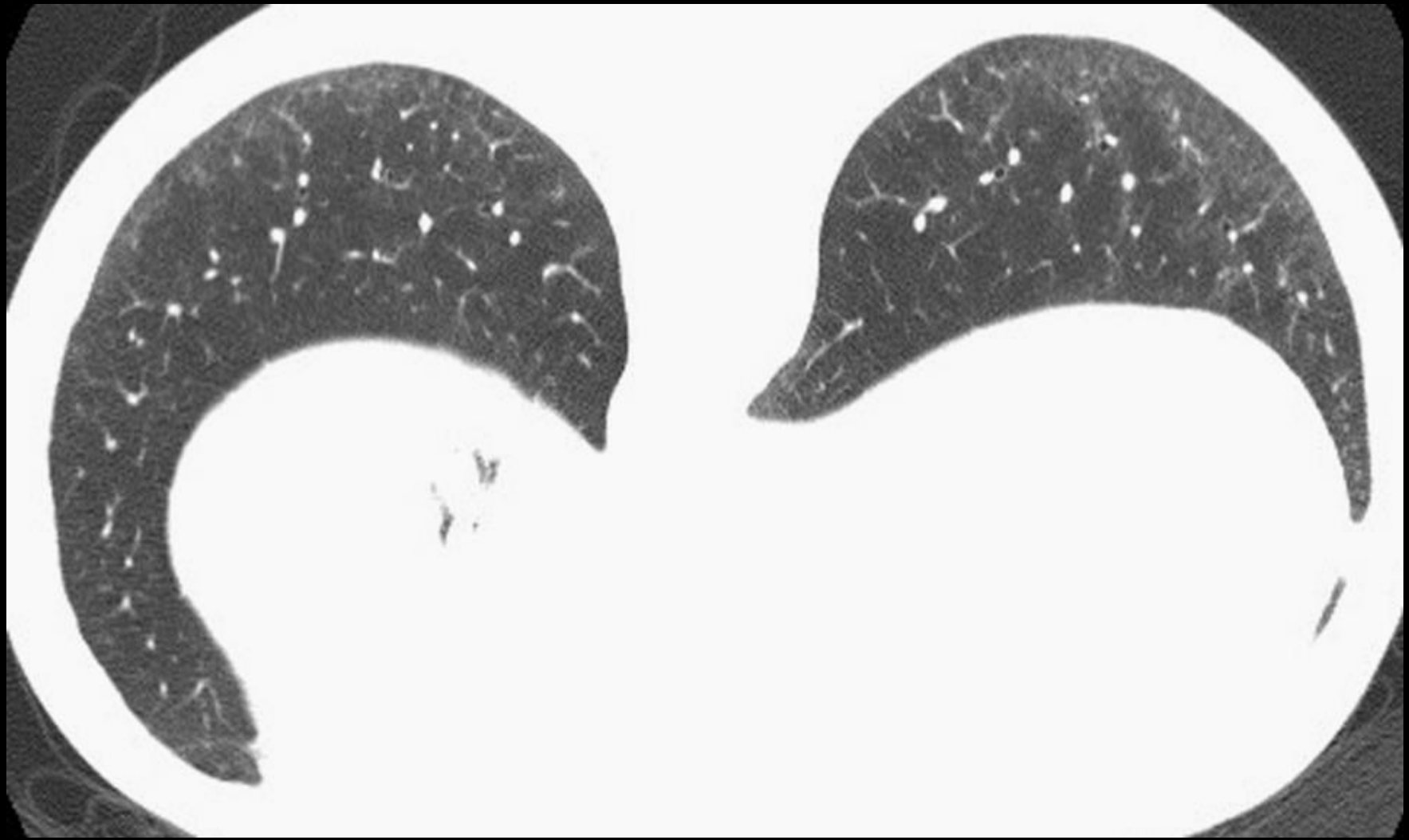
100 mA

400 mA

Patient Position

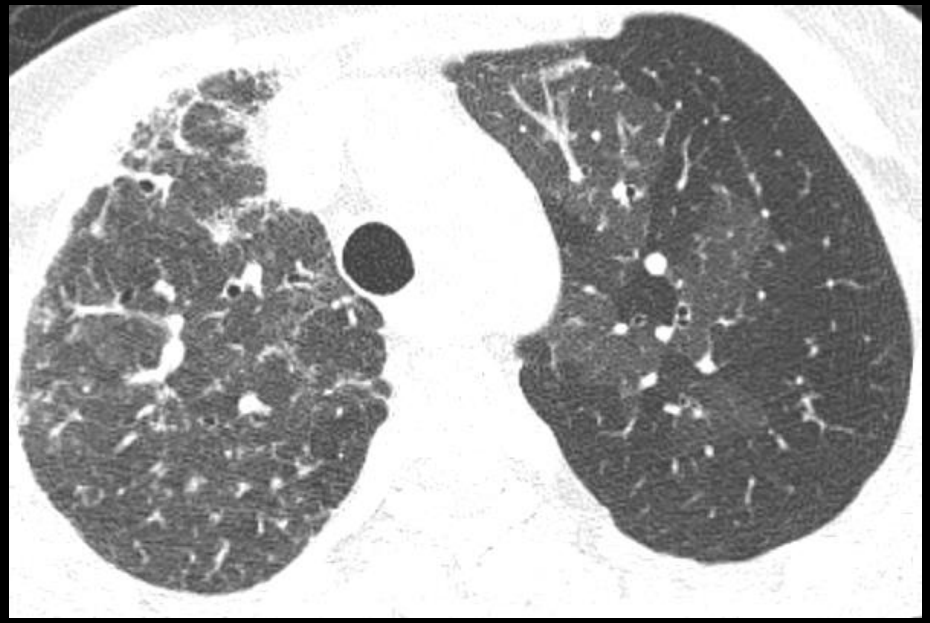
- Supine - routine
- Prone - optional
  - For initial evaluation
  - Follow up equivocal abnormalities
    - Can scan as prone only

Scleroderma and 6 months of progressive dyspnea



Expiratory Scans

Air trapping (indirect sign of small airways disease)

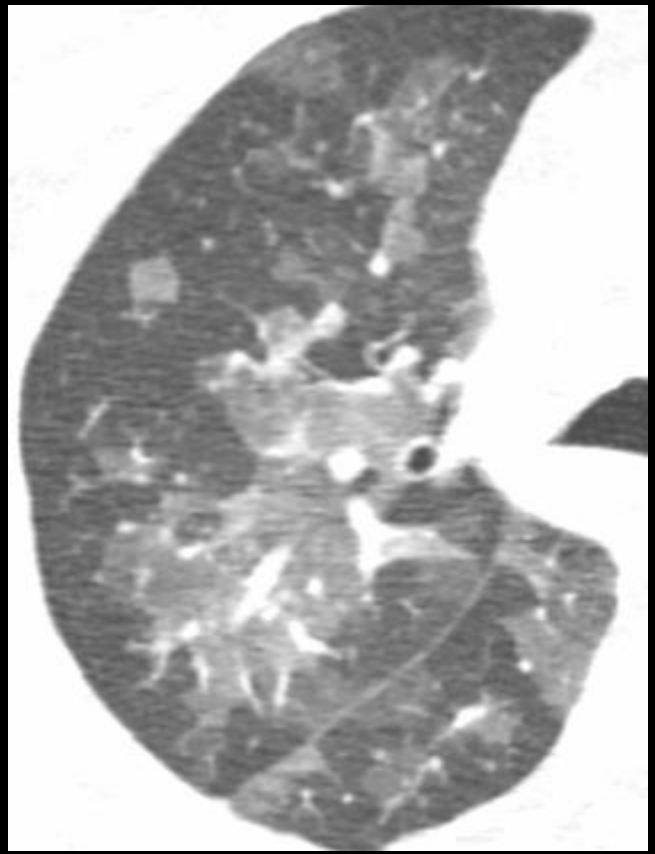


Inspiratory

Expiratory

Expiratory Scans

- Initial evaluation
  - Dyspnea
  - Cough
  - Hypoxia
- Other indications
  - Collagen vascular disease
  - Lung transplant
  - Bone marrow transplant



