

Lucent Lung Lesions

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What we're covering

- “Cavitary” lung disease
- “Cystic” lung disease

What we're not covering

- Bronchiectasis
- Pleural lucencies
- Lucent lung, lucent lobe, air trapping

- The word *cavity* fails to imply an etiology.

The word *cyst* technically indicates histology we cannot know AND is used casually to indicate a large range of lesions.

Let's change our way of thinking

Lung lesion evaluation: by appearance

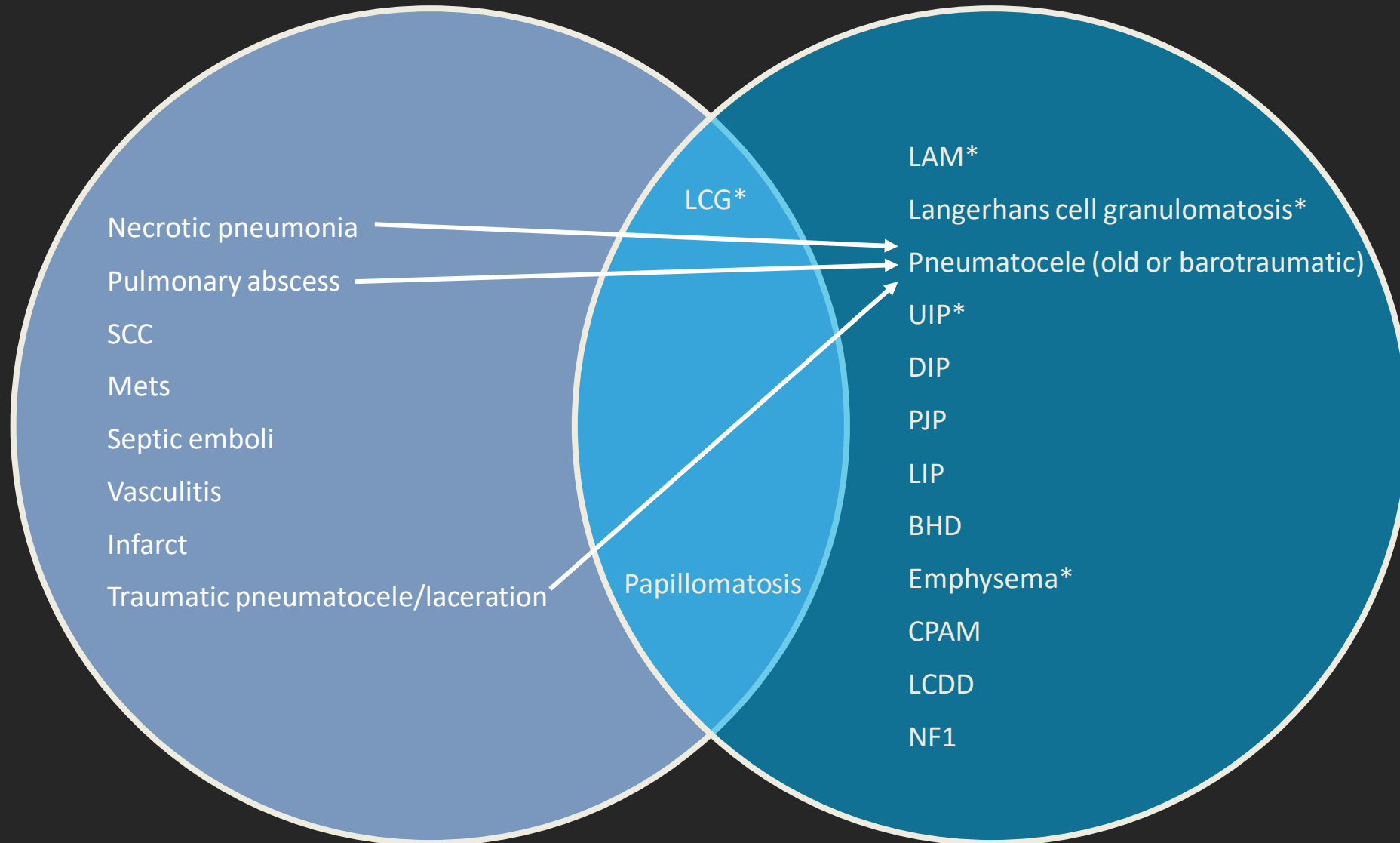
Thick-walled (“cavitary” lung disease)

- Necrotic pneumonia
 - Bacterial, mycobacterial, fungal
- Pulmonary abscess
- Infarct
- Septic emboli
- Traumatic Pneumatocele/laceration
- SCC
- Mets
- Vasculitis/autoimmune
- Papillomatosis

Thin-walled (“cystic” lung disease)

- Emphysema
 - Centrilobular, paraseptal, bullous
- LCG
- Old or barotraumatic pneumatocele
- UIP
- LAM
- LIP
- DIP
- PJP
- CPAM
- BHD
- LCDD
- NF1

Thick vs. Thin



Thick

(Usually) Single

1. Necrotic pneumonia
2. Pulmonary abscess
3. Infarct
4. NSCCa
5. Traumatic pneumatocele/laceration

Multiple

1. Septic emboli
2. Vasculitis (GPA, RA)
3. Mets (SCC, sarcoma)

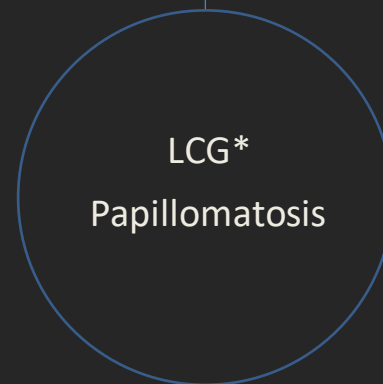
Thin

Characteristic

- a. Emphysema*
- b. LAM*
- c. Honeycombing* (UIP/Fibrosis)

Nonspecific

- a. Old pneumatocele
- b. PJP
- c. DIP
- d. LIP
- e. BHD
- f. CPAM
- g. LCDD
- h. NF1



Thick wall

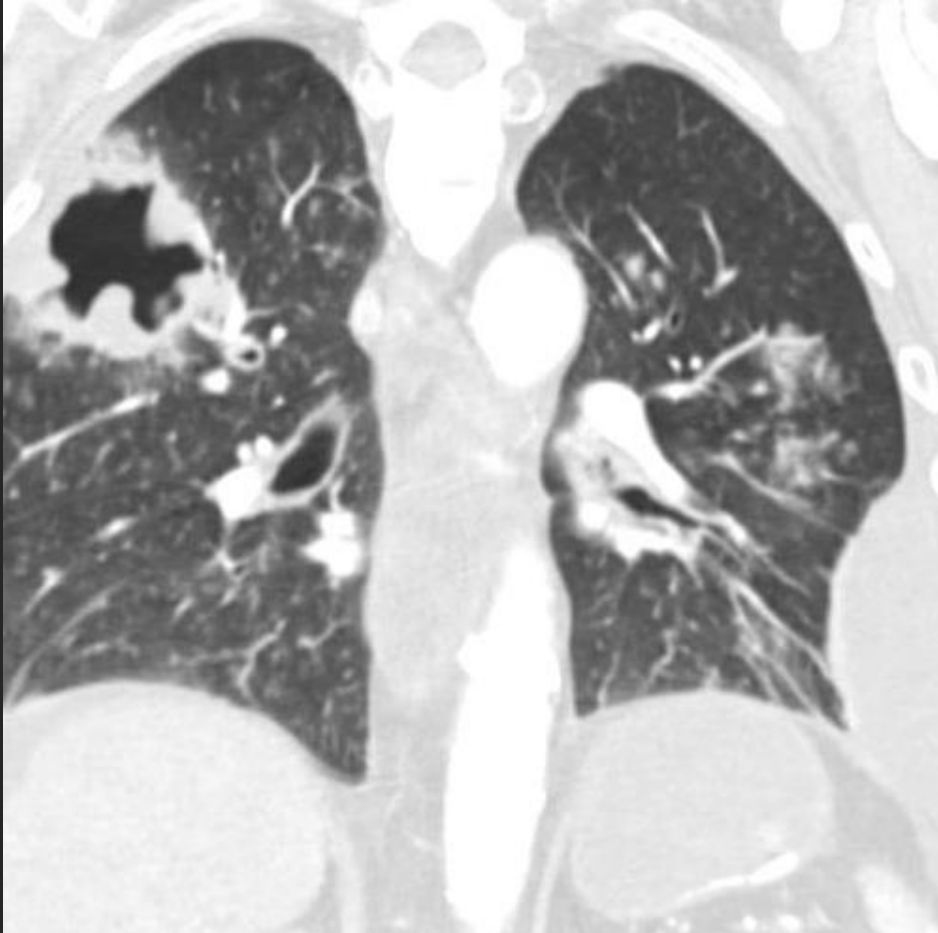
Single

- Necrotic pneumonia
- Pulmonary abscess
- Infarct
- Traumatic pneumatocele/laceration
- SCC

