Pulmonary Infections

Emergency Radiology 2023
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8th Nordic Course in Emergency Radiology,
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Disclosures: None

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Radiology learning :

First: Recognizing the patterns of “normal enough”
….and the patterns of “not normal”.

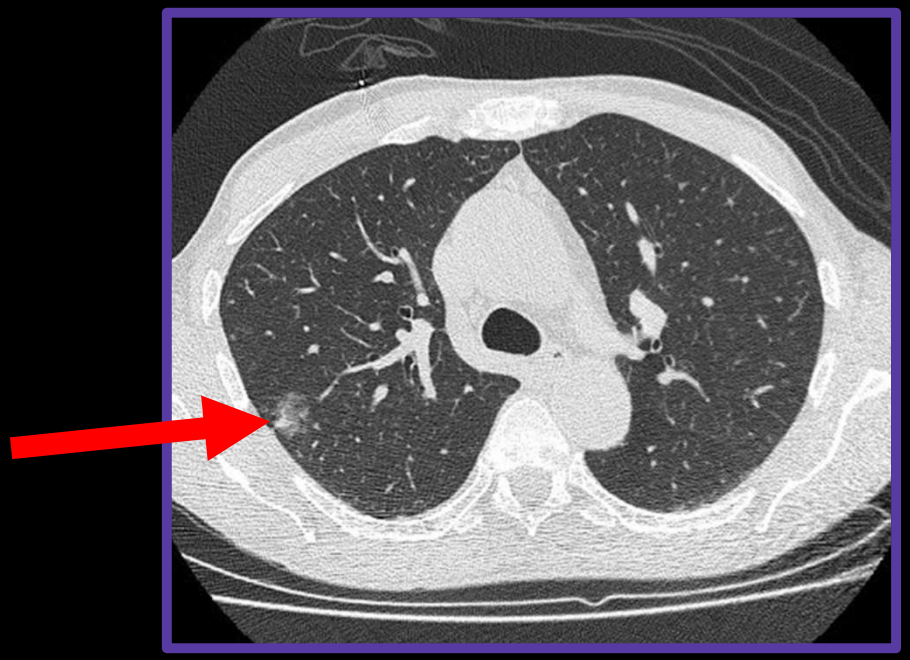
Second: Be serially humbled when the pattern you relied on betrays you.
…Only to wake up tomorrow with your “modified pattern” to continue on.

Lung CT patterns in infection:

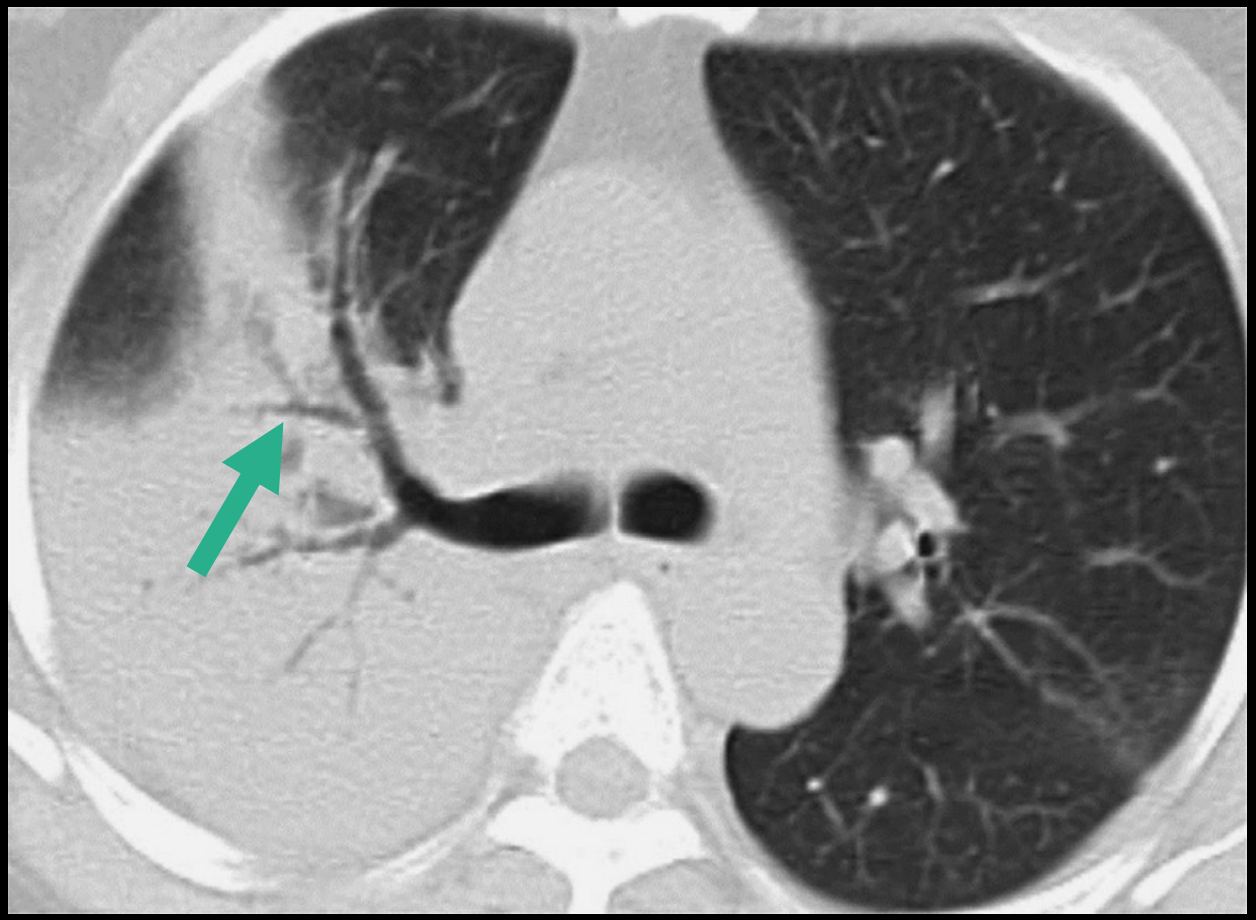
- Air Bronchogram
- Ground glass
- Tree in bud
- Air Fluid Level & Cavitation
- Feeding Vessel
- Finger-in-Glove
- Halo & Reverse Halo
- Miliary
- Split Pleura