Expiratory Scans

- Technique
  - 1.0 – 1.25 mm every 10 mm
  - Helical or sequential
  - Low mA (20-40)
- Protocol
  - Can be add-on option for a generic HRCT protocol

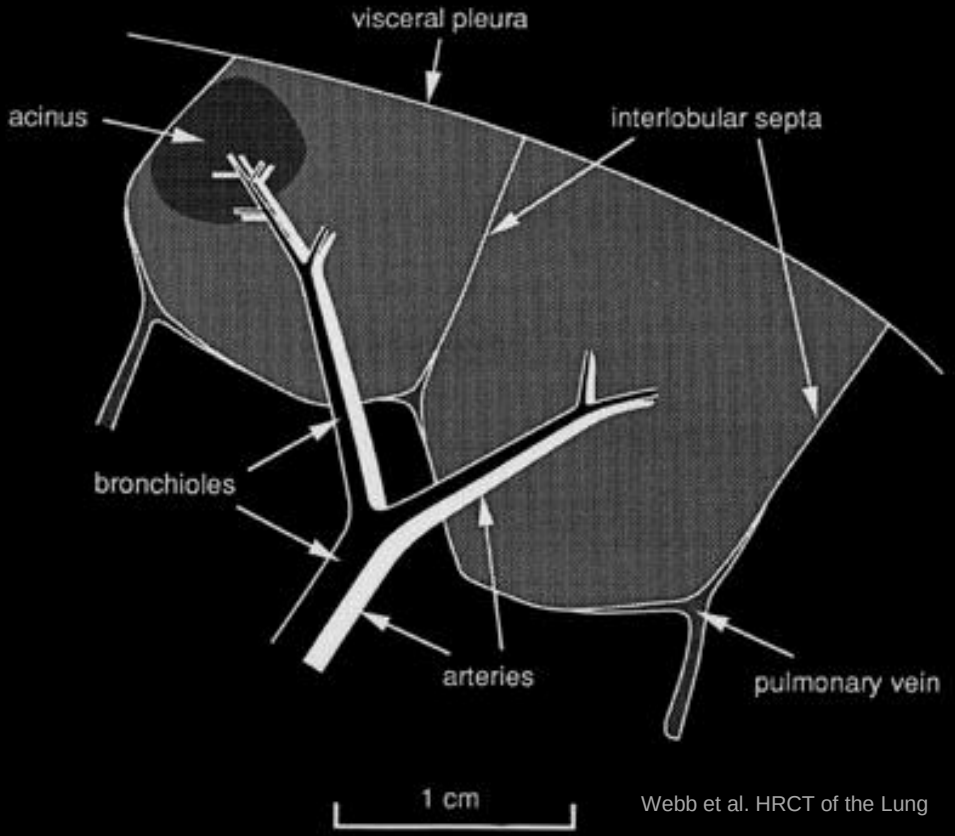
Radiation Exposure

- Yearly background dose: 3.5 mSv
- PA chest radiograph: 0.05 mSv
- Routine volumetric chest CT: 5-7 mSv
  - Much lower with AEC
- 2-3 mSv chest CTs readily attainable on modern scanners

HRCT: Anatomy

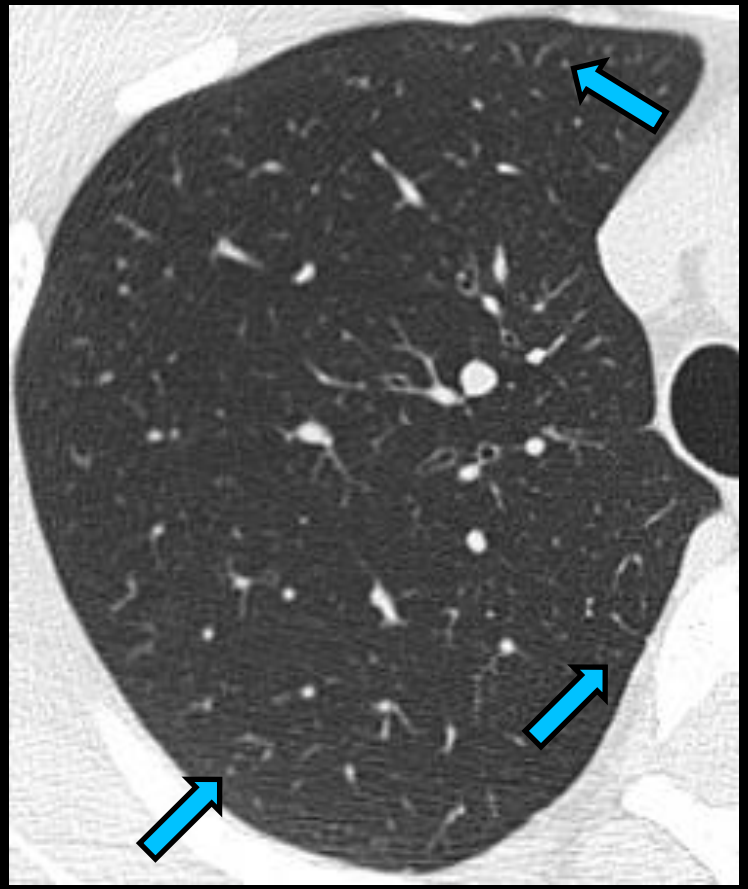
Secondary Pulmonary Lobule (SPL)