Multiple

- Septic emboli
- Vasculitis (GP, RA)
- Mets (SCC, sarcoma)
- Papillomatosis

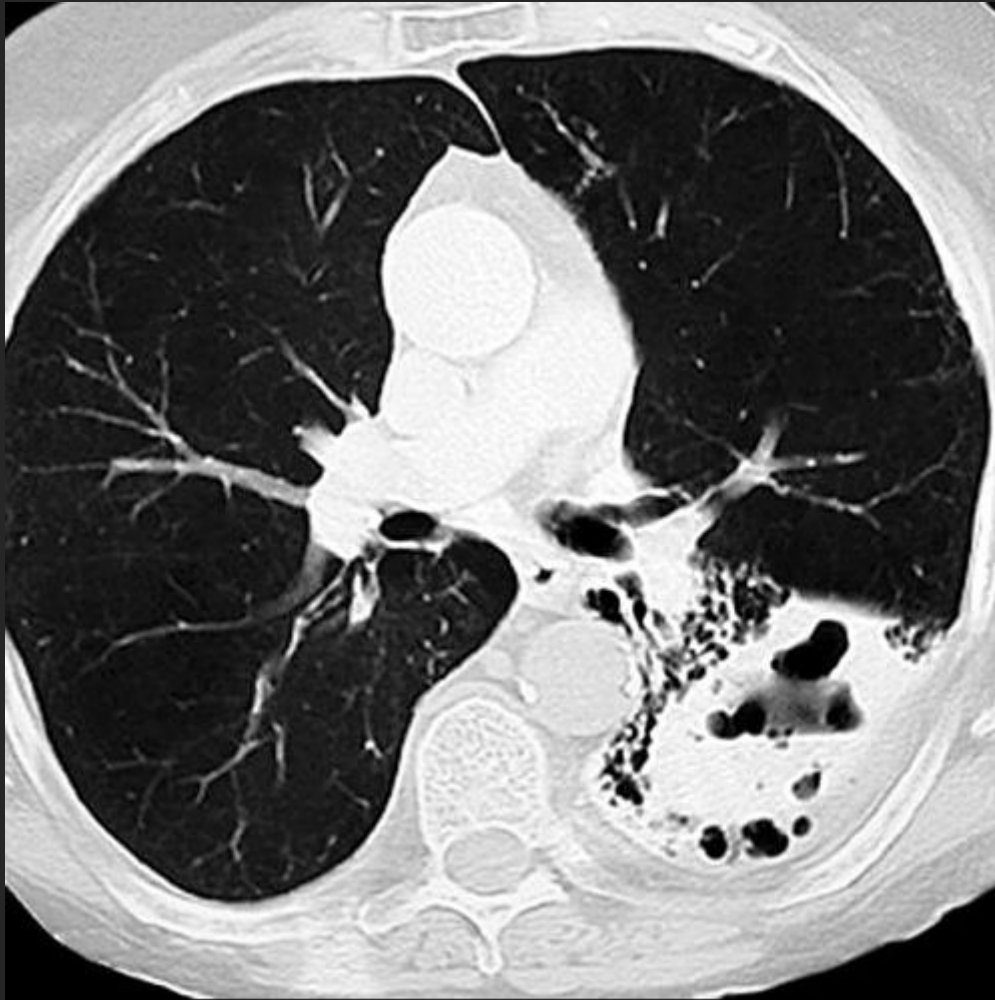
Pneumonia



Thick; (usually) single

- Mycobacteria and fungi often upper lobe
- Typicals often lower lobe

Abscess

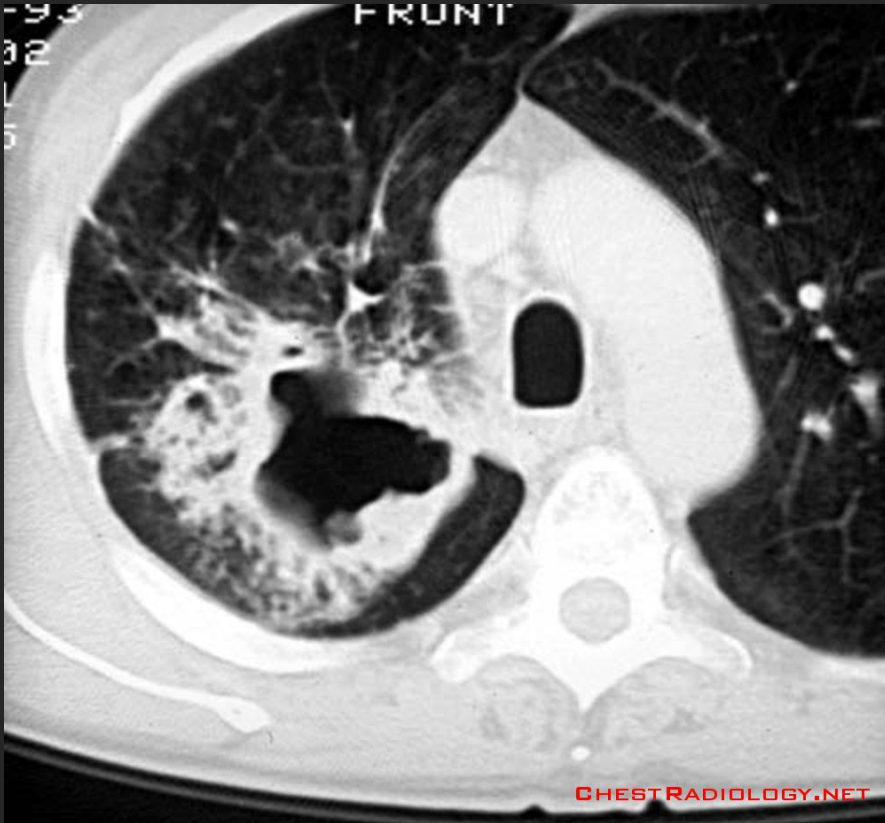


Thick; (usually) single

- **AFL in 75%**
- Thick wall or surrounded by consolidation
- May spread disease endobronchially
- Aspiration (mixed flora)
- Anaerobes, aerobes, parasites, fungi

Squamous Cell Carcinoma (lung primary)

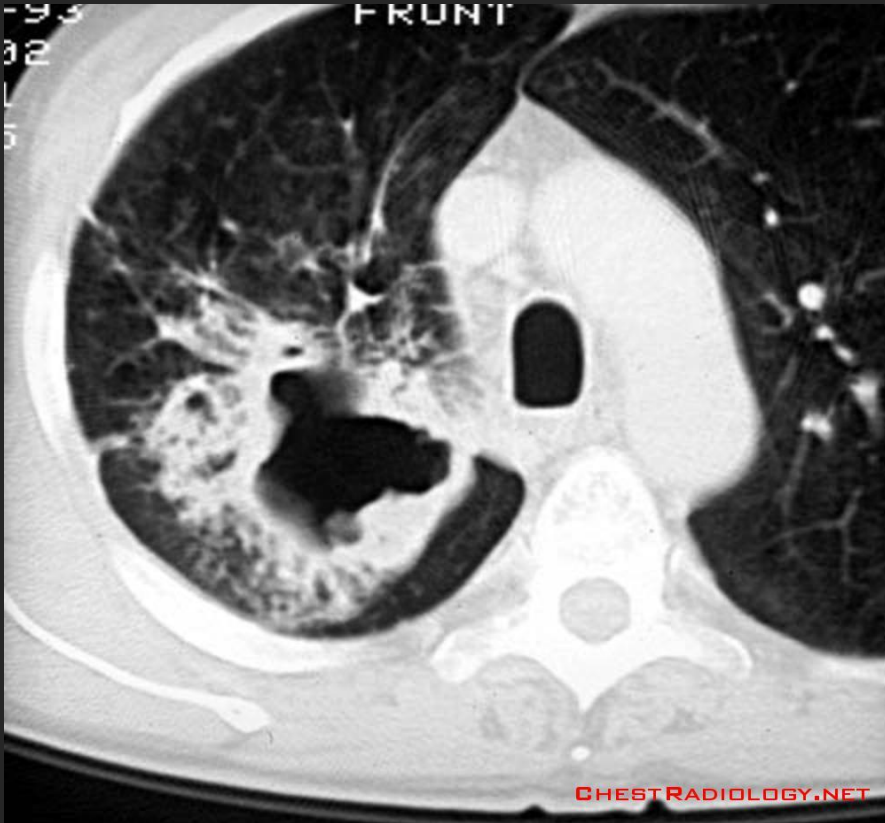
Thick; (usually) single



- Nodule or mass, central or peripheral
- Airway destruction and obstruction with **postobstructive change**
- Hilar and mediastinal adenopathy
- 15% cavitate
- 13% calcify

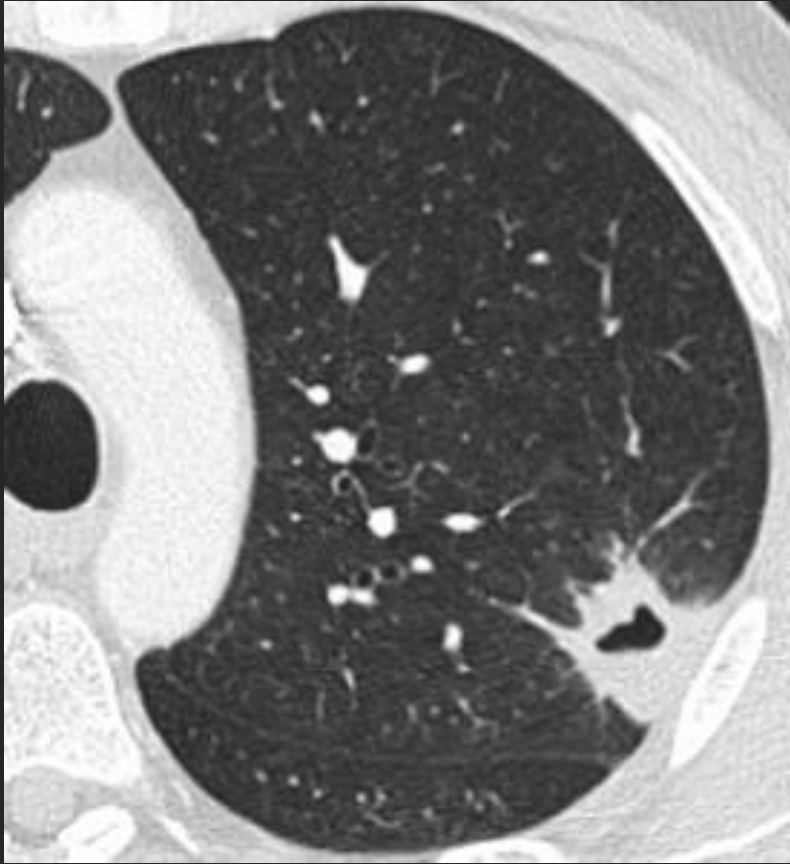
Squamous Cell Carcinoma (lung primary)

Thick; (usually) single



- **Smokers**
- Airway squamous cell origin
- Cough, hemoptysis, fever, weight loss
- 7-10% asymptomatic

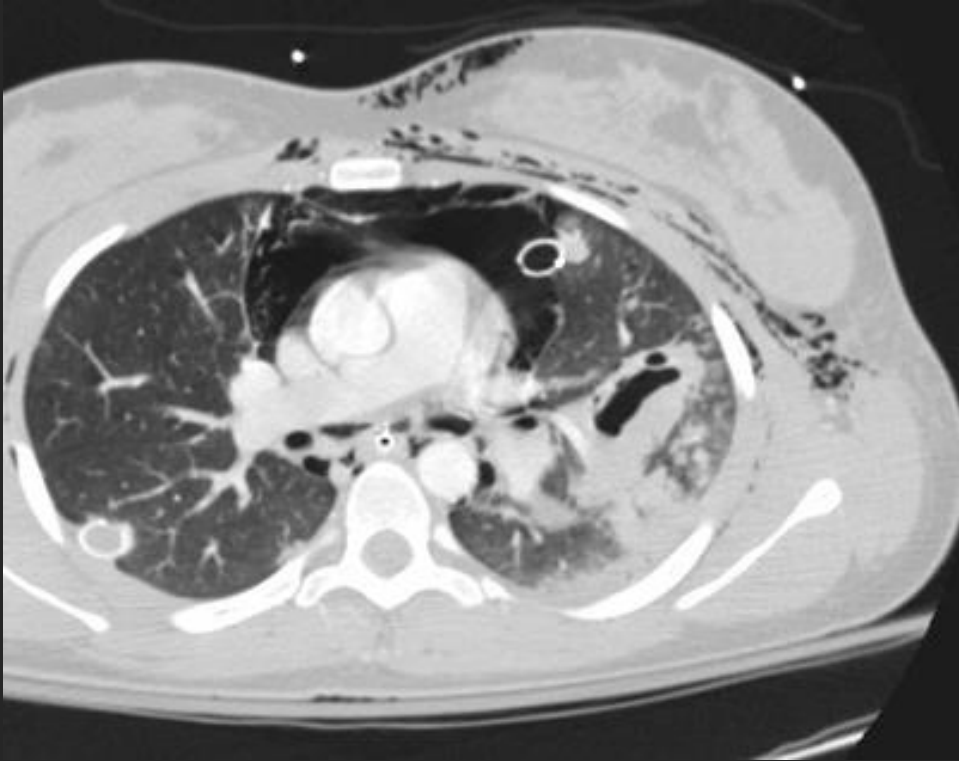
Infarction



Thick; (usually) single

- Juxtapleural, wedge-shaped
- 4-5% of infarcts cavitate
- May heal as pneumatocele