Ground glass = Alveolar process

- Viral infections
- Pulmonary hemorrhage
- Edema
- Adenocarcinoma in situ



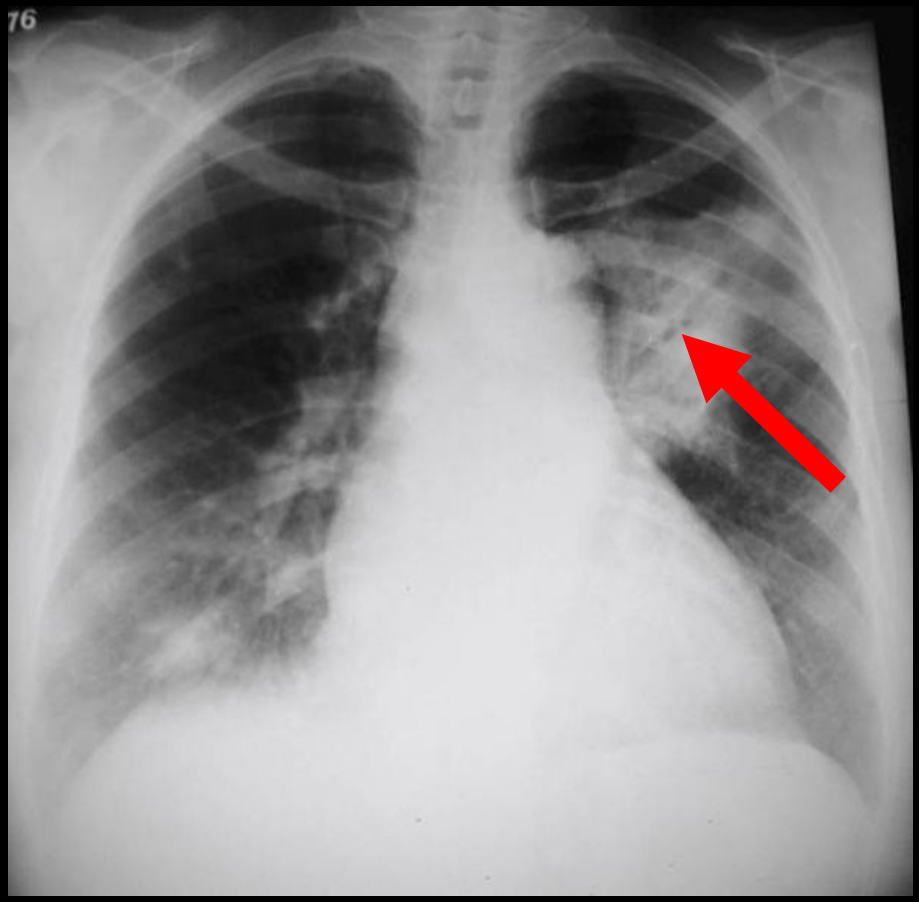
Air Bronchograms



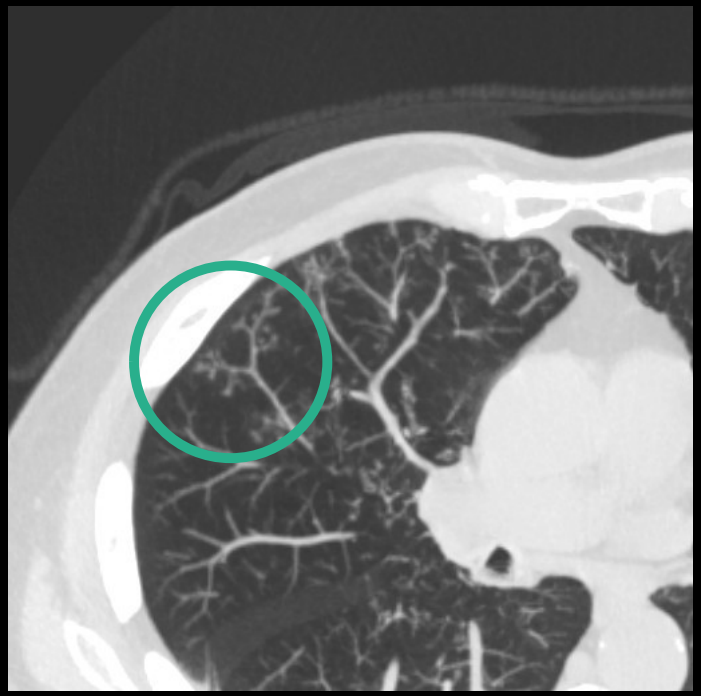
Air-filled bronchi (dark) being made visible by the opacification of surrounding alveoli (grey/white)

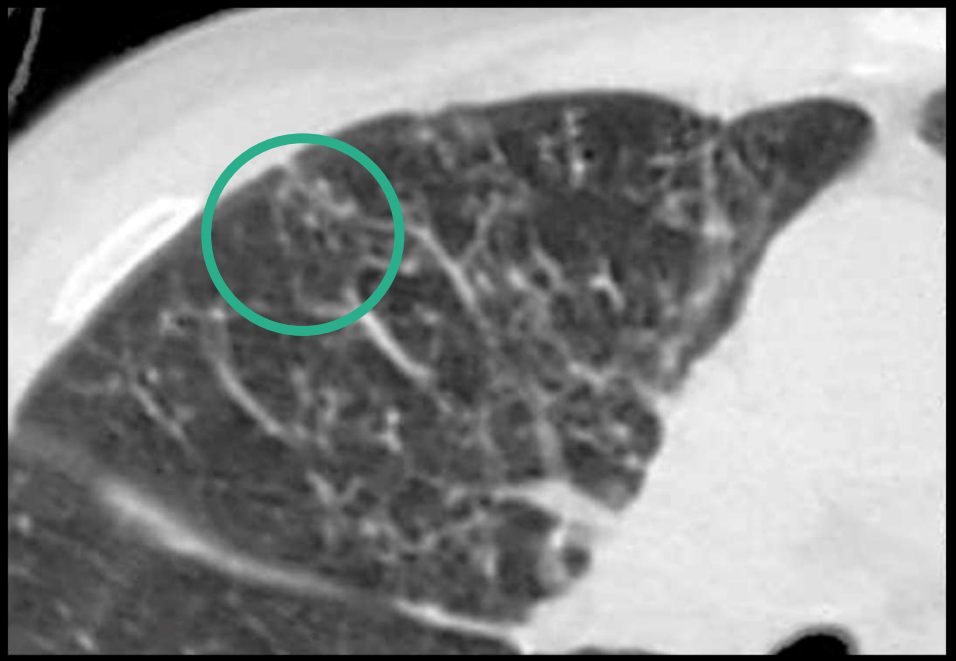
Air bronchograms = Alveolar process *with* patent bronchi

- Pulmonary consolidation due to pneumonia
- Non-obstructive atelectasis
- Bronchioloalveolar carcinoma
  - Have suspicion if ”infection” persist (weeks) despite treatment



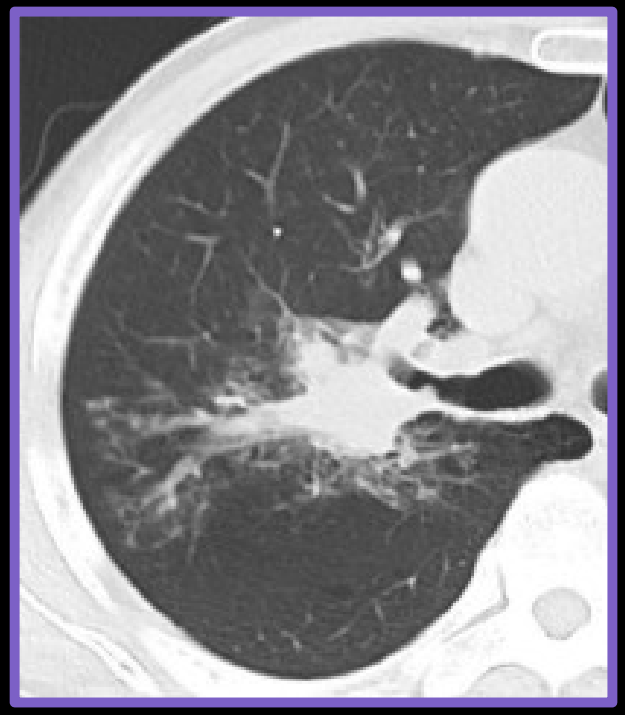
Tree in Bud = Endobronchial Spread





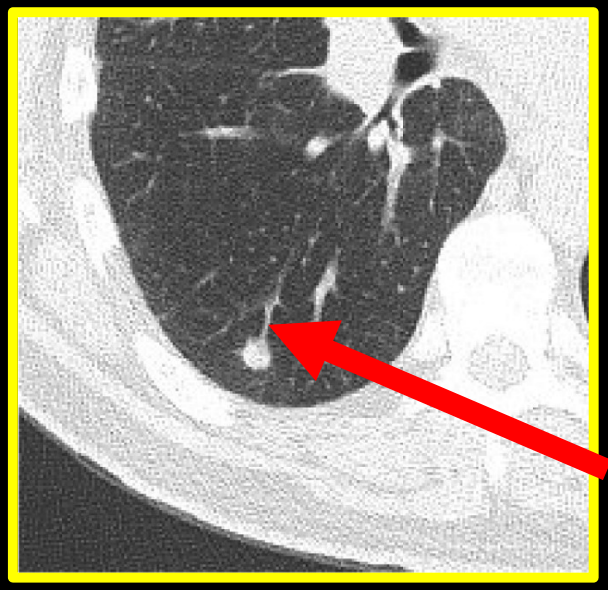
Tree in Bud = Endobronchial Spread

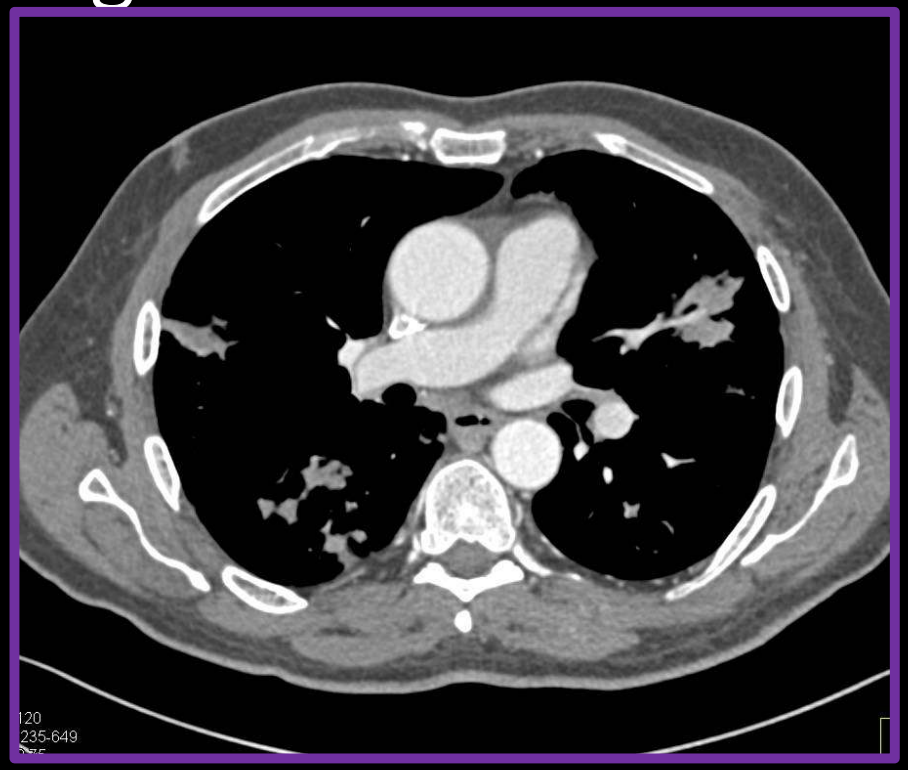
- MAI
- Aspiration, Bronchiolitis
- Tumor primary spread -or head and neck, breast cancer, stomach cancer



Feeding Vessel = Artery leading to a nodule

- Septic embolism
- Vasculitis
- AV malformation
- Metastasis

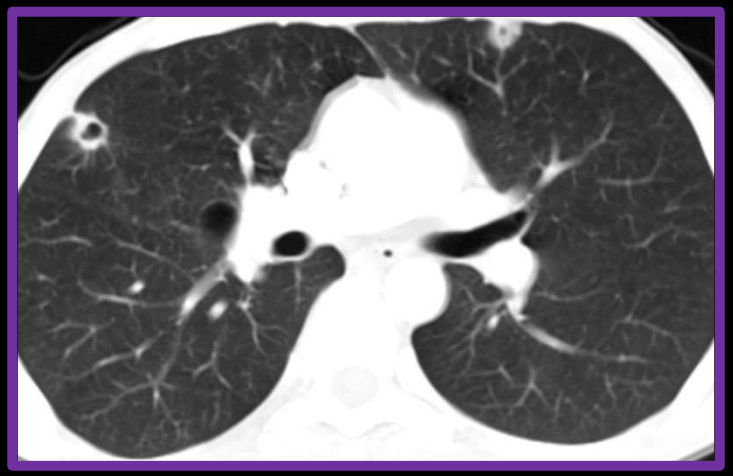




Air Fluid Level & Cavitation – RUL PNA Abscess

Cavitation

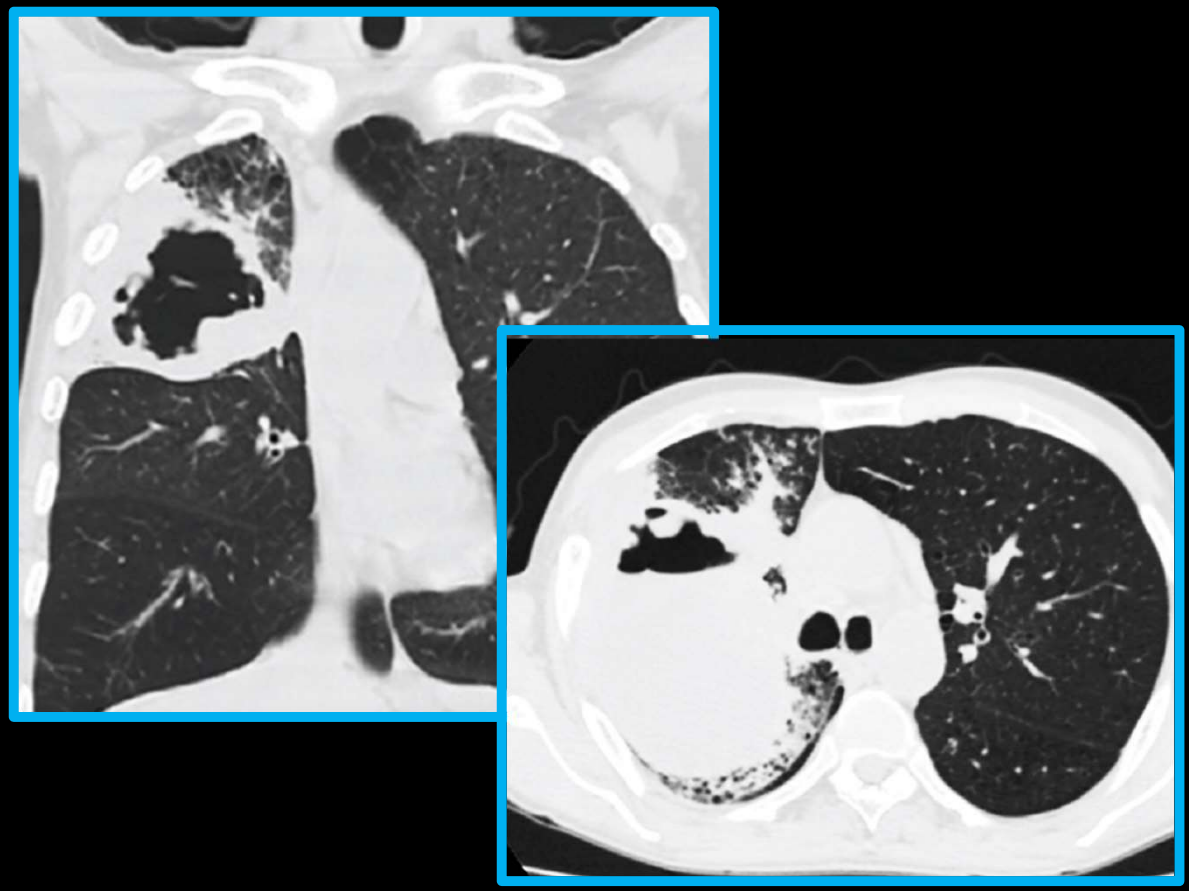
- Abscess
- Septic Emboli
- Metastasis



- Squamous Cell (lung, H&N) ~70%
- TCC
- Osteosarcome
- Pancreatic

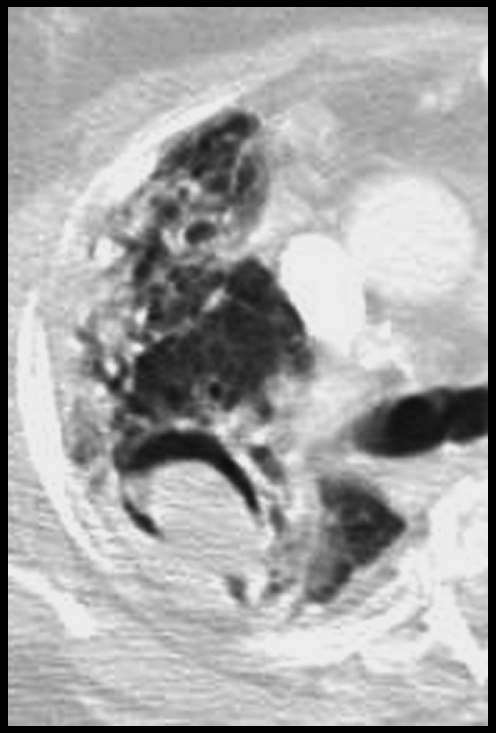
Air Fluid Level in Cavitation

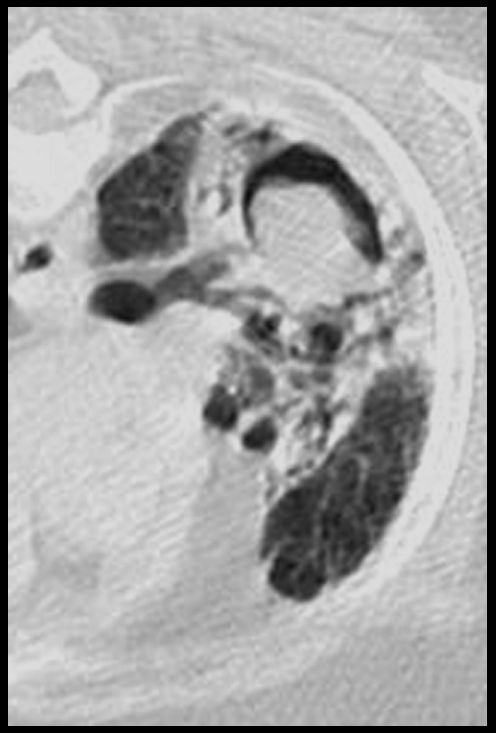
- Abscess
- Laceration, Hematocele, Infected Bulla
- Malignancy
- Bronchial atresia, Congenital pulmonary airway malformations



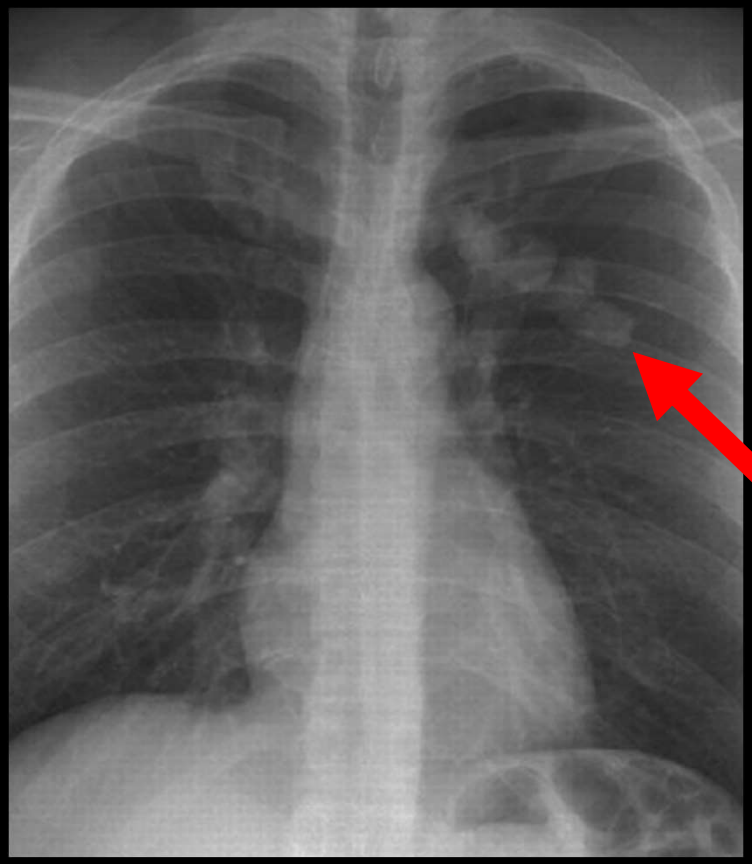
Chronic cavity … with a ball of fungus

- Aspergilloma
- Ball is made of : fungal hyphae with mucous, fibrin and cellular debris
- Chronic cavitary disease
  - Sarcoid, TB and bronchiectasis
- Mass is mobile within the cavity (*Monad Sign*)



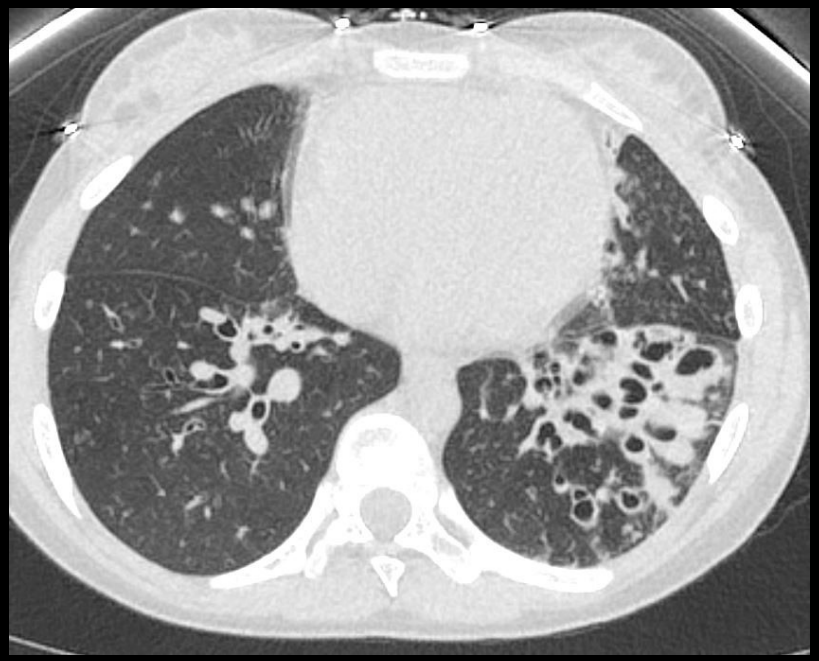


Finger in Glove = **Allergic bronchopulmonary aspergillosis (ABPA)**



Finger in Glove = Dilated filled airway

- ABPA
- Cystic Fibrosis



Halo Sign – Angio-invasive Aspergillus

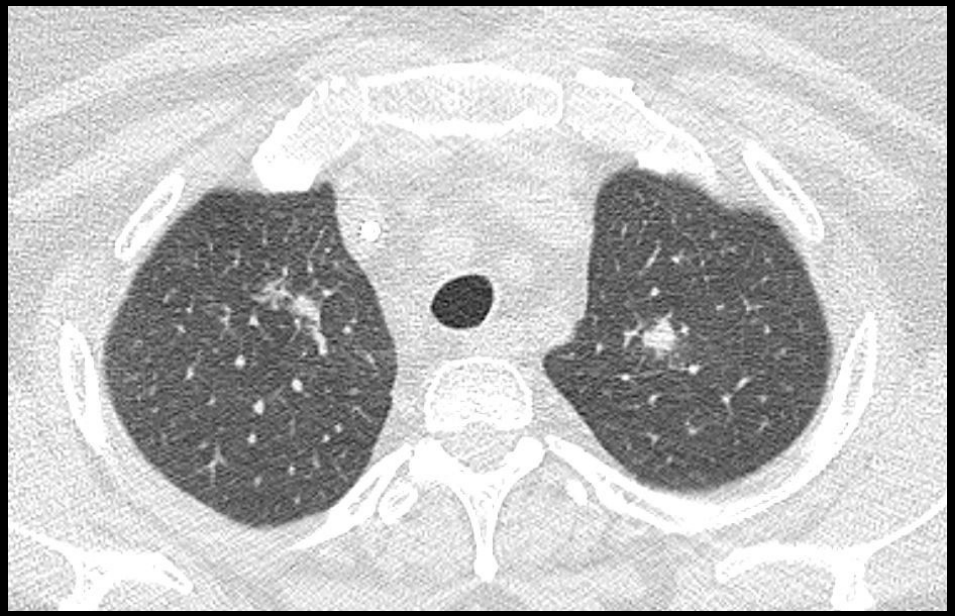
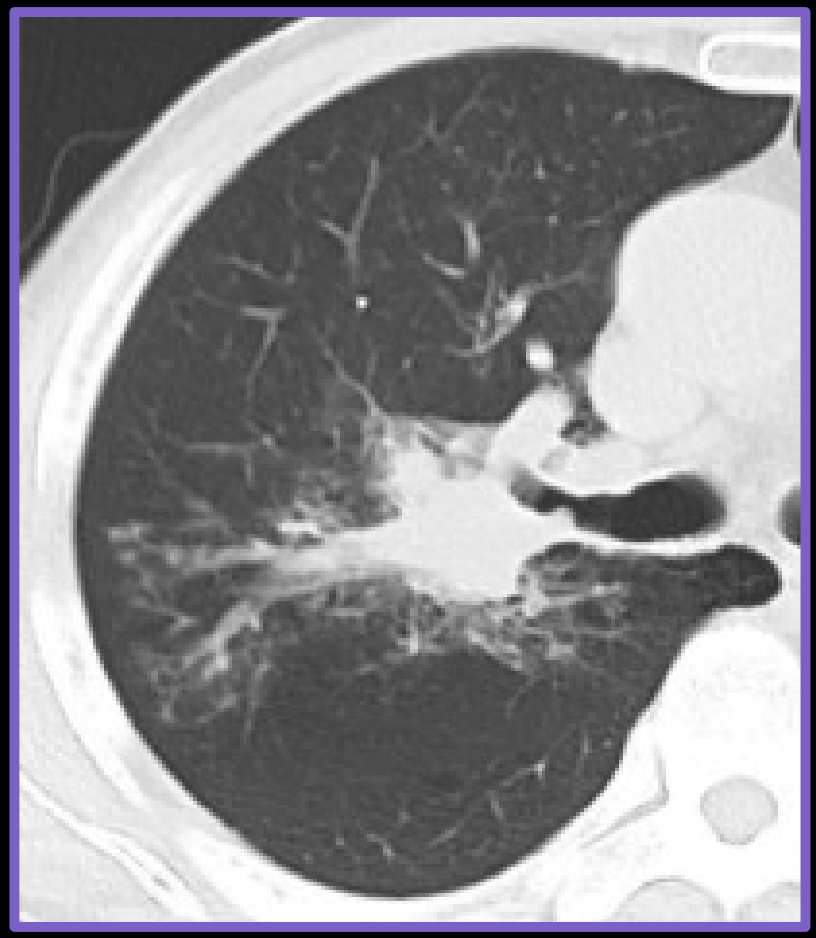


Image author: Dr Bruno Di Muzio

Halo Sign

- Aspergillus invasive
- Mucormycosis
- Coccidiomycosis
- TB

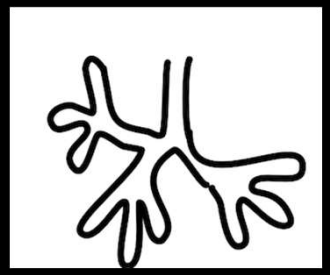
- Septic Embolism
- Malignancy – localized spread
- Metastasis



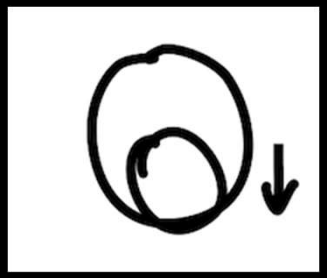
Aspergillus appearance depends on the host immune status

Hyper-Immune — Normal Immunity — Immunosuppression

ABPA



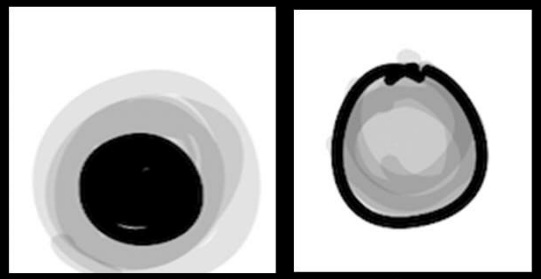
Mycetoma

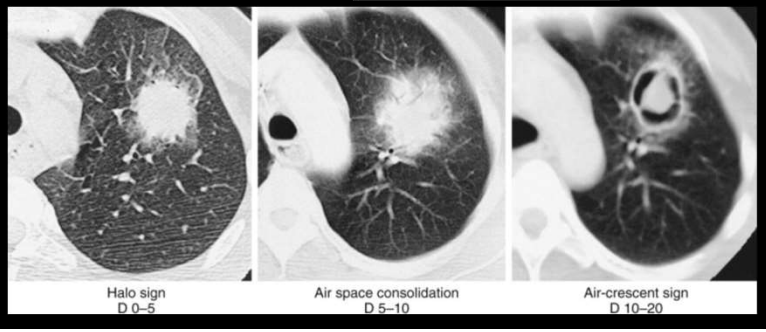


Semi-Invasive

Air – Cresent Sign

Invasive

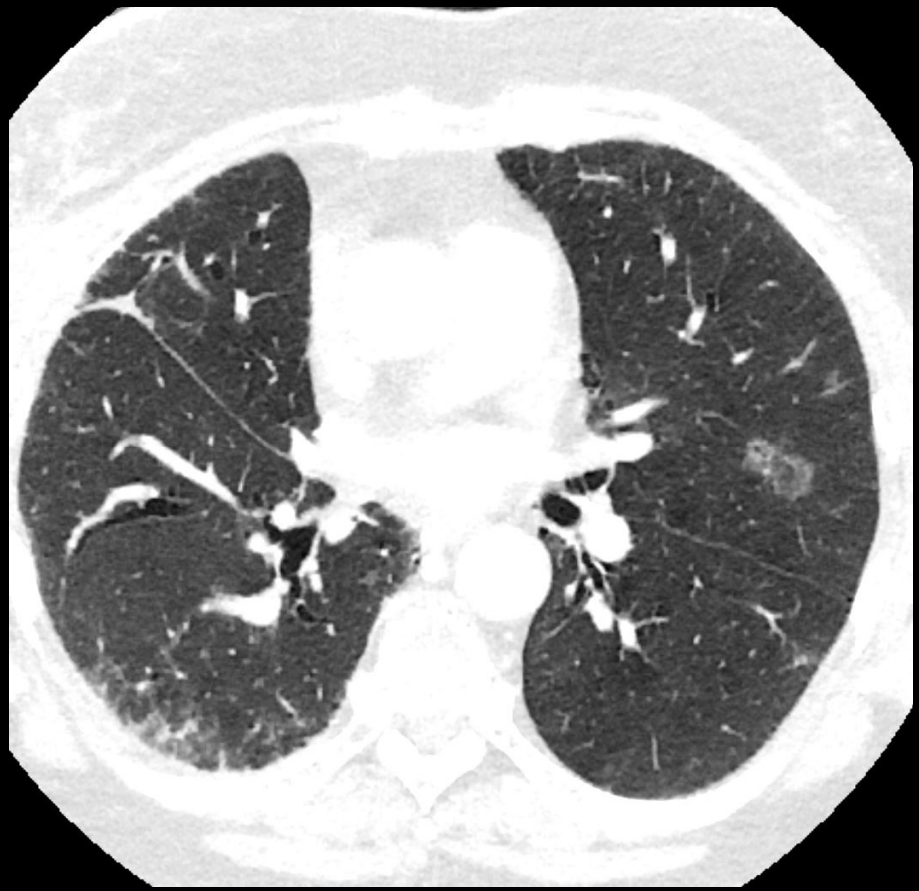




Reverse Halo (Atoll sign) – COP

Reverse Halo (Atoll sign)

- COP
- Invasive Aspergillosis & mucormycosis
- Infarct
- Sarcoid

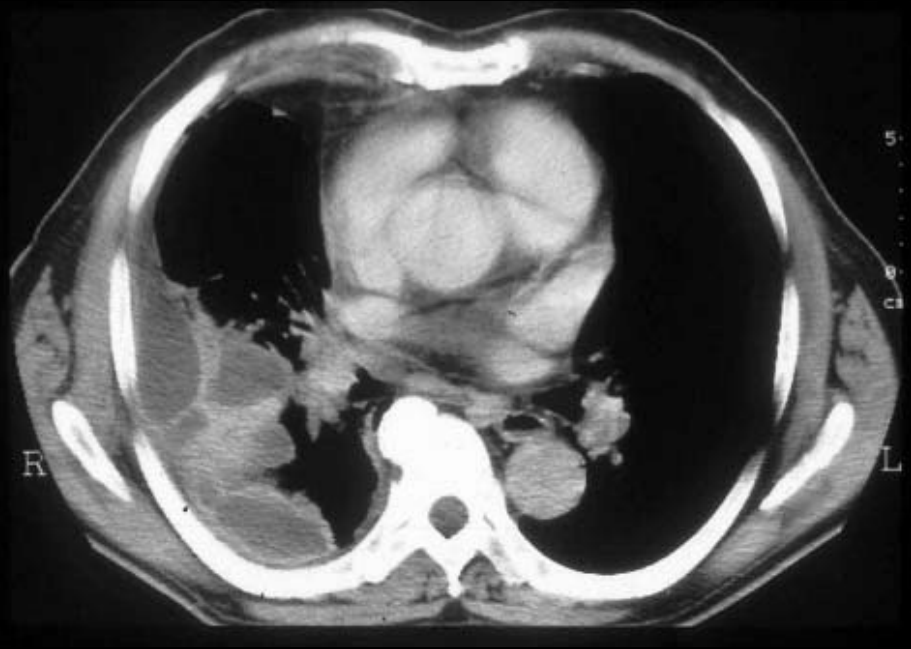


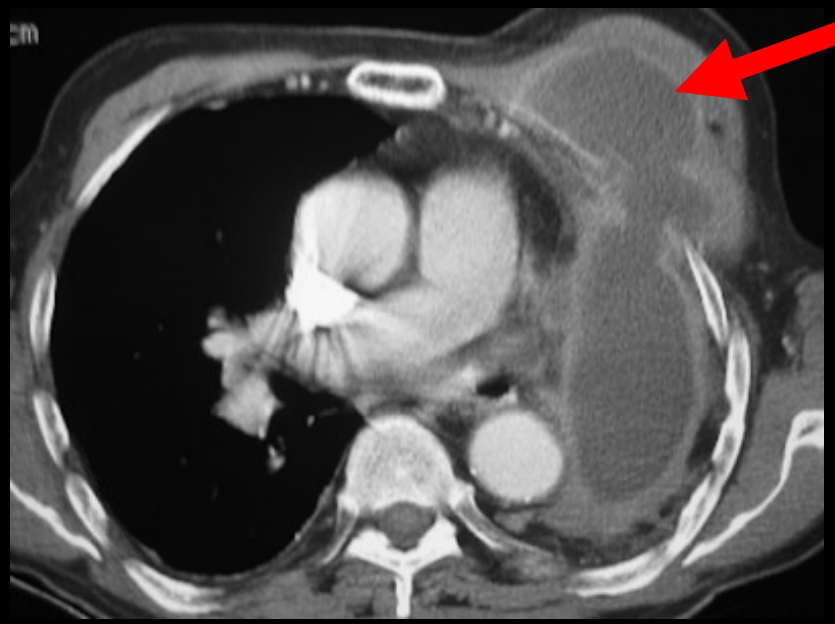
Miliary

- Miliary tuberculosis
- Healed varicella pneumonia
- Thyroid carcinoma
- RCC, Melanoma, Breast

Split Pleura

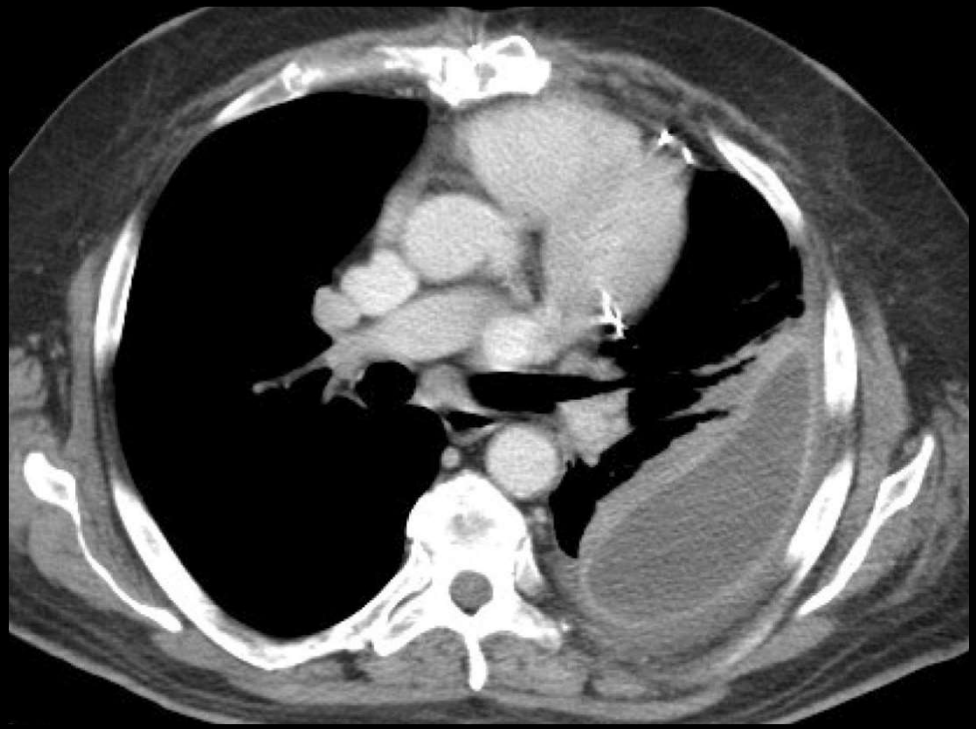
Empyema & Empyema necessitans





Split Pleura Sign

- Empyema
- Hemothorax
- TB
- Metastasis to pleura



Pulmonary Infections: Role of Radiology

- *Narrow* the clinical differential which can help with consideration of risk factors and exposure but they do not make the clinical diagnosis

- CT patterns can be *helpful*

  …But are *not specific to infection, especially in patients with history of metastatic malignancy*