- Smallest unit of lung marginated by connective tissue septa
- 1-2.5 cm

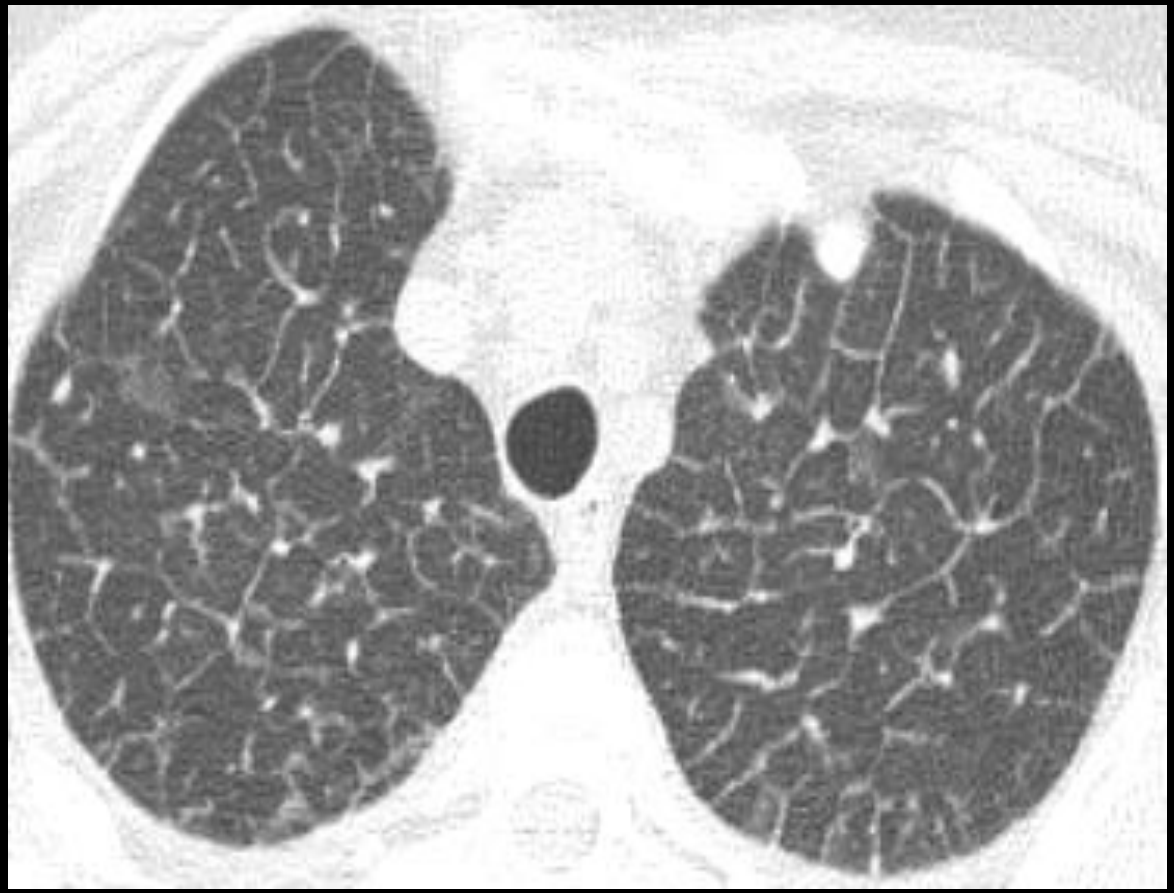


Webb et al. HRCT of the Lung

Normal = only see the pulmonary artery

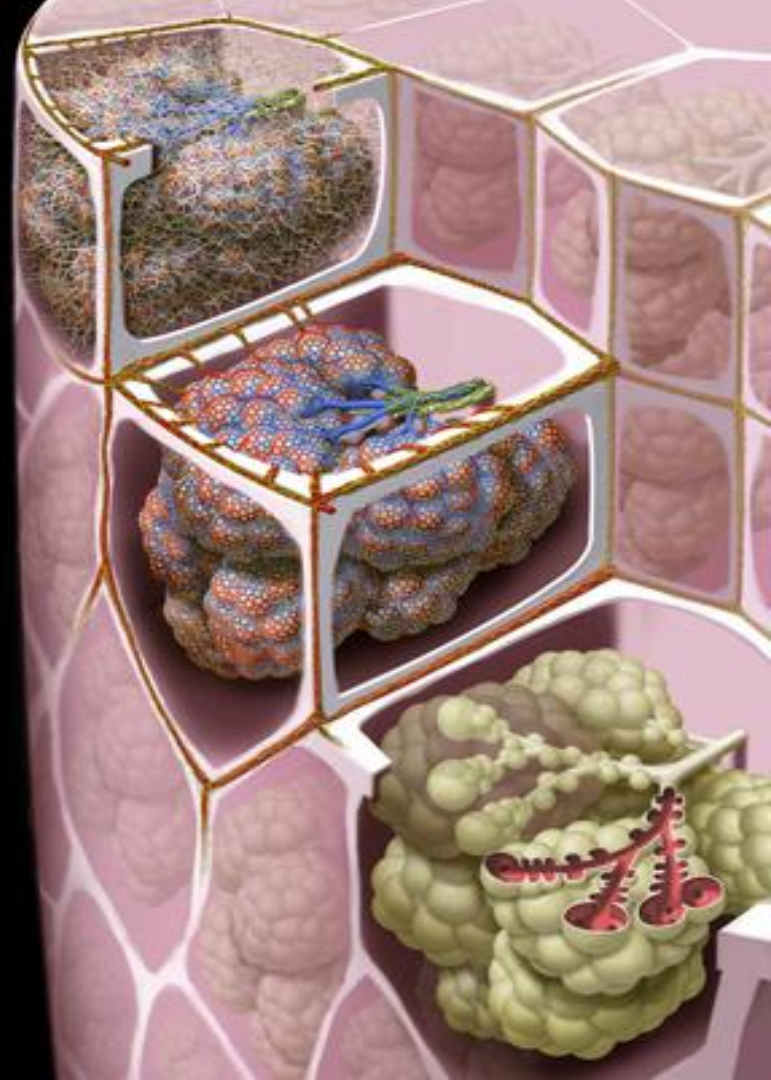


Abnormal = edema = interlobular septal lines



SPL Components

1) Interstitium
2) Lymphatics
3) Airways
4) Vessels

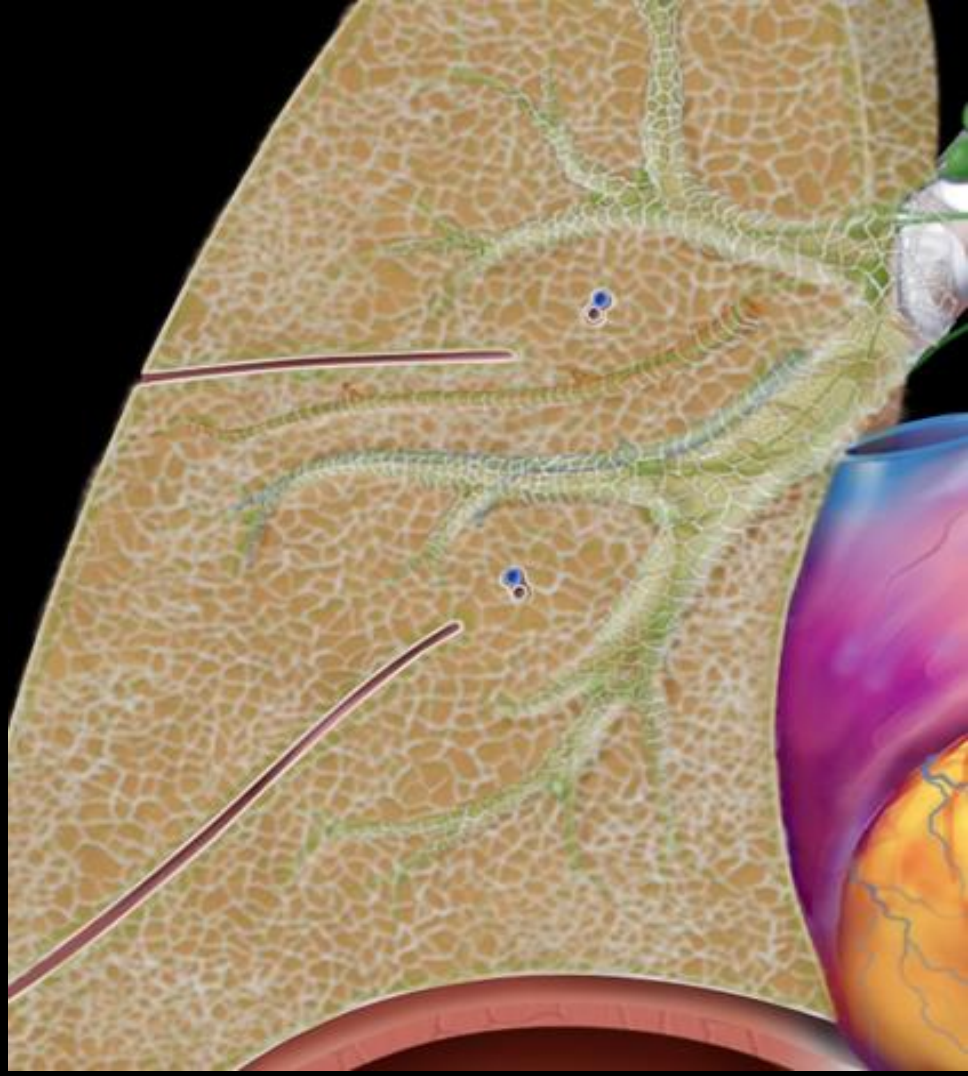


1. Interstitium

Not normally visible

Connective tissue

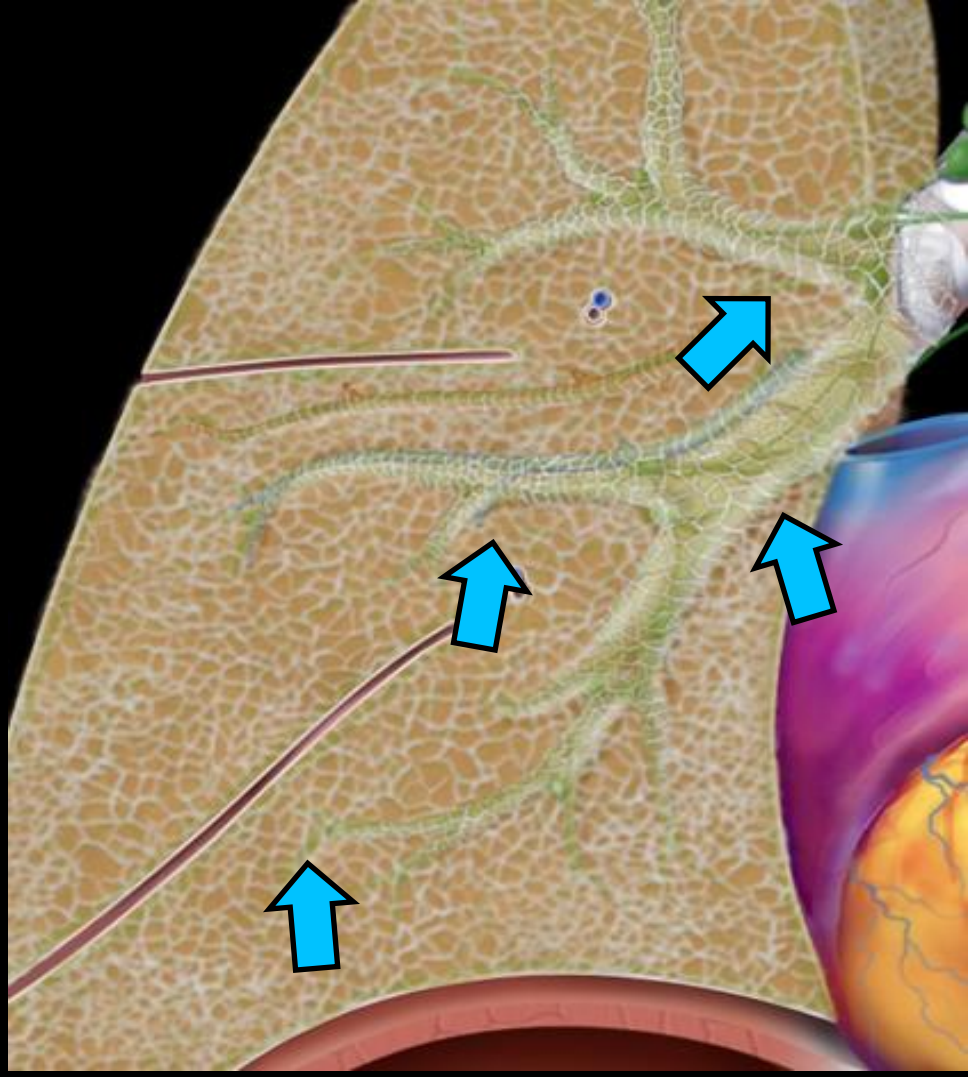
Three compartments



1. Interstitium

1.1 Axial (bronchovascular)

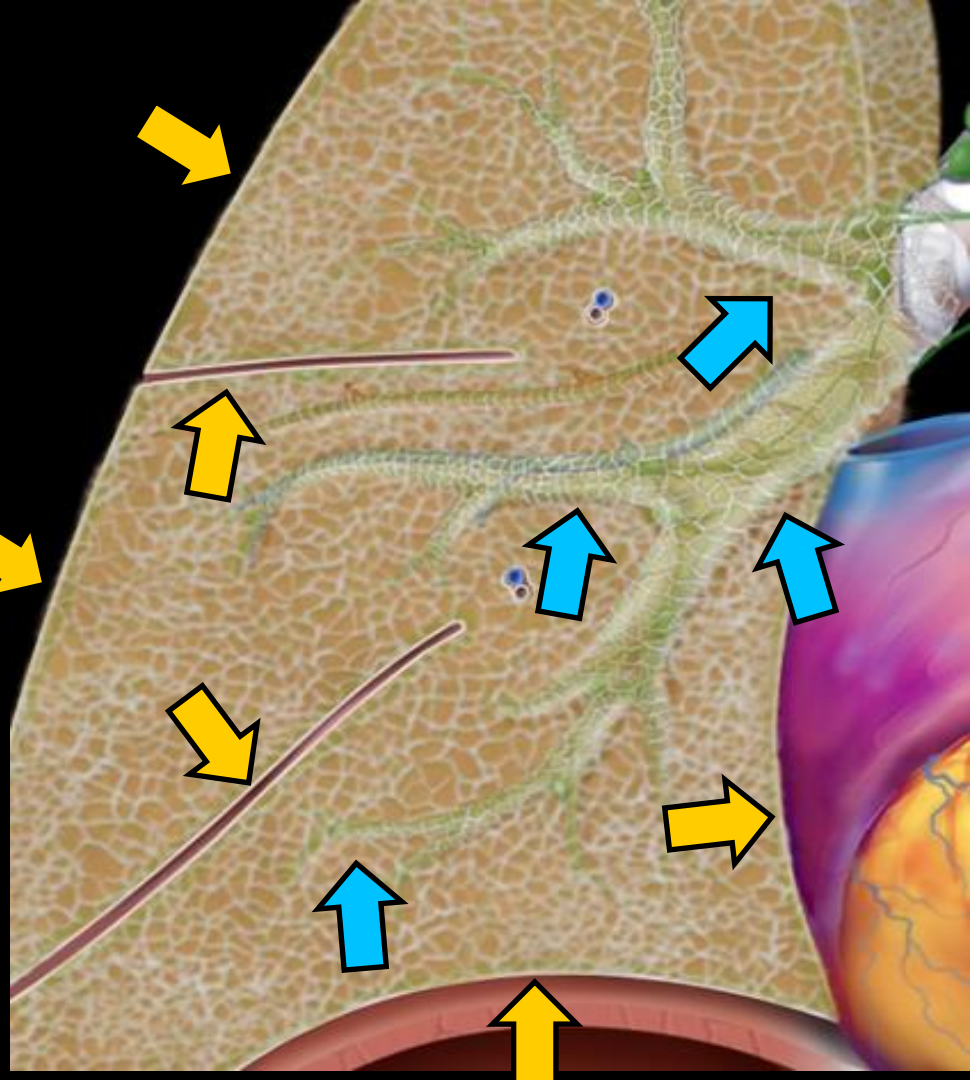
Supports airways, vascular, and lymphatics from hila to respiratory bronchioles



1. Interstitium

1.2 Peripheral (interlobular)

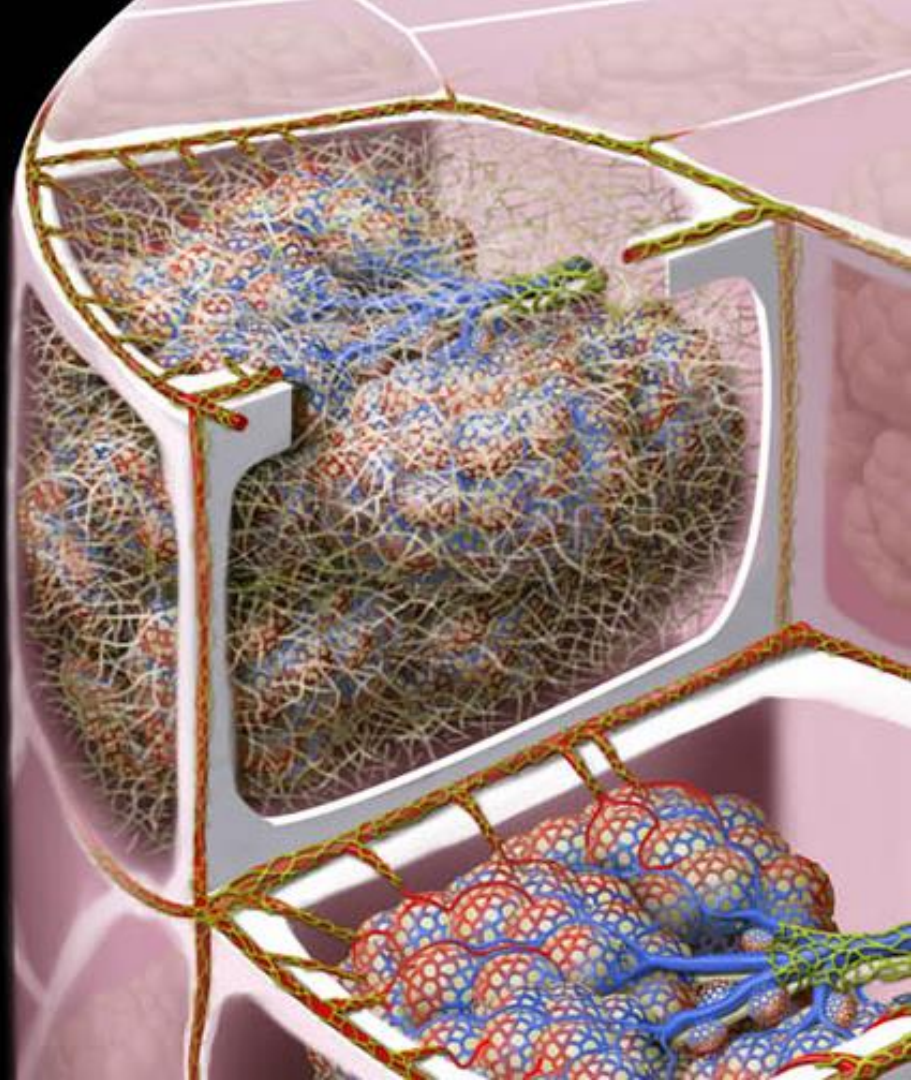
Extends from visceral pleura. Forms the envelope of the SPL (interlobular septa on CT)



1. Interstitium

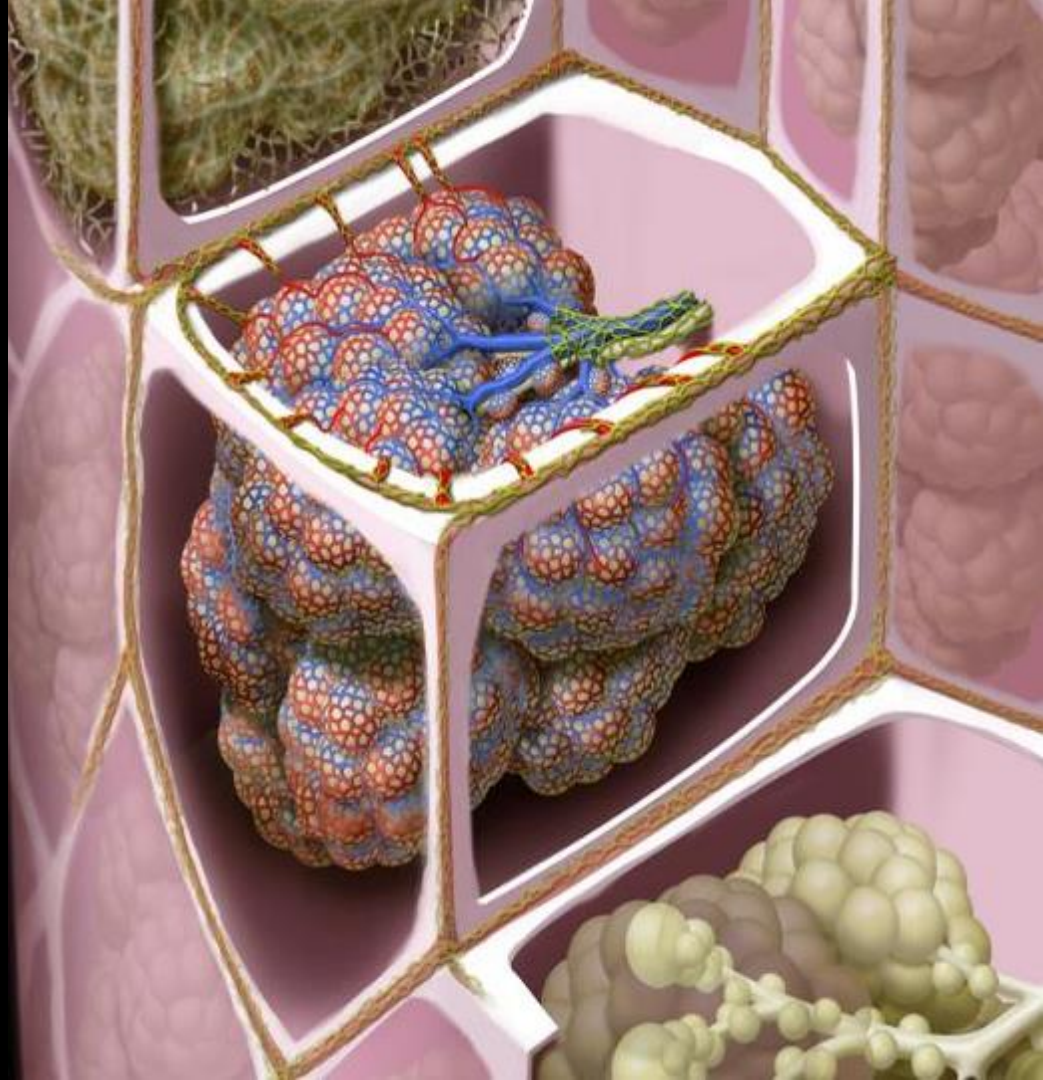
1.3 Intralobular

Within the SPL, supports alveolar walls



2. Lymphatics

Extend along the interstitium

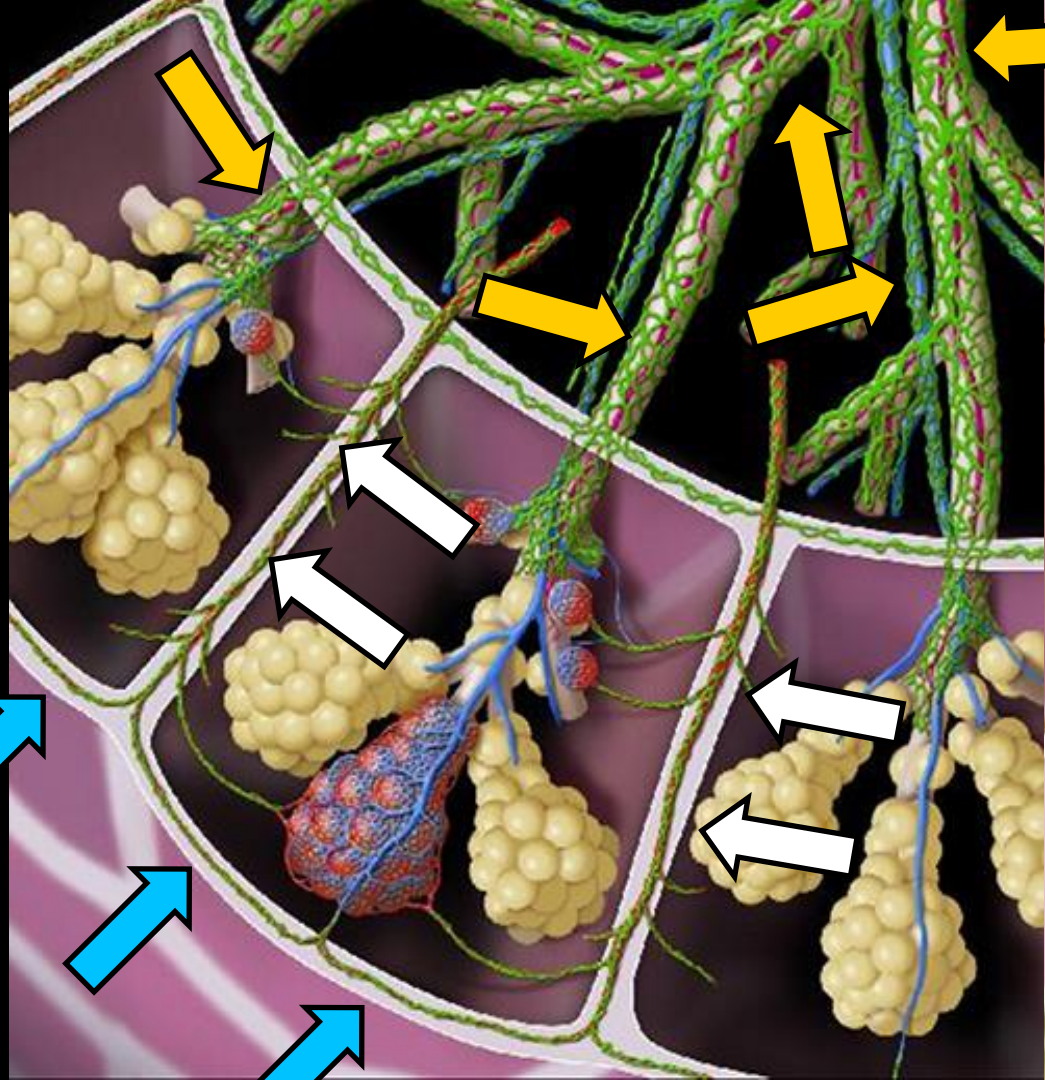


2. Lymphatics

1. Interlobular septa

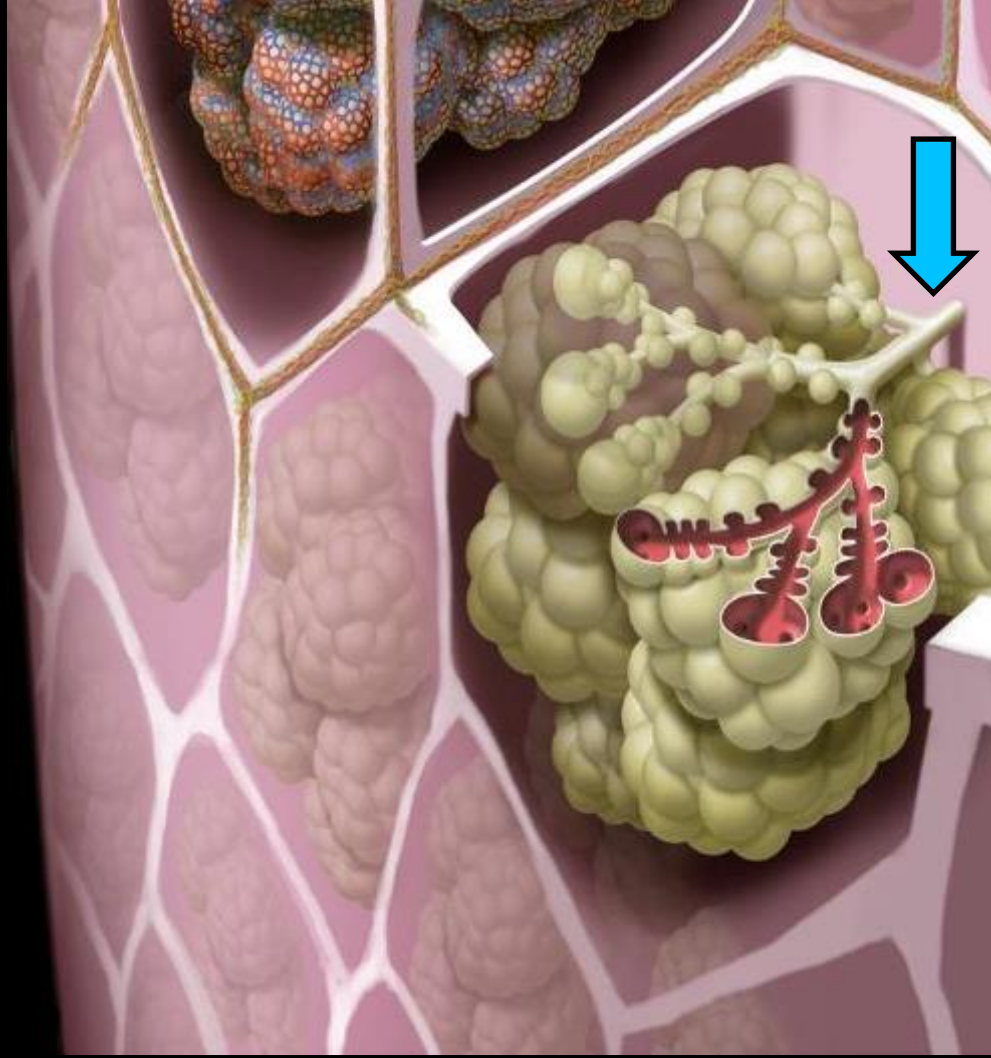
2. Peribronchovascular

3. Subpleural



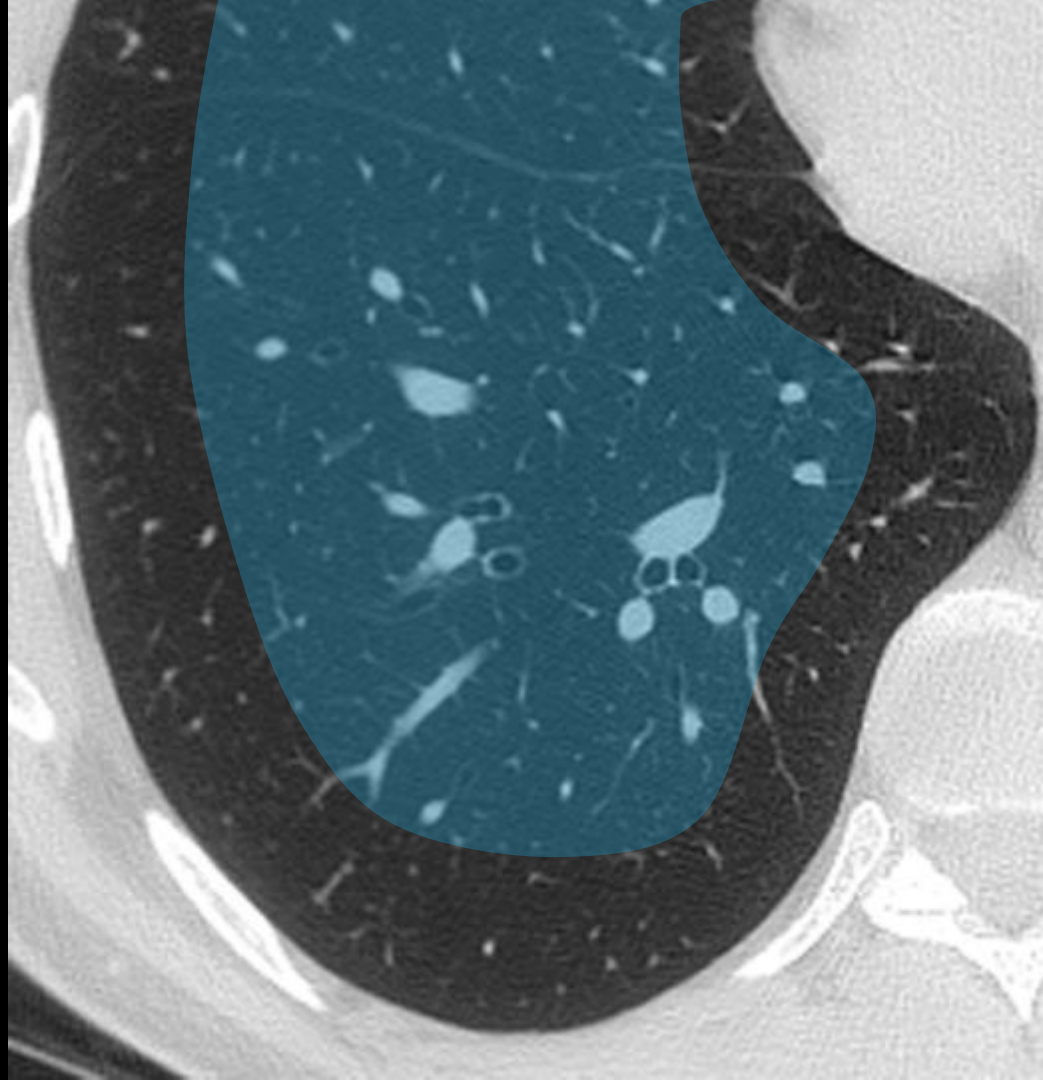
3. Airways

- Small airways = normally not seen
- < 2 mm
- Lack cartilage and submucosal glands
- Terminal and respiratory bronchioles



3. Airways

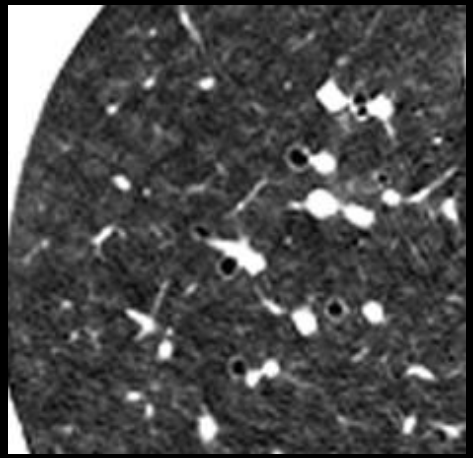
Normal = no airways visible in outer 1/3 of lung

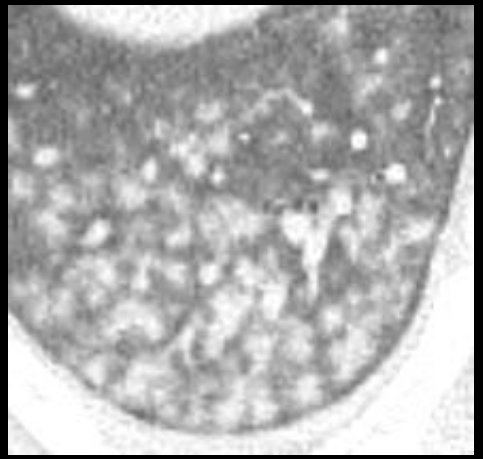


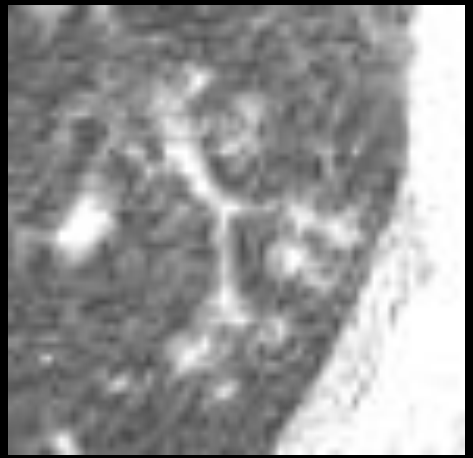
3. Airways

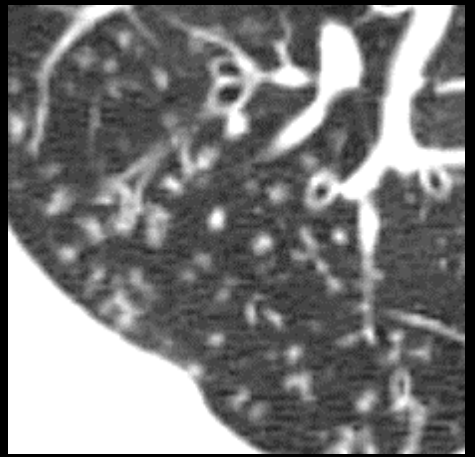
Abnormal = Small airways disease

“Centrilobular, airway-centered, tree-in-bud, branching”





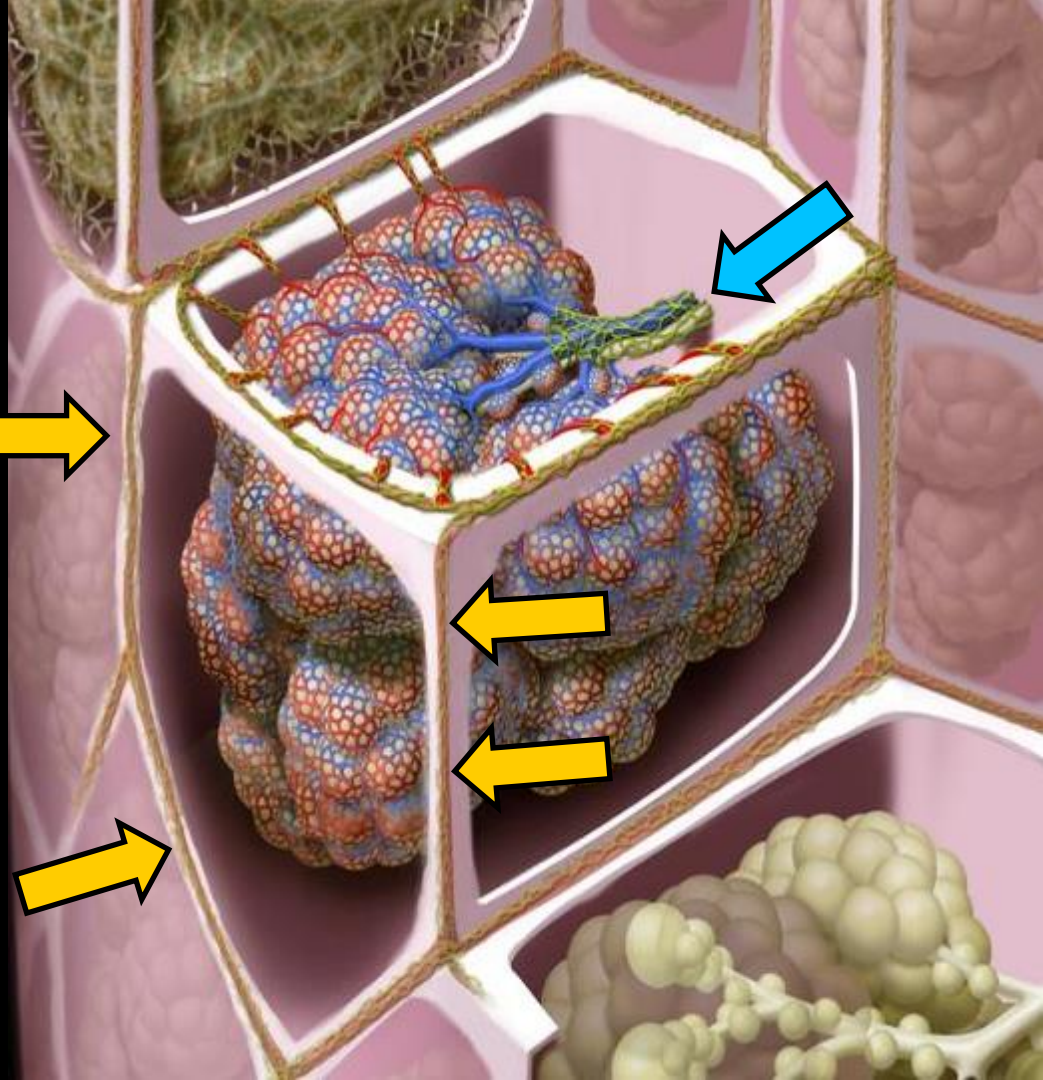




4. Vessels

Artery = Center

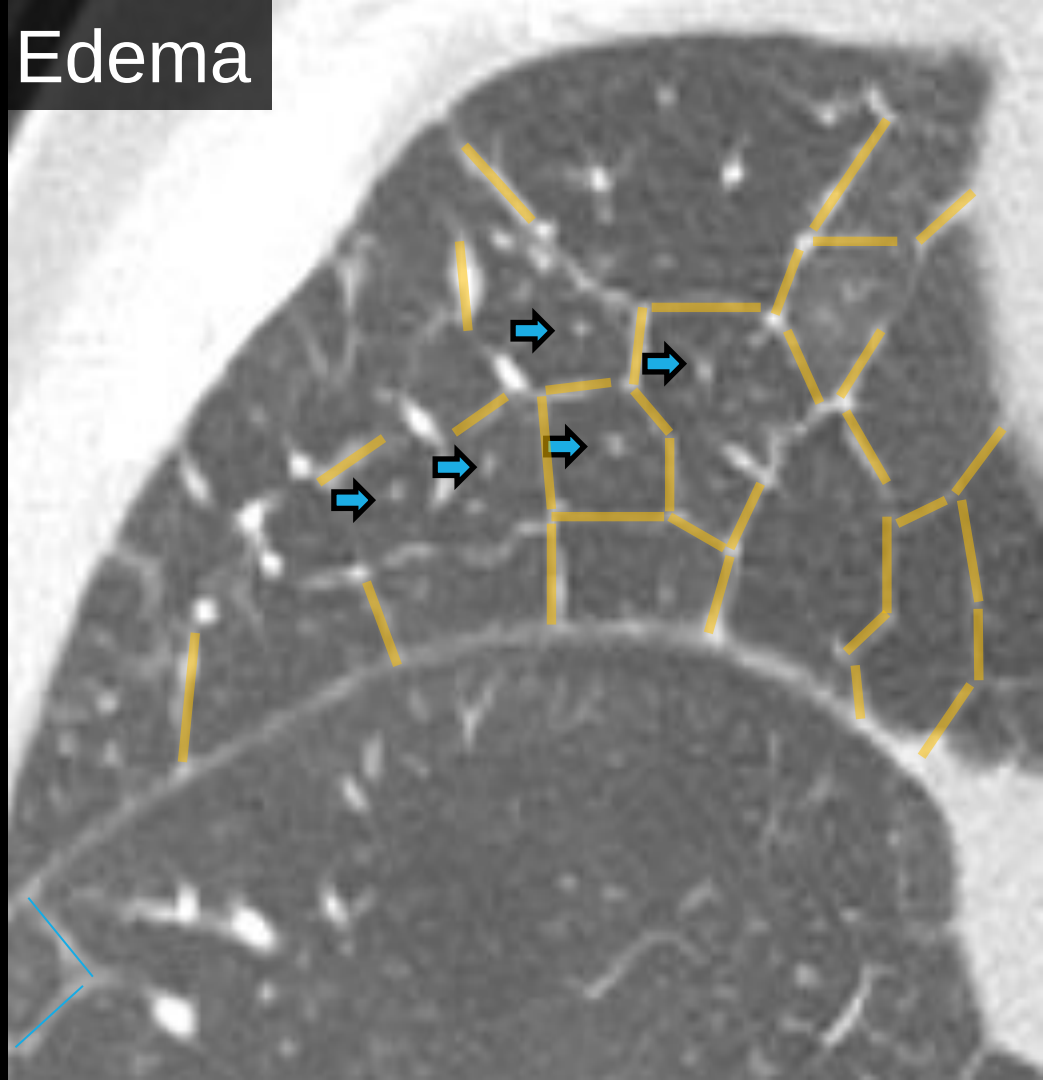
Veins = Septa



4. Vessels

Artery = Center

Veins = Septa



HRCT: Terminology

Radiology

REVIEWS AND COMMENTARY · STATEMENTS AND GUIDELINES

Fleischner Society: Glossary of Terms for Thoracic Imaging

February 2024

Technique, Anatomy, and Terminology

Questions?