Traumatic Pneumatocele Laceration



Thick; (usually) single

- **At site/along course of trauma**
- Surrounding consolidation is hemorrhage
- May heal as thin-walled pneumatocele

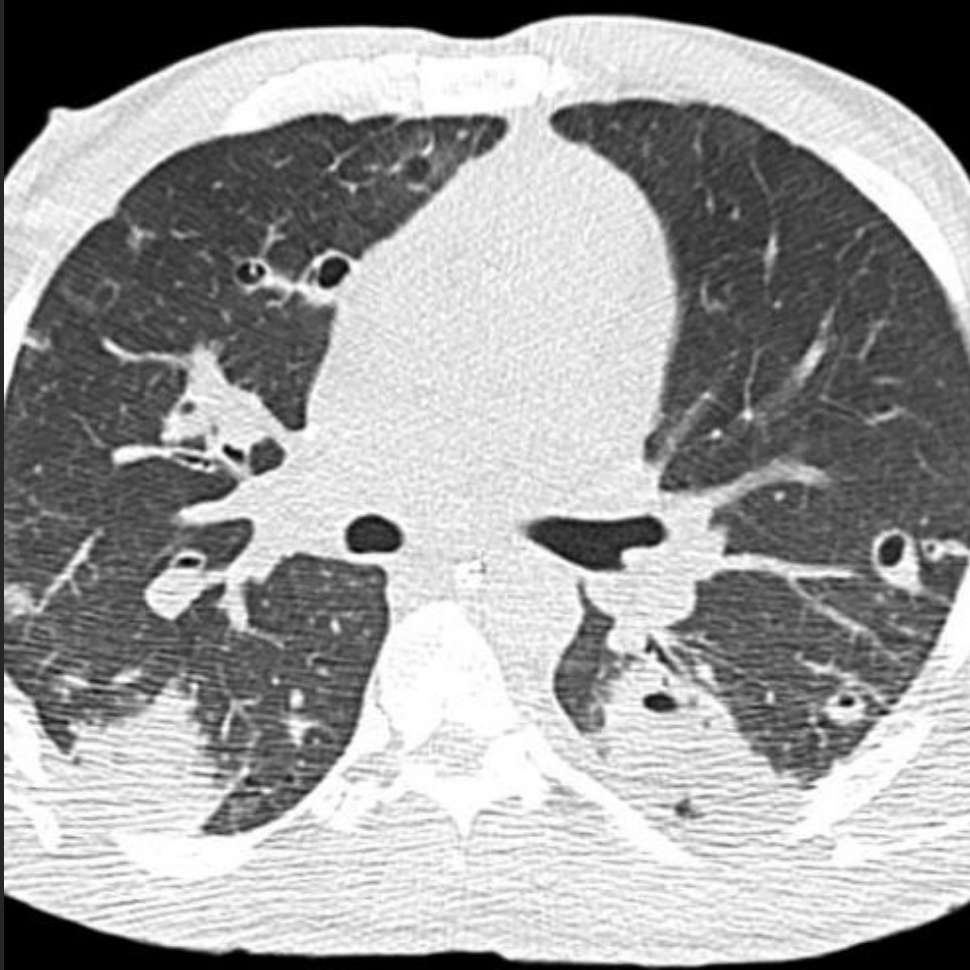
Metastases

Thick; Multiple



- Multicentric
- Peripheral
- Lower lung zone predominance
- **SCC** and sarcomas

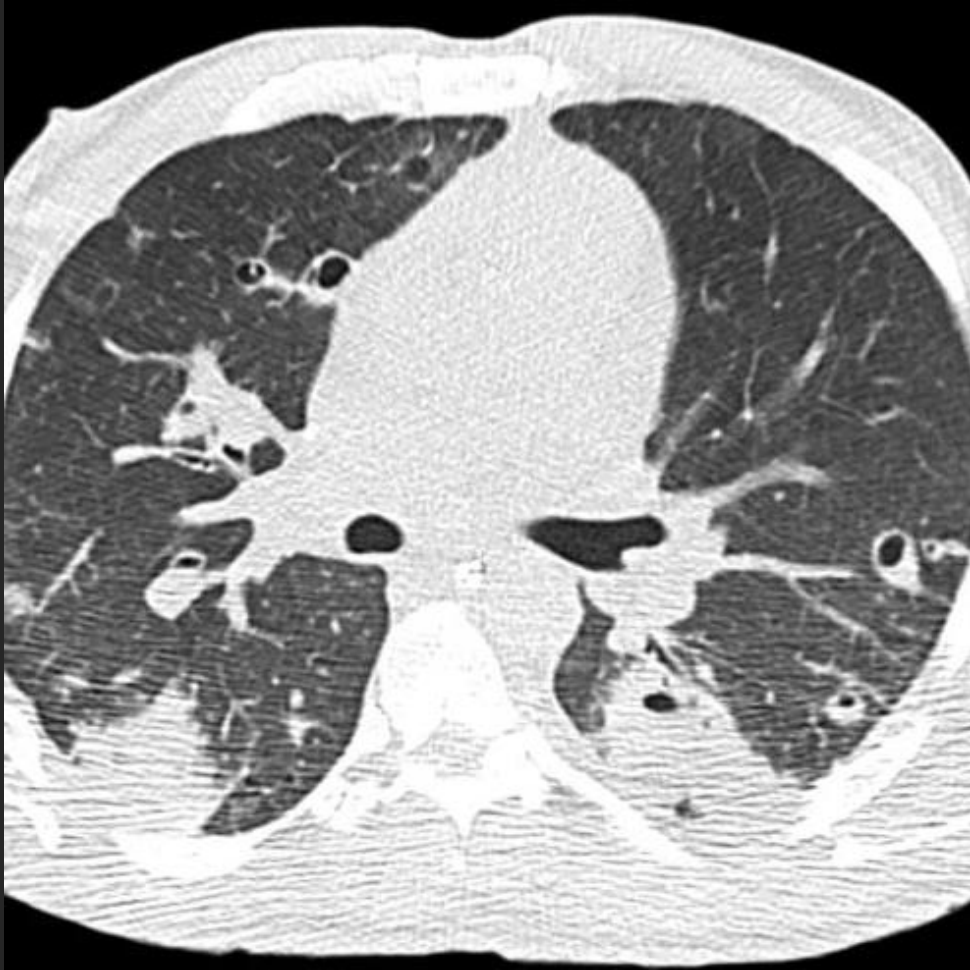
Septic Emboli



Thick; Multiple

- Multicentric, peripheral, basilar
- **Cavitation in various stages**
- Coexistent infarcts
- Feeding vessel sign (60-70%)
- Rapid cavitation (~24h)
- Adenopathy in minority (25%)
- **Loculated effusion**

Septic Emboli

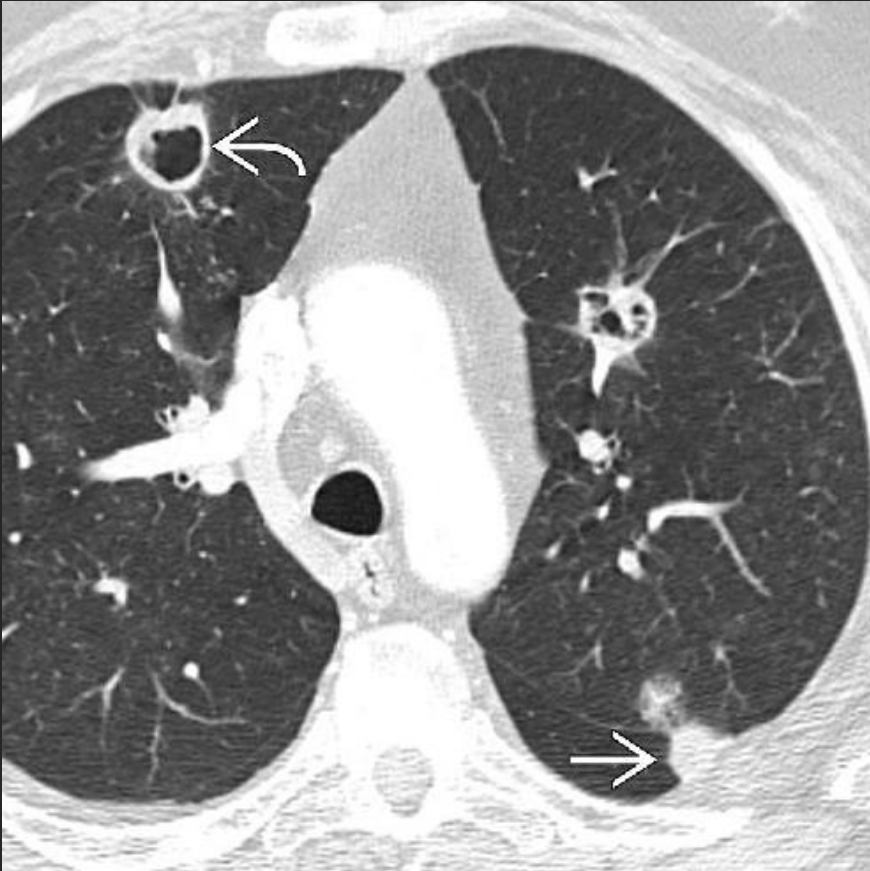


Thick; Multiple

- **IVDU, indwelling catheters**
- *Staphylococcus aureus* most common organism related to foreign bodies & IV drug abuse
- Fever, dyspnea, hemoptysis
- Imaging abnormalities may precede + blood cx

Autoimmune/Vasculitis (Wegener; GPA)

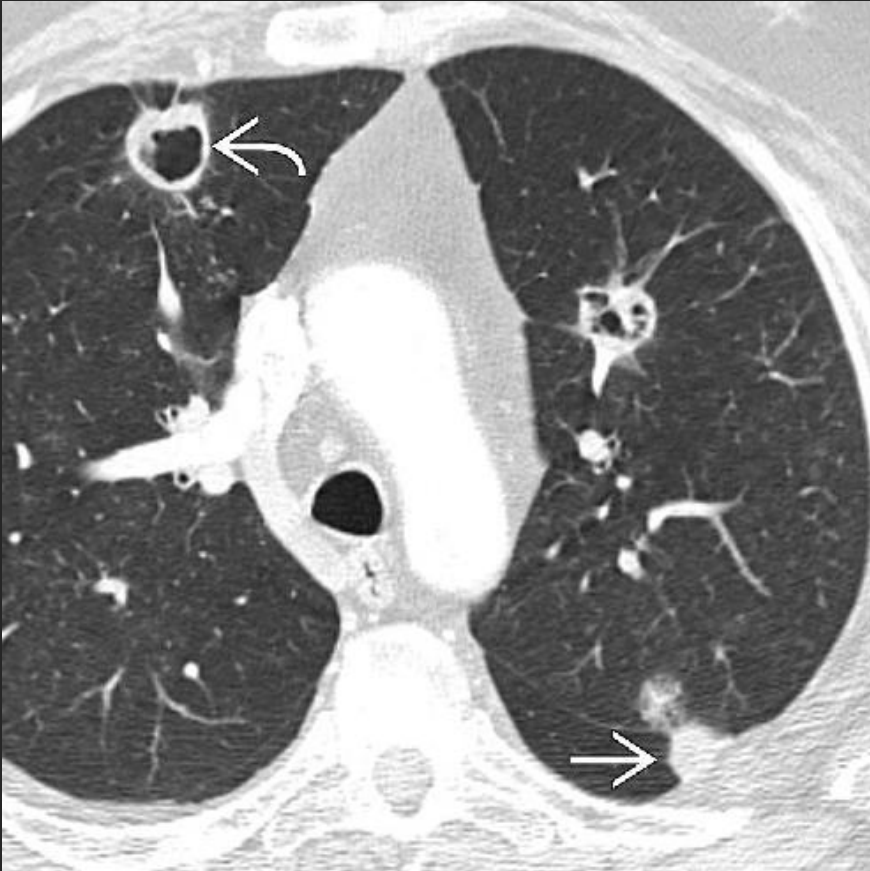
Thick; Multiple



- Multicentric
- **Ground glass halo** (hemorrhage)
- Cavitation in larger nodules
- Airspace opacity

Autoimmune/Vasculitis (Wegener; GPA)

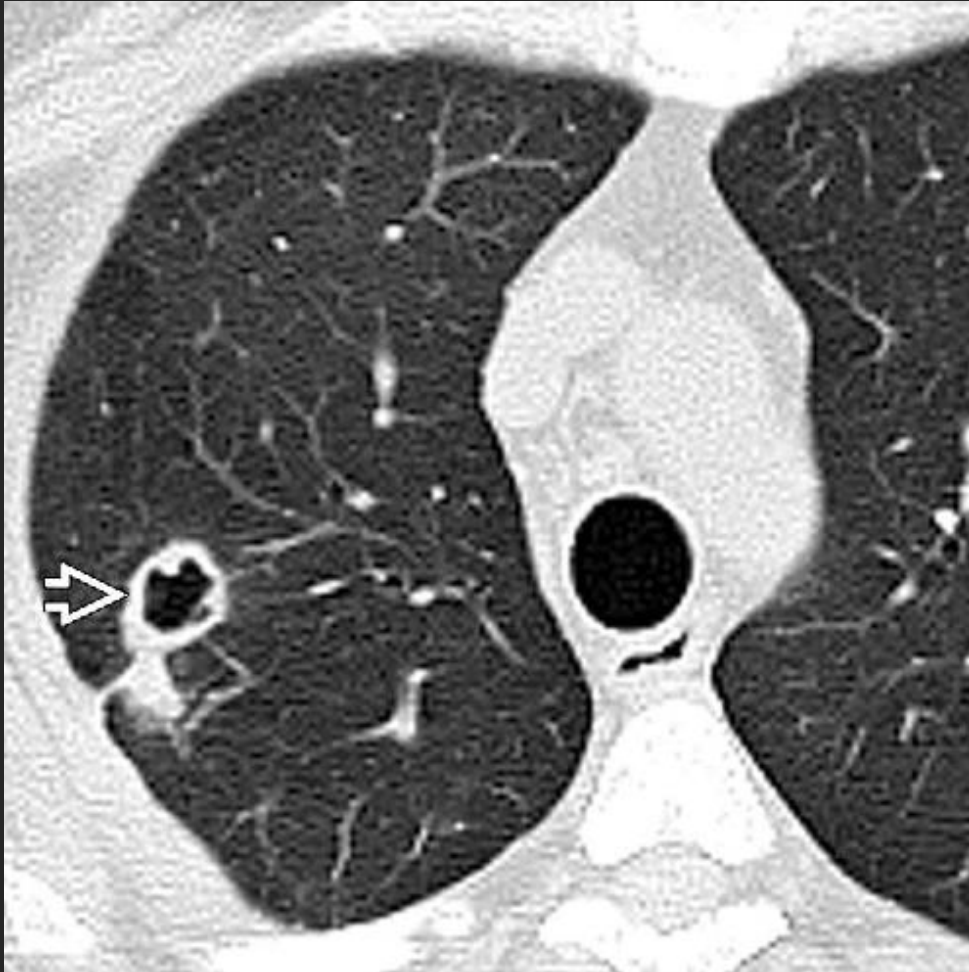
Thick; Multiple



- Multisystem necrotizing granulomatous vasculitis of small to medium-sized vessels
- Classic: Pulmonary disease, sinusitis, glomerulonephritis
- **c-ANCA**
- 4th and 5th decades

Autoimmune/Vasculitis (Rheumatoid nodules)

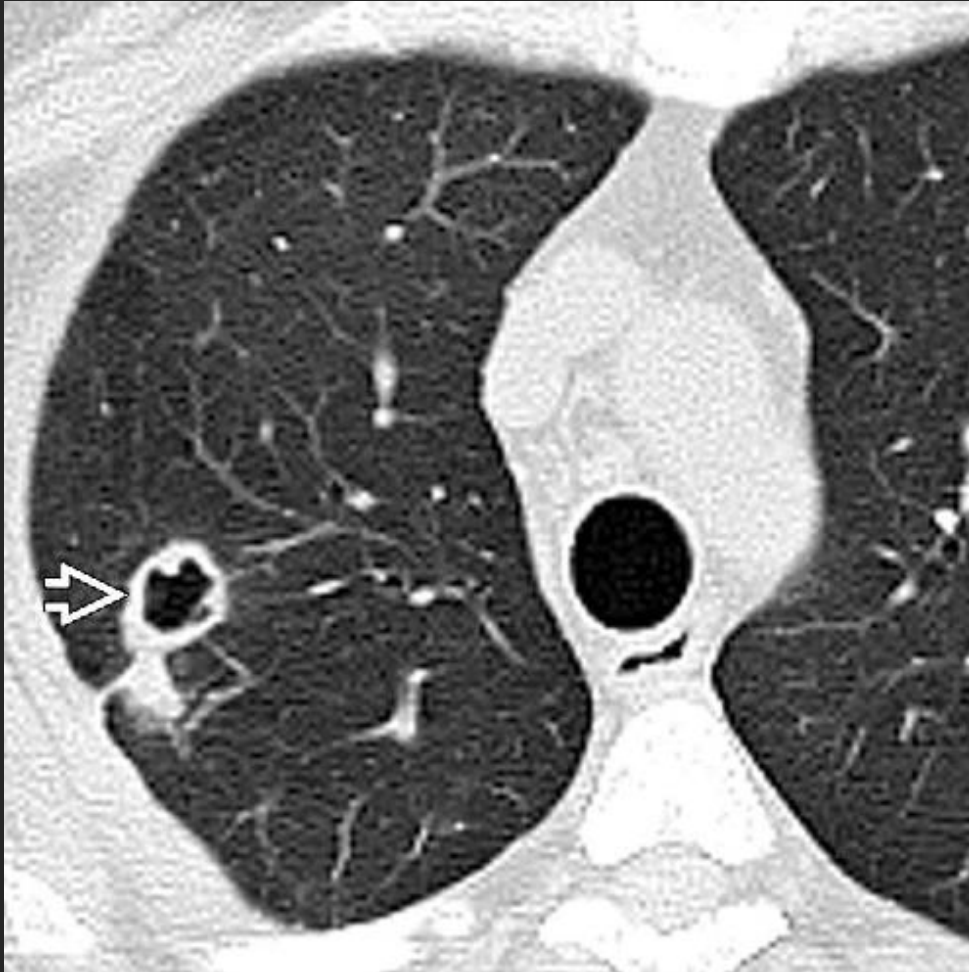
Thick; Multiple



- Onset 25-50 yoa
- **Synovitis and polyarthrititis**
- **80% RF+**
- M>F, smokers

Autoimmune/Vasculitis (Rheumatoid nodules)

Thick; Multiple



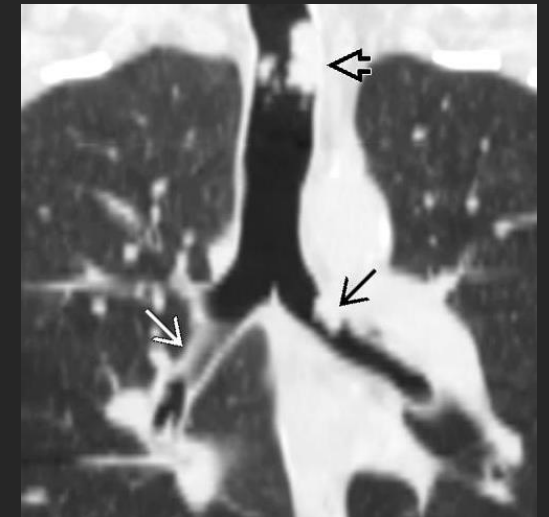
- Peripheral
- Waxing and waning
- 50% cavitate
- Associated with **serositis and fibrosis**

Bronchial Papillomatosis

Thick; multiple

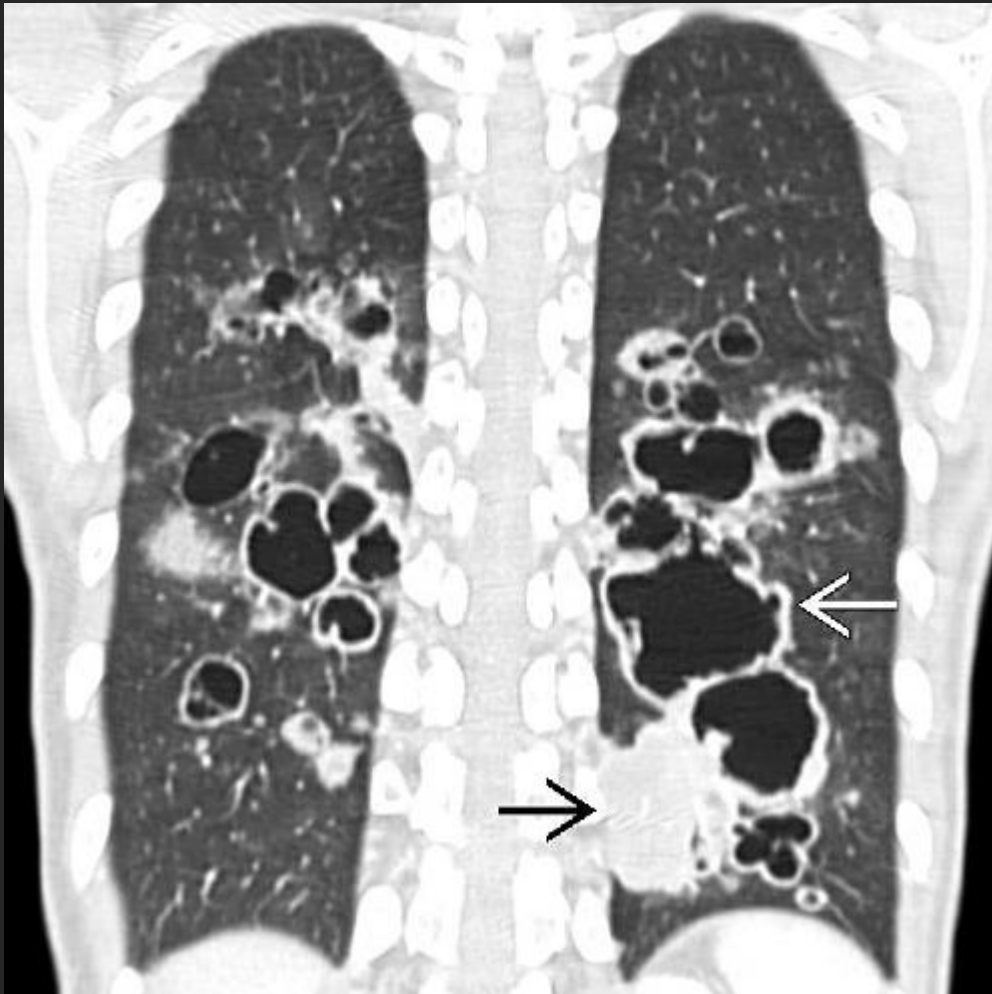


- Multiple nodules of varying size
- Slow growth of nodules
- Lucent lesions vary in size and wall thickness
- **Bronchial wall lesions**



Bronchial Papillomatosis

Thick; Multiple



- HPV 6 and 11
- Pulmonary involvement indicates invasive disease
- Rapid nodule growth indicates degeneration into SCC

Thin wall

Characteristic

- LAM
- Langerhans cell histiocytosis
- Emphysema
- Honeycombing

Nonspecific

- Pneumatocele (old or barotraumatic)
- DIP
- PJP
- LIP
- BHD
- CAM
- LIP
- LCDD
- NF1

Emphysema (Centrilobular)

Thin; Characteristic

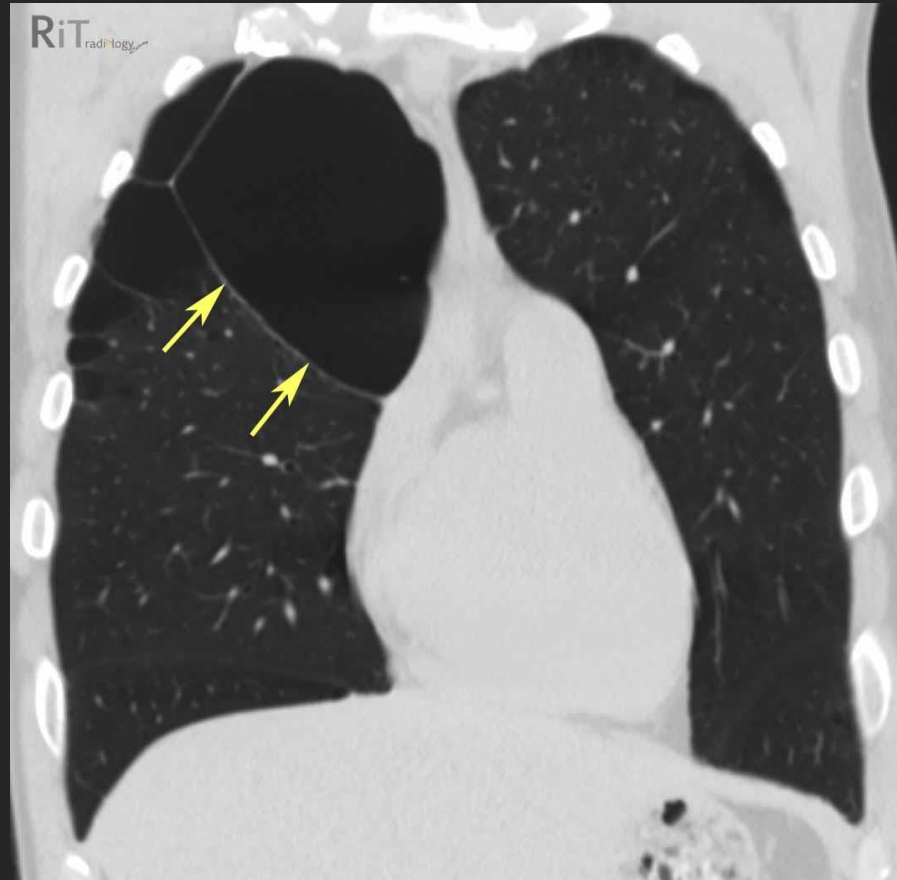


- Centrilobular lucencies
- Upper lung zone predominant
- Imperceptible walls
- Smokers

Emphysema
(Paraseptal/Bullous)



Thin; Characteristic



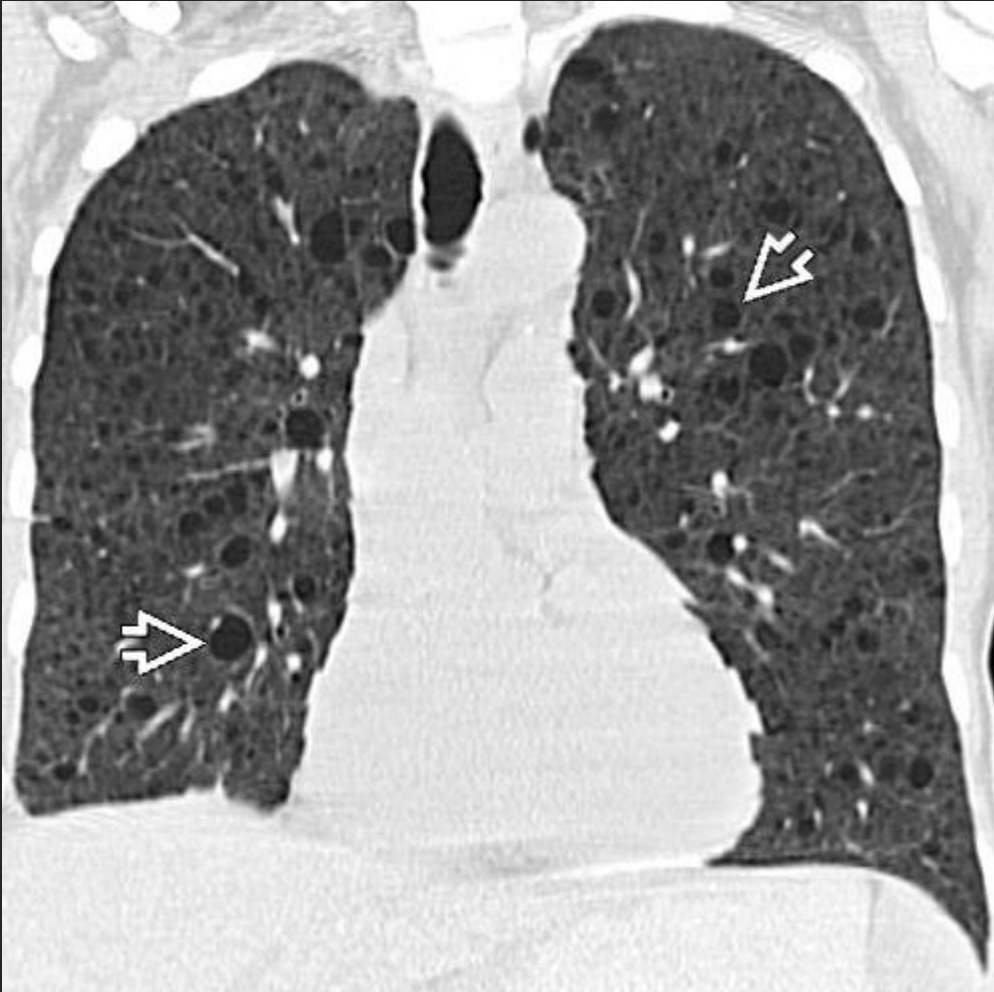
Lymphangiomyomatosis



Thin; Characteristic

- Diffuse, **no zonal predominance**
- **Uniform, very thin walls**
- Large or small lesions
- Normal to increased volumes
- **Exclusively in women**
- Tuberosus sclerosis complex if in men

LAM



Thin; Characteristic

- Smooth muscle cell proliferation within lymphatic vessels
- Large lesions indicate progressive disease
- Women of reproductive age

Langerhans Cell Histiocytosis

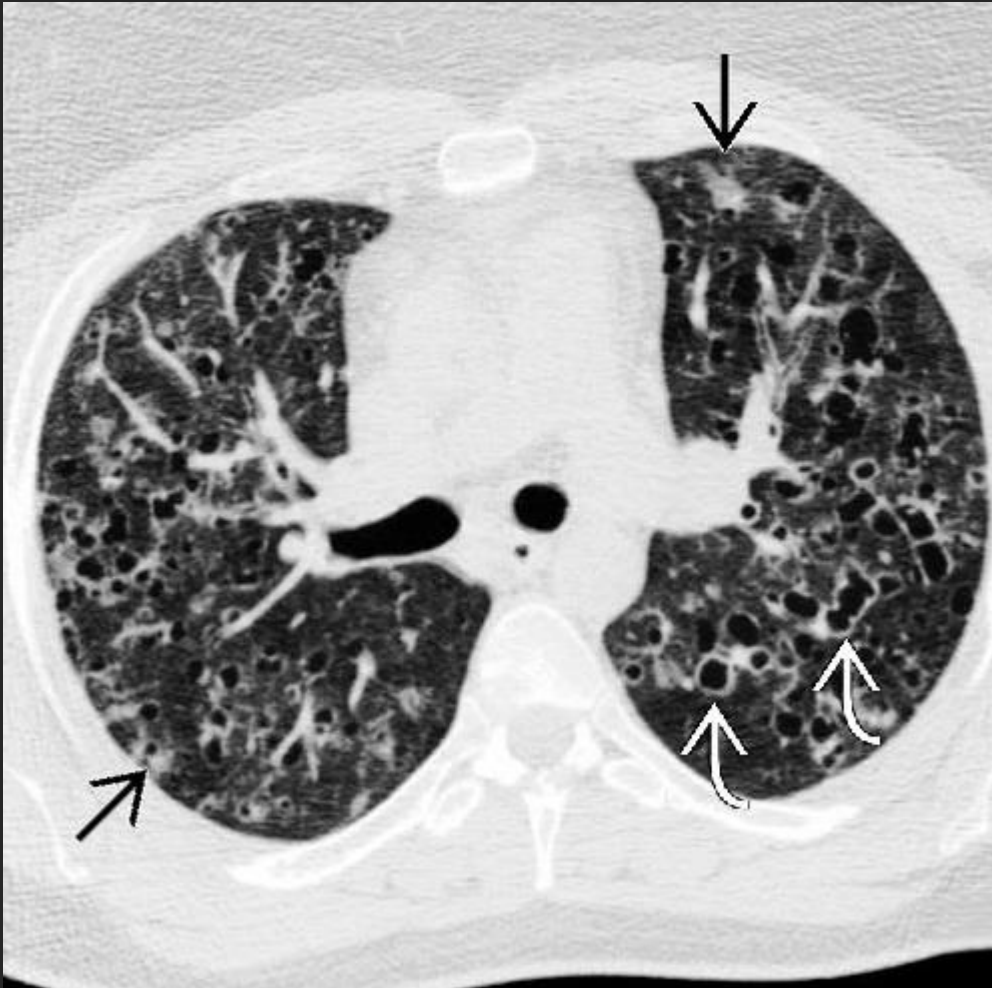
Thin; Characteristic



- Bizarrely shaped cysts with irregular walls
- Small, **irregular or stellate nodules**
- **Mid-upper lung zone predominance**

Langerhans Cell Histiocytosis

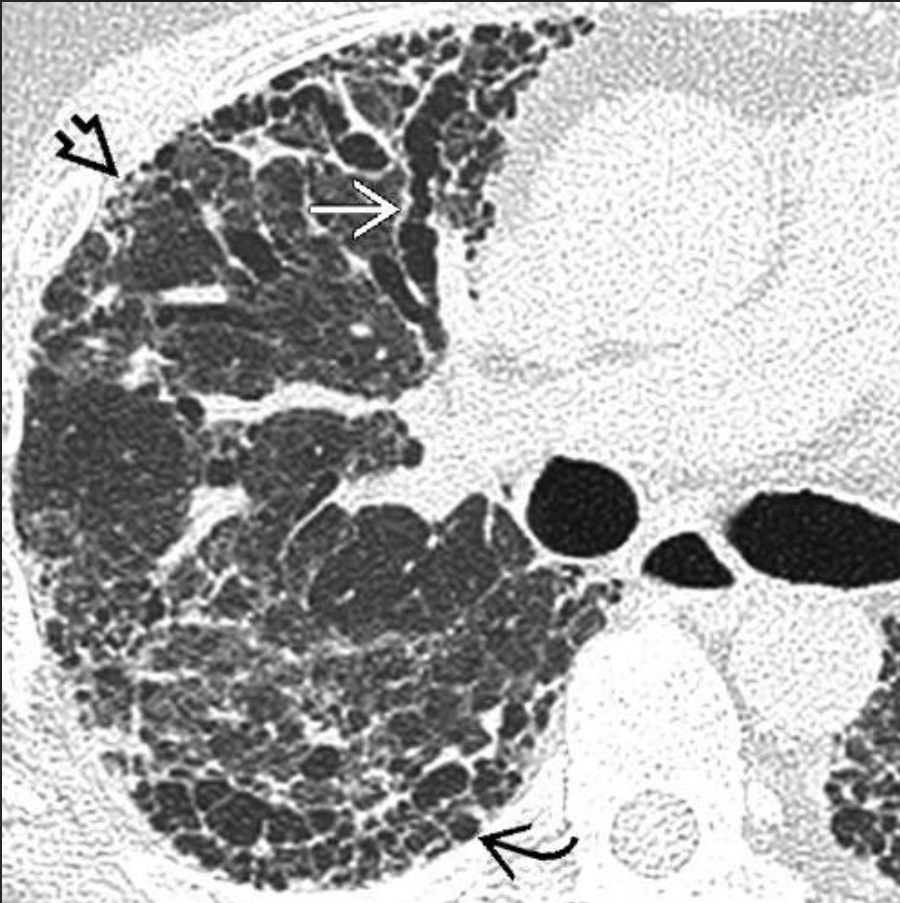
Thin; Characteristic



- Peribronchovascular proliferation of Langerhans' cells
- S100 protein and CD1a surface marker +
- 95% **smokers**
- M=F, 20-40 yoa
- Nonspecific sx
- Pneumothorax in 25%

Honeycombing/Fibrosis

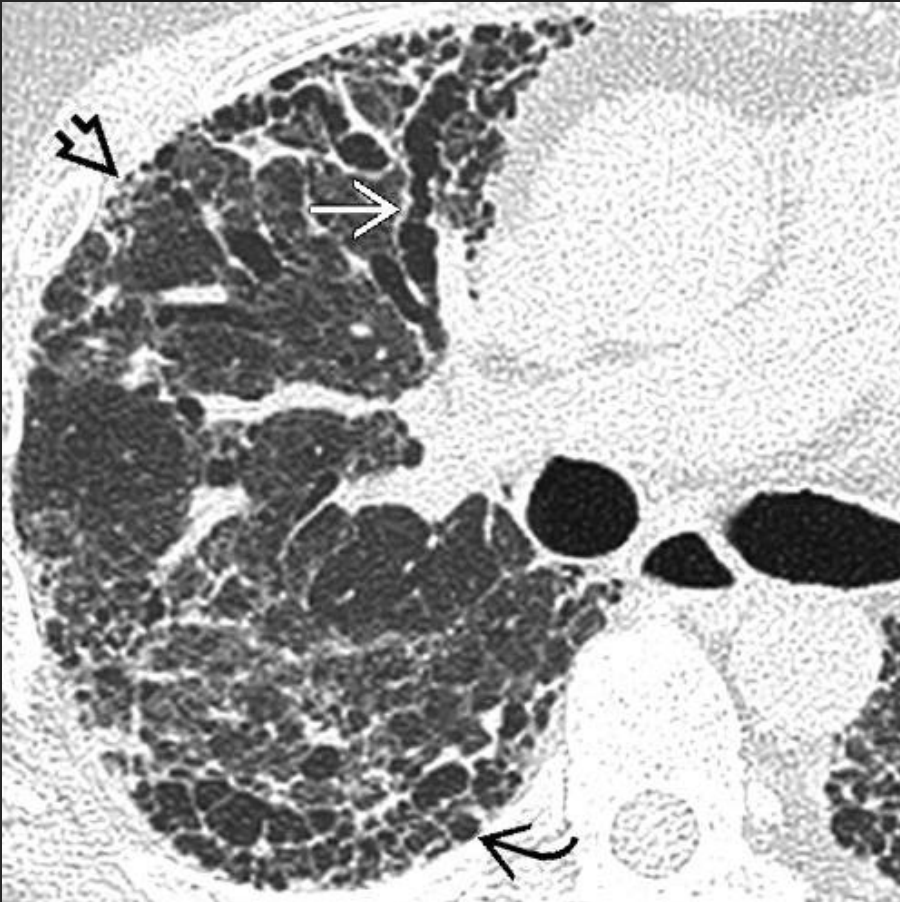
Thin; Characteristic



- Basilar predominant, peripheral, **stacked reticulation**
- **Traction bronchiectasis**
- Ground-glass less extensive than reticulation
- Low volumes

Honeycombing/Fibrosis

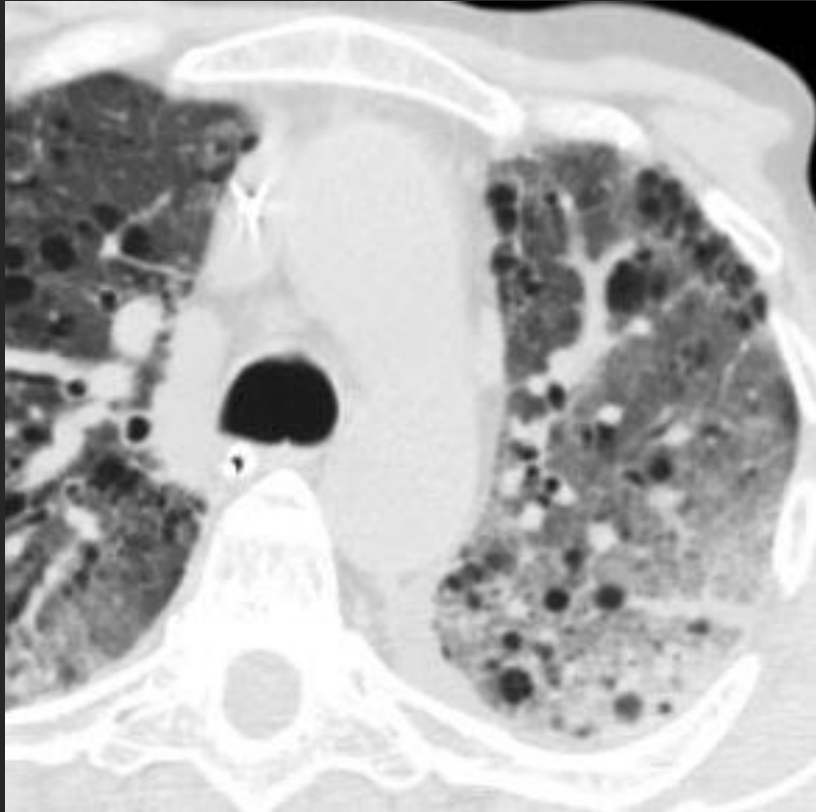
Thin; Characteristic



- Endstage of numerous pathologic pathways (UIP, fibrosis)
 - IPF
 - Asbestosis
 - RA, systemic sclerosis
 - Drug reaction
 - Chronic inflammation

Pneumocystis Jiroveci Pneumonia

Thin; Nonspecific



- Ground-glass opacity is dominant finding
- "Crazy-paving" pattern less common
- Cysts (30%)
- Atypical patterns (5-10%): Multiple small nodules, asymmetric ground-glass, & consolidation

PJP

Thin; Nonspecific



- Opportunistic fungal infection with **T-cell immunodeficiency**
- CD4 < 200 in HIV
- Hypoxia

Desquamative Interstitial Pneumonitis

Thin; Nonspecific



- **Basilar**, peripheral distribution
- **Small cysts**
- **Ground glass**
- Can coexist with other reactive changes (COP, NSIP, UIP, etc)

DIP

Thin; Nonspecific



- Macrophage infiltration of alveoli
- **Smokers**
- Insidious onset
- RB → RB-ILD → DIP
- M > F, 4th-5th decades

Lymphocytic Interstitial Pneumonitis

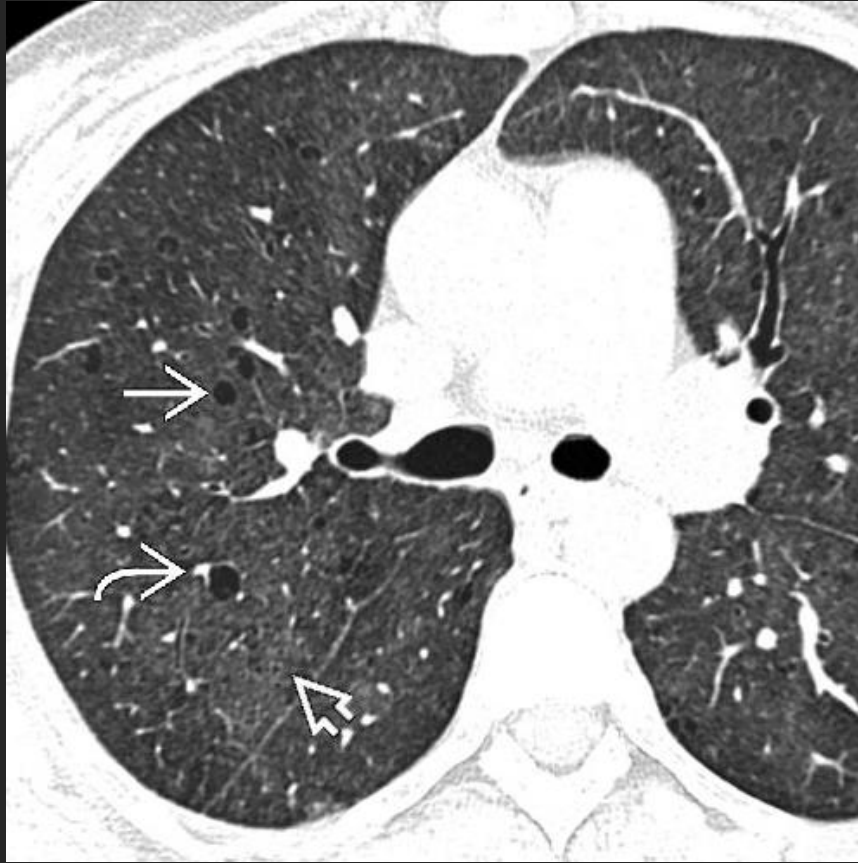
Thin; Nonspecific



- Bilateral **ground glass**
- **Mid-lower predominance**
- Poorly defined centrilobular nodules
- Small subpleural nodules (85%)
- Peribronchial thickening (85%)
- Large and small cysts, often perivascular

LIP

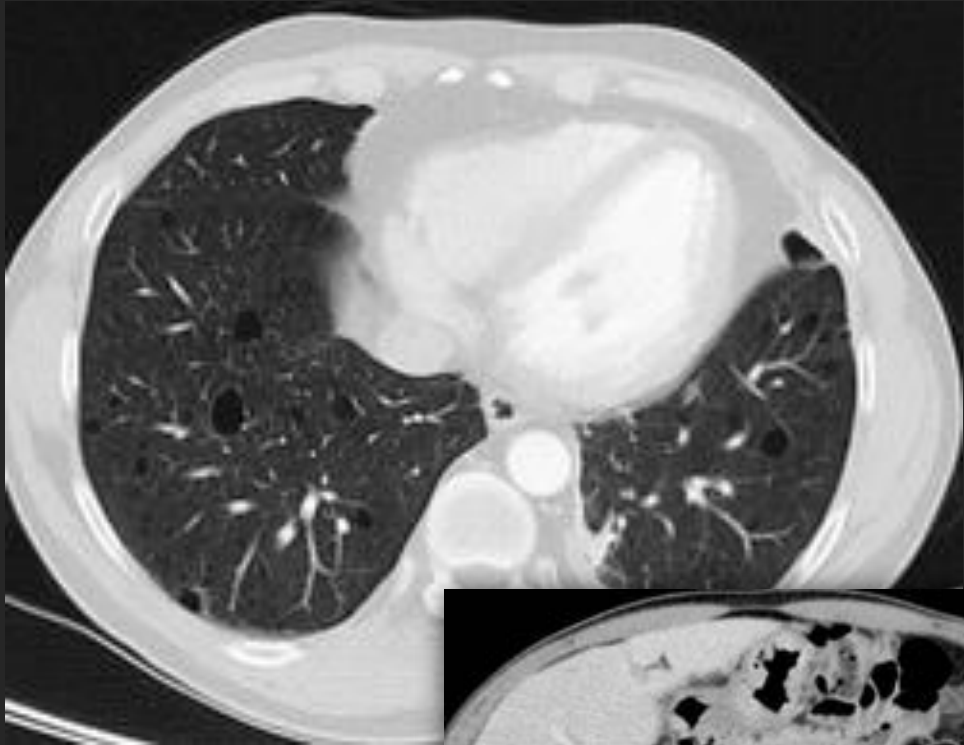
Thin; Nonspecific



- Lymphocytic infiltration of alveolar septa
- **Immunocompromise** or autoimmune disease
- F>M; high association with **Sjogren's**

Birt Hogg Dube

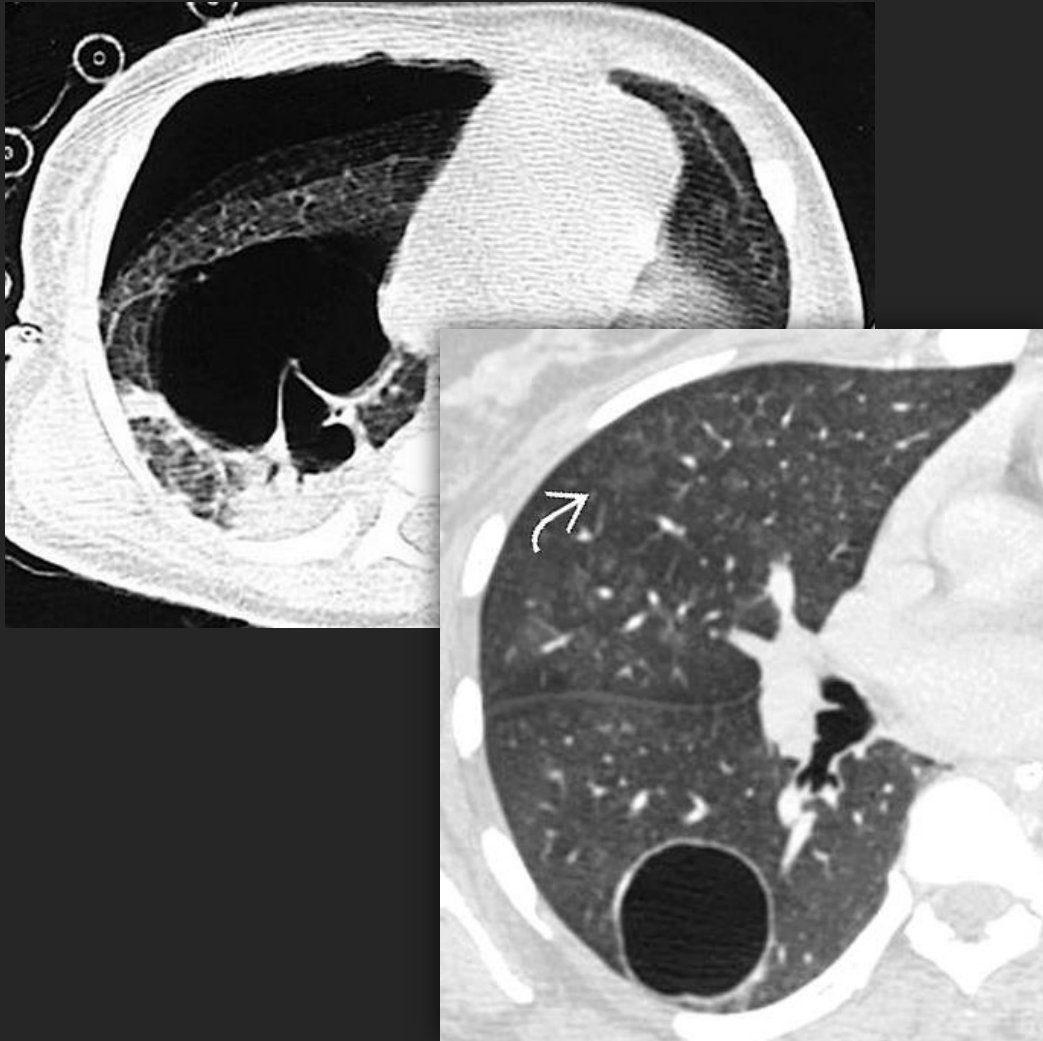
Thin; Nonspecific



- Pulmonary cysts
- **Renal tumors**
- **Cutaneous lesions**
- Deletion on the FLCN gene (chromosome 17)
- Autosomal dominant

Barotrauma Old Pneumatocele

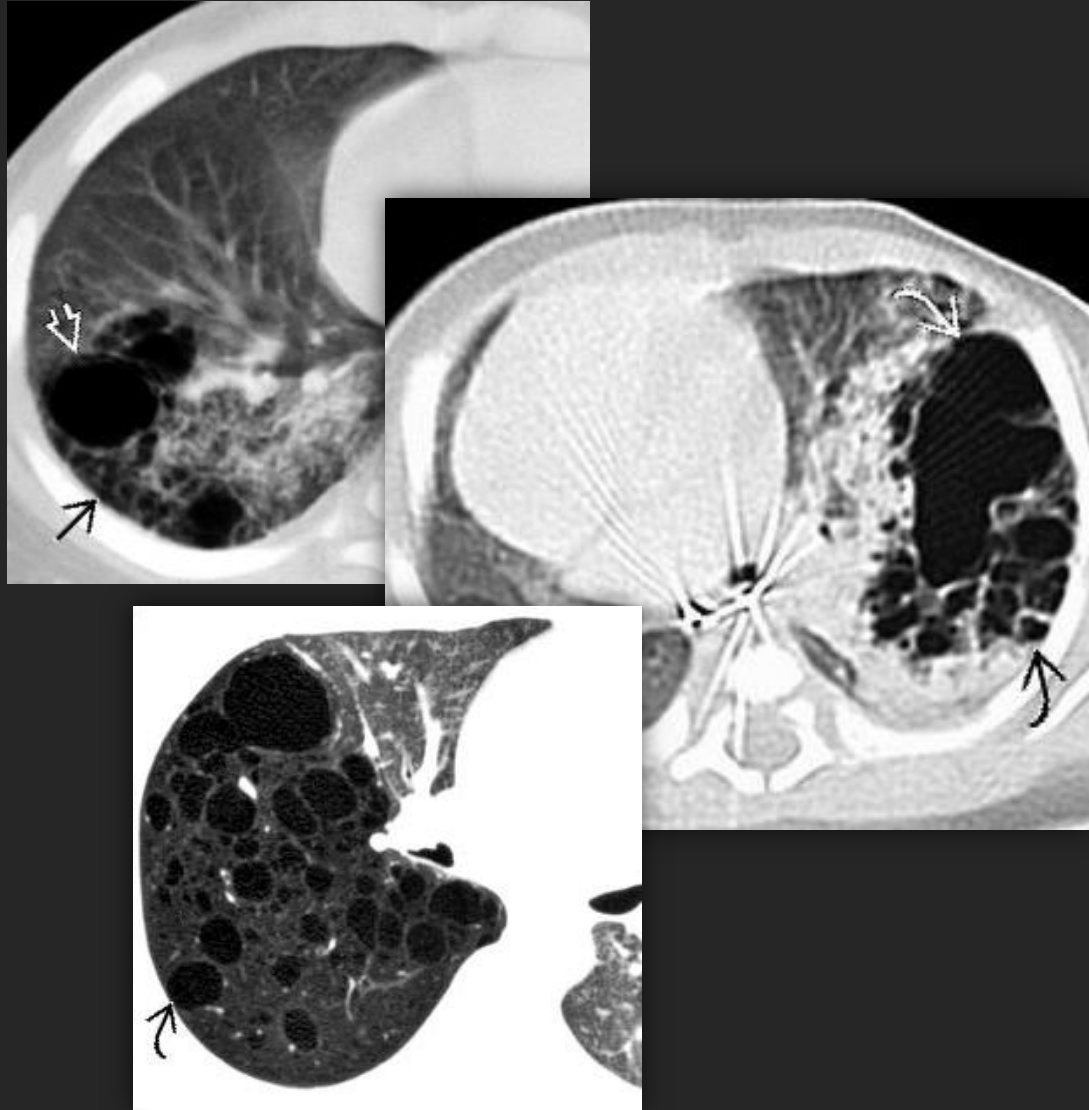
Thin; Nonspecific



- Barotrauma
 - Mechanical ventilation
 - Consolidated areas are protected
 - Frequent ptx or PIE
 - Consolidation=laceration
- Old pneumatocele
 - Thin wall
 - At site of prior insult

Congenital Pulmonary Airway Malformation

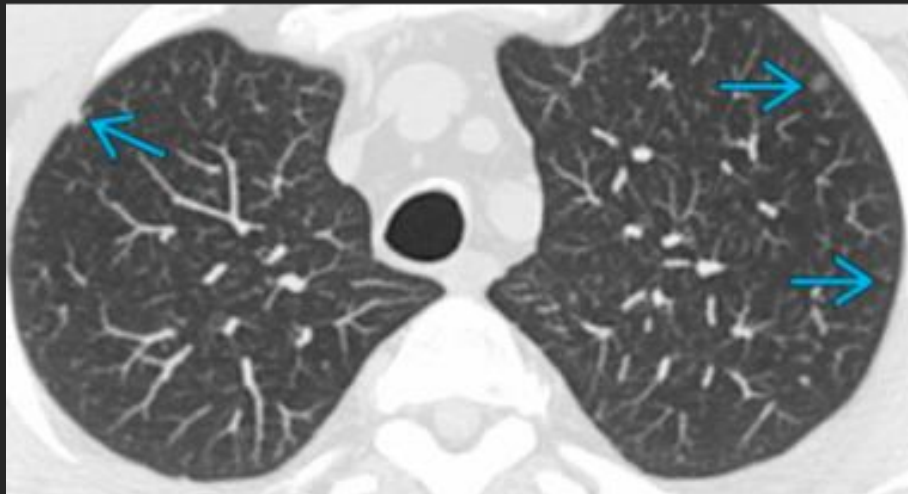
Thin; Nonspecific



- Large, small, and microcystic varieties
- Clustered cysts with normal lung elsewhere
- Usually presents as **neonatal** distress

Light Chain Deposition Disease

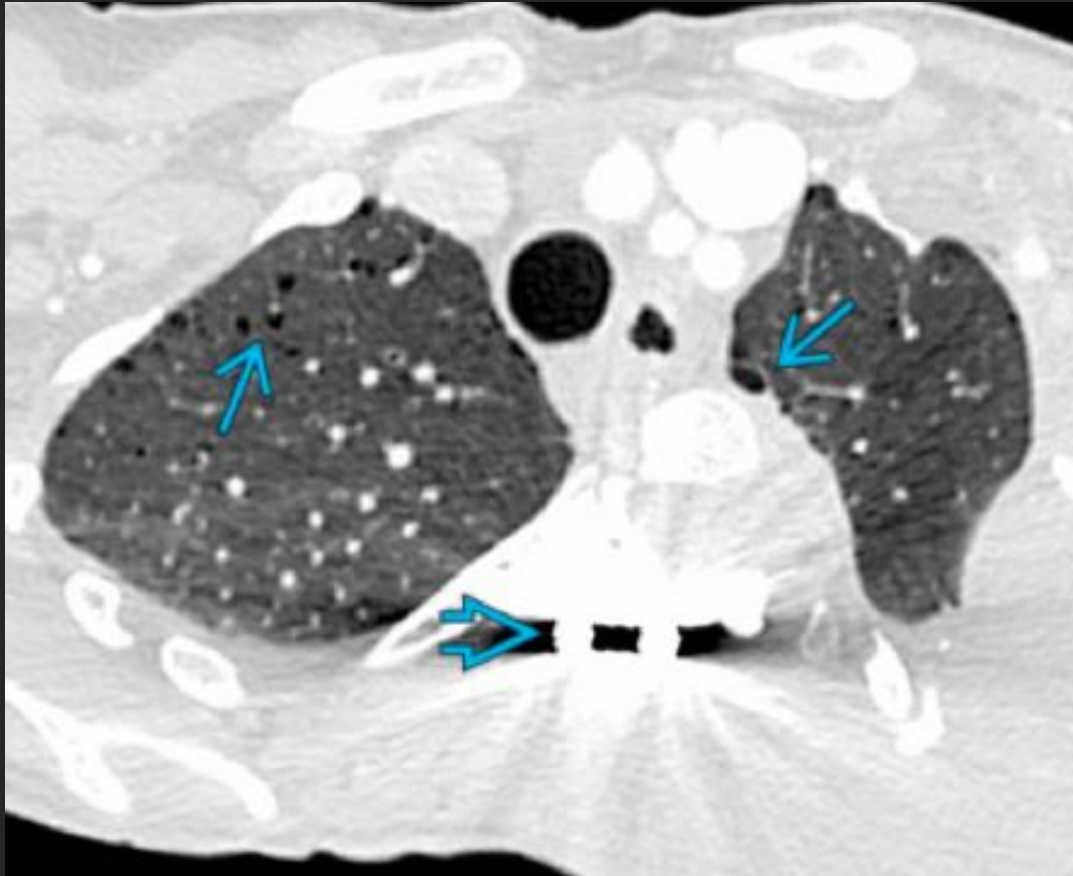
Thin; Nonspecific



- Symptoms range from asymptomatic to progressive dyspnea.
- Systemic extracellular **accumulation of immunoglobulin light chains due to underlying plasma cell dyscrasia**
 - Deposition of amorphous nonfibrillary material; does not contain amyloid fibrils
 - Does not have β -pleated sheet configuration and consequently **does not bind Congo red**, unlike amyloidosis
- Thin walled cysts and/or small nodules

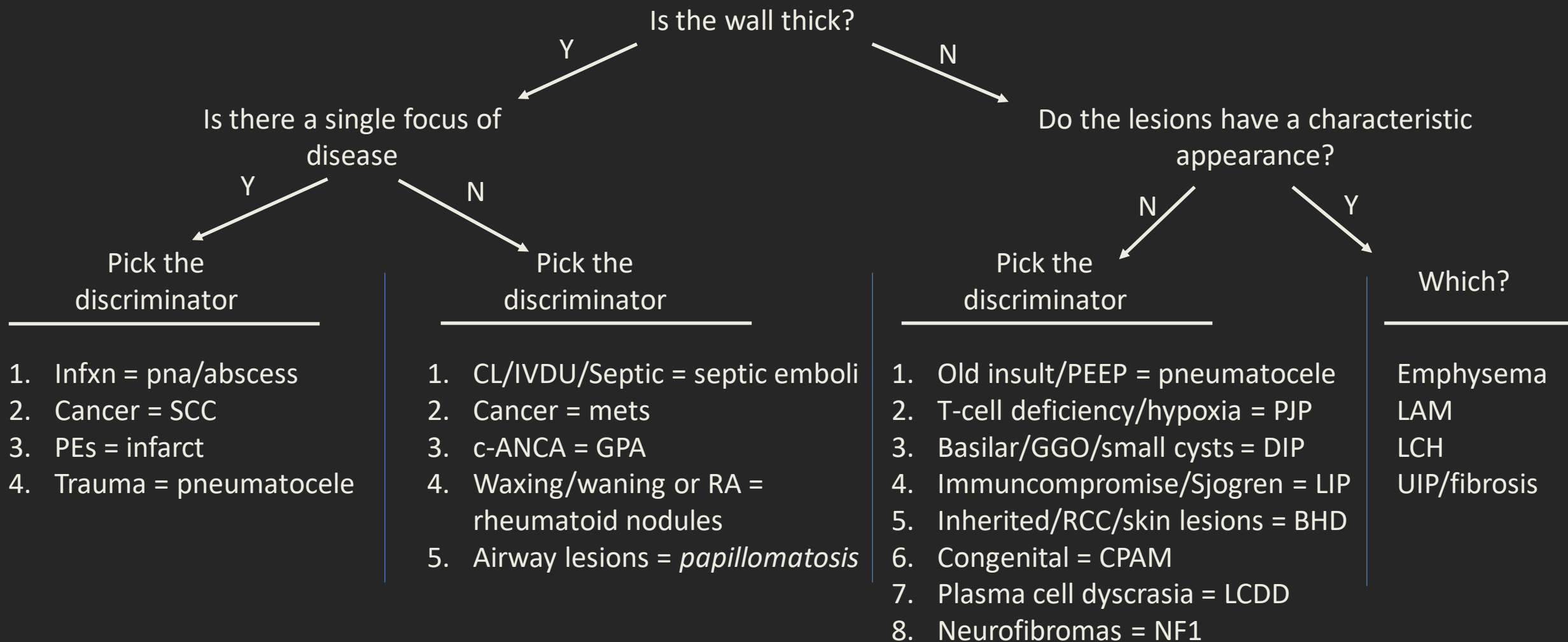
Neurofibromatosis 1

Thin; Nonspecific



- **Multiple nerve sheath neoplasms** (dermal, cutaneous, intraforaminal neurofibromas or diffuse plexiform neurofibromas)
- Mutations in neurofibromin gene
- Nodules (neurofibromas) and thin-walled cysts

So what do we do if we see a lucent lesion?



Images thanks to Amirsys Statdx

Thank you