

An axial CT scan of the chest at the level of the main bronchi. The lung fields show bilateral, patchy, hazy opacities consistent with ground-glass opacities. The central airways are visible as dark, branching structures. The mediastinum and chest wall are also visible.

# GROUND-GLASS OPACITIES

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# Definition...



- Non-specific increased opacity / hazziness of the lung parenchyma due to change in relative propotions of air and alveolar walls with preservation of bronchial and vascular markings.

# Pathologic basis

- **Partial filling of air spaces** with- fluid, macrophages, neutrophils, amorphous materials.
- **Interstitial thickening.**
- **Partial collapse of alveoli.**
- **Normal expiration.**
- **Increased capillary blood volume.**

# False Positive / Pitfalls

- Artificial Blooming- Narrow window width.
- Volume averaging- Thicker collimation.
- Expiratory phase.
- Cardiac and Respiratory motion.
- Microatelectasis- In gravity dependent positions.

# Patterns of GGO



# DIFFUSE

Acute lung transplant rejection.

ARDS

Edema

Extrinsic allergic alveolitis

Hemorrhage

Infectious pneumonia.

# Acute rejection of lung transplant

- HRCT 65% sensitive & 85% specific

- GGO

Mild rejection – Patchy & localised

Severe rejection – Widespread

DDs- Reperfusion edema

Infections- CMV



# Acute Respiratory Distress Syndrome

- Non Hydrostatic pulmonary edema
- Leaky capillary membranes
- Etiology-  
Aspiration, contusion, smoke, sepsis.
- CT – Bilateral gravity dependent lung opacities.





# Pulmonary Edema

Venous / Lymphatic obstruction  
Increased capillary permeability  
Hypoproteinemia

CT- interlobular septal thickening  
increased vascular calibre  
peribronchovascular interstitial  
thickening, pleural effusion,  
thickening of fissures.



# Extrinsic allergic alveolitis

Also known as  
Hypersensitive Pneumonitis.

Complex immunologic reaction  
Of lung to inhaled organic  
Antigens.

Acute, Sub acute ,Chronic.

CT- GGO(82%) , Small Nodules,  
Reticular pattern,  
Air trapping.



# Diffuse Alveolar Haemorrhage

May be Diffuse , patchy or focal

Acute phase-  
GGO / Consolidation

Sub acute-  
uniformly distributed 1-3mm  
nodules with GGO & interstitial  
septal thickening.



# Infectious Pneumonia

Bacterial, Viral, mycobacterial, Fungal, Parasitic.

A diffuse pattern – CMV & PCP

CMV with HIV -dense consolidation,  
Bronchiectasis,interstitial reticulations.

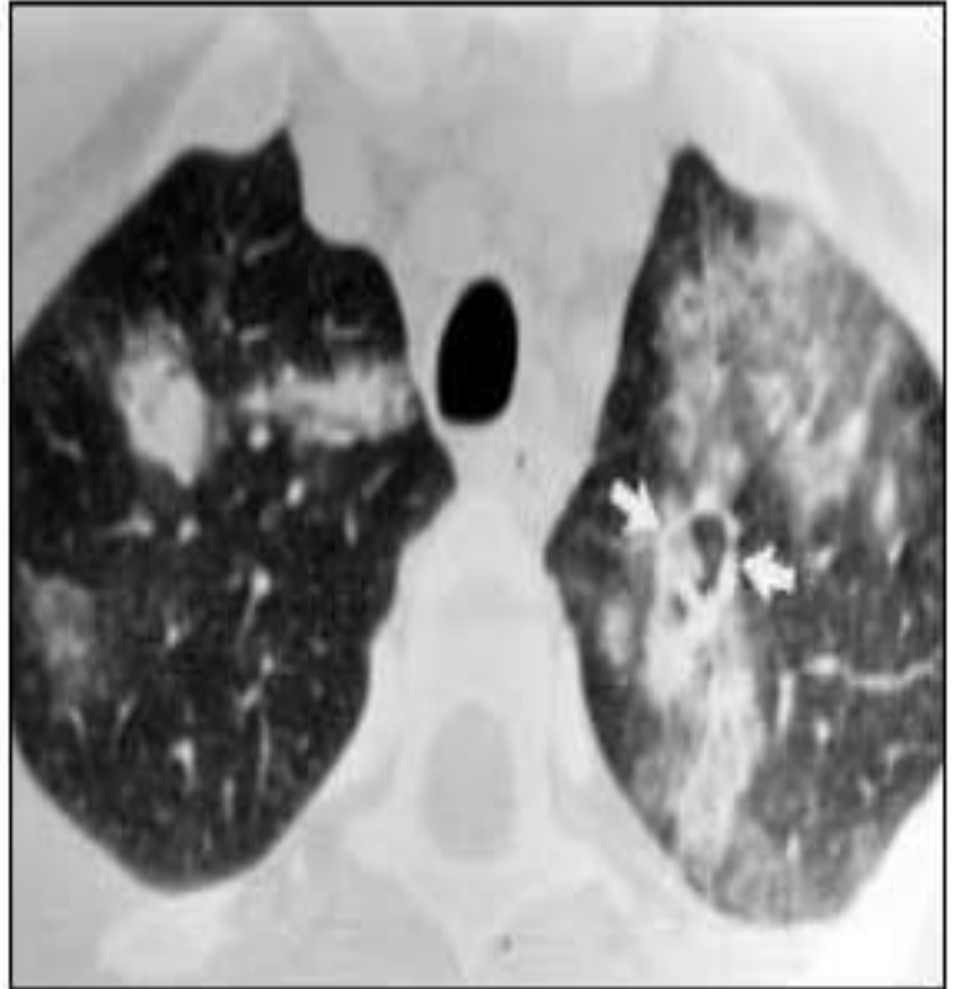
CMV post transplant - small nodules,  
Irregular lines.



# Infectious Pneumonia

Presence of isolated GGO

without additional findings in patient with AIDS highly suggestive of *Pneumocystis carinii*.



# Patchy

Bronchiolitis obliterans organising pneumonia.

Bronchio-alveolar cell carcinoma.

Pulmonary alveolar proteinosis.

Acute lung transplant rejection.

ARDS

Extrinsic allergic alveolitis

Hemorrhage

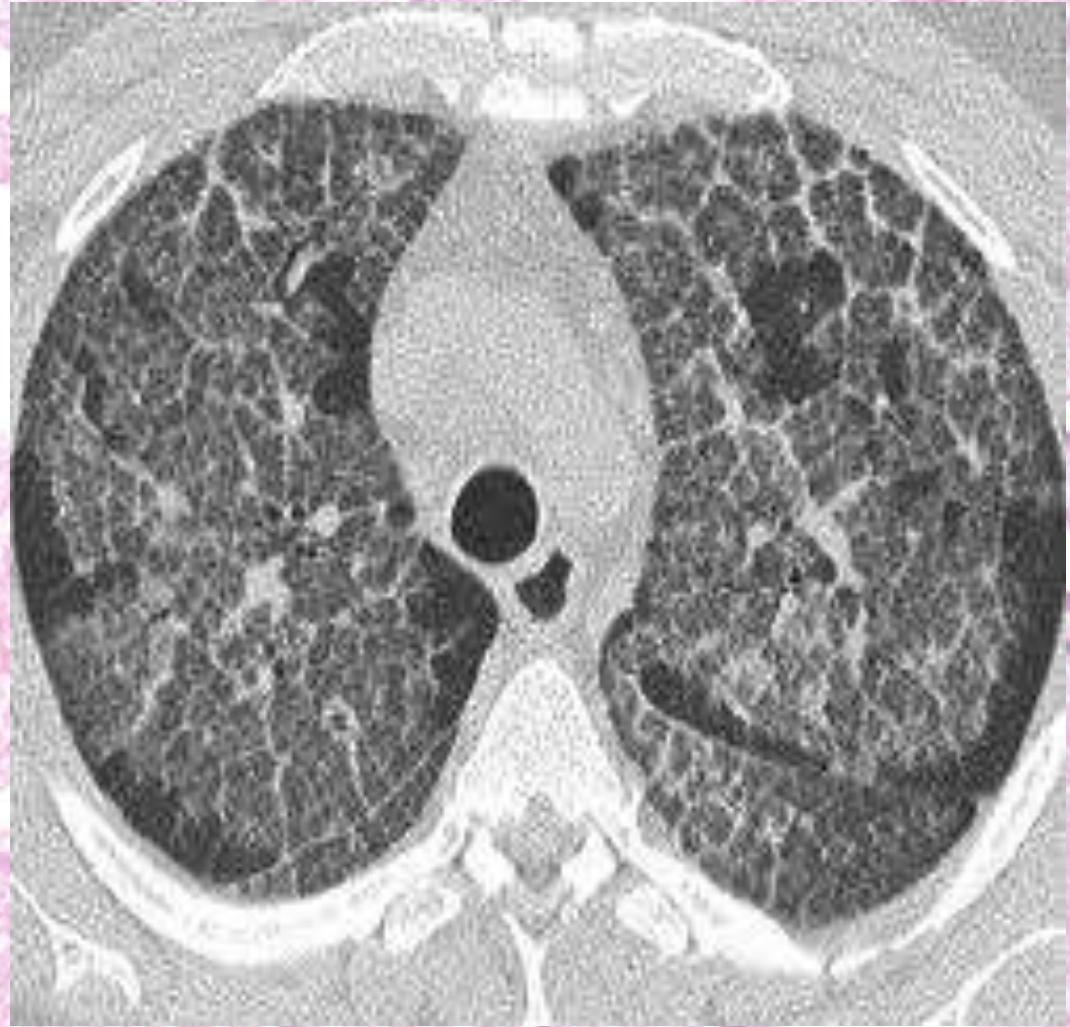
Infectious pneumonia.

# Pulmonary alveolar proteinosis

Filling of alveoli with PAS positive  
Proteinaceous material.

CT – **Crazy paving**

DDS- lipoid pneumonia,  
ARDS, PCP.



# FOCAL

Bronchoalveolar Lavage

Bronchiolitis obliterans organising pneumonia

Bronchio-alveolar carcinoma

Hemorrhage

Pulmonary infection.



# HALO Pattern

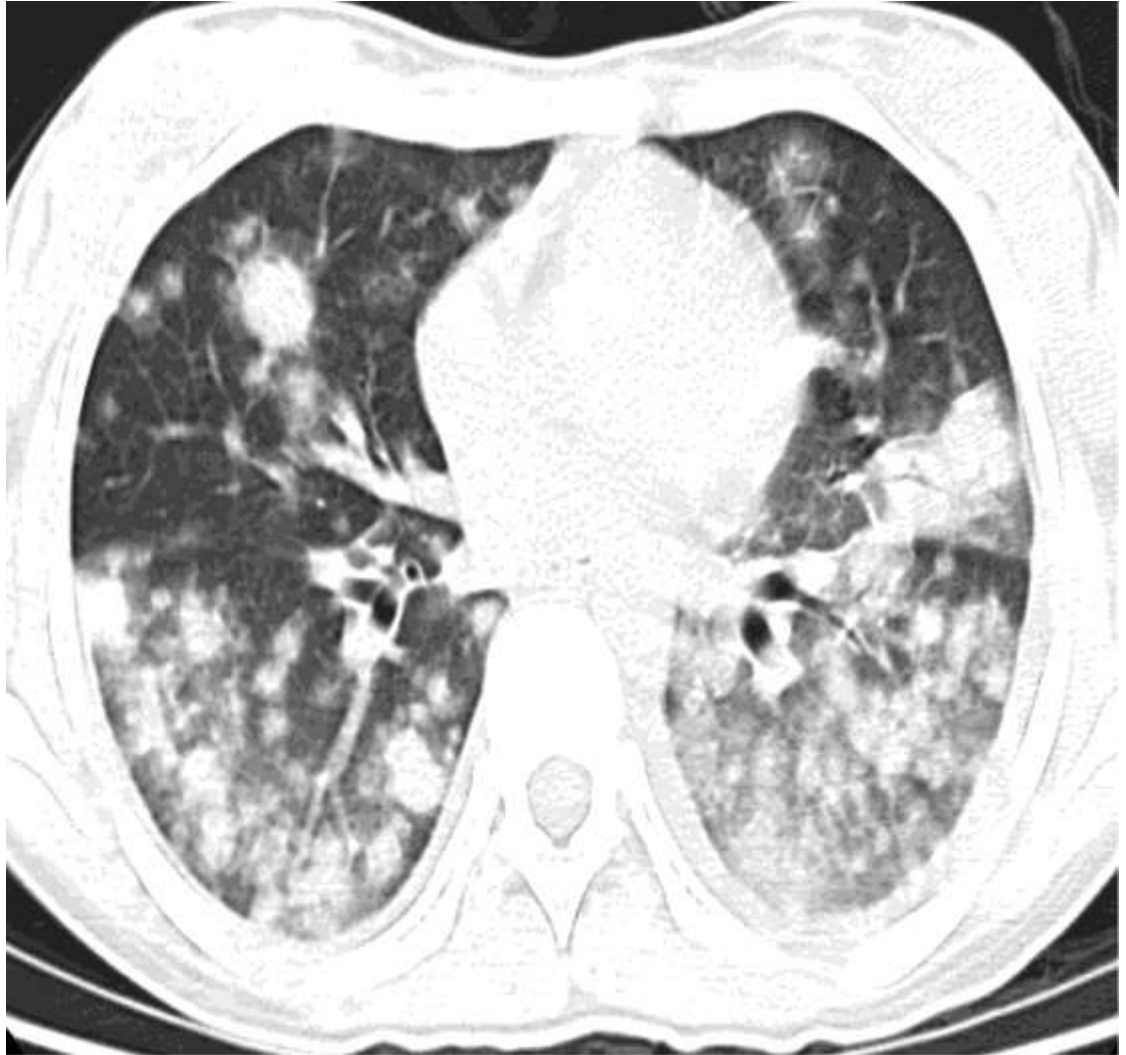
Invasive pulmonary aspergillosis

Neoplasm, haemorrhagic

Post-Biopsy pseudonodule.

# Invasive Aspergillosis.

Peripheral ring of haemorrhage or haemorrhagic infarction surrounding target lesion of Aspergillosis.



# Peripheral Pattern.

Collagen vascular disease

Contusions

Desquamative interstitial pneumonitis

Drug toxicity

Eosinophilic pneumonia

Fibrosis

Sarcoidosis

BOOP.

# Bronchiolitis obliterans organising pneumonia.

Histologically- granulation tissue plugs within respiratory bronchioles and alveolar ducts with Organising pneumonia extending into the surrounding alveoli.

CT –pachy GGO,nodules, consolidation in peripheral distribution

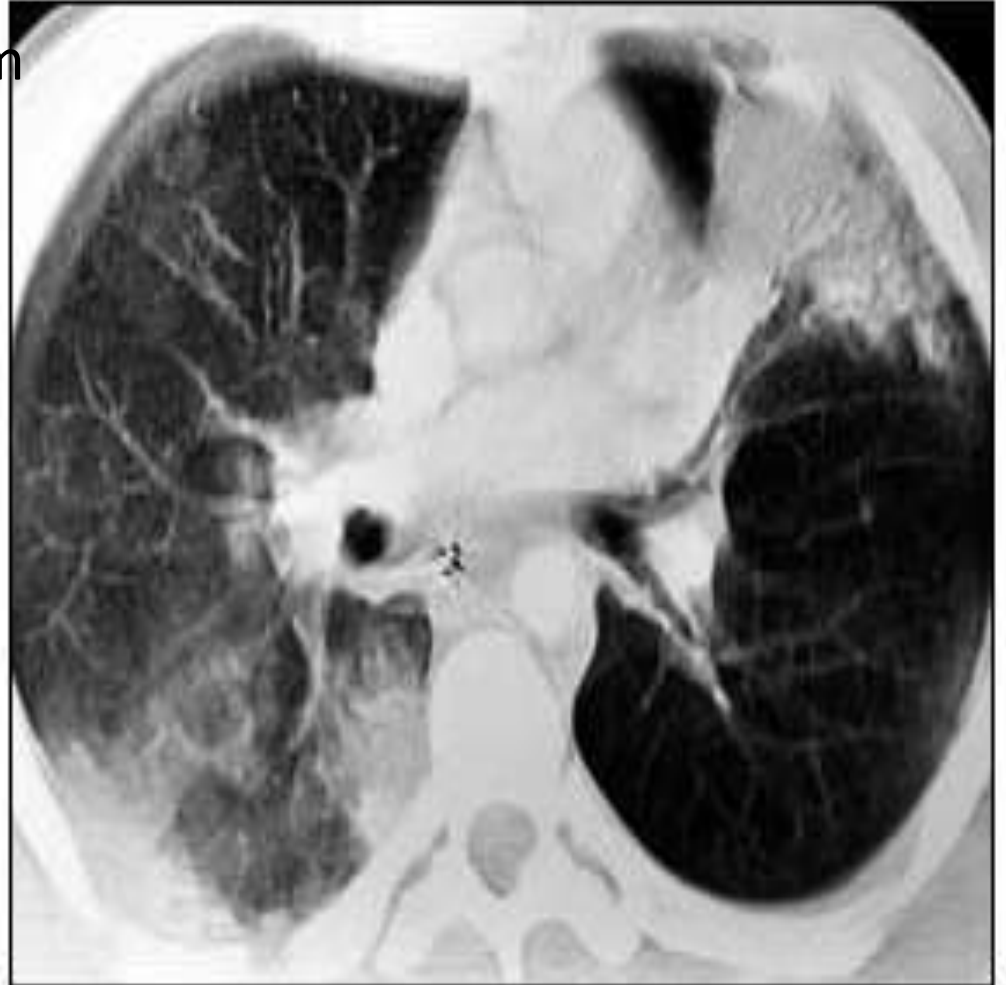
Bilateral, non-segmental.



# Pulmonary contusions

Bleeding into lung interstitium  
and air spaces.

CT- ill defined areas of GGO,  
Peripheral, non-anatomic  
distribution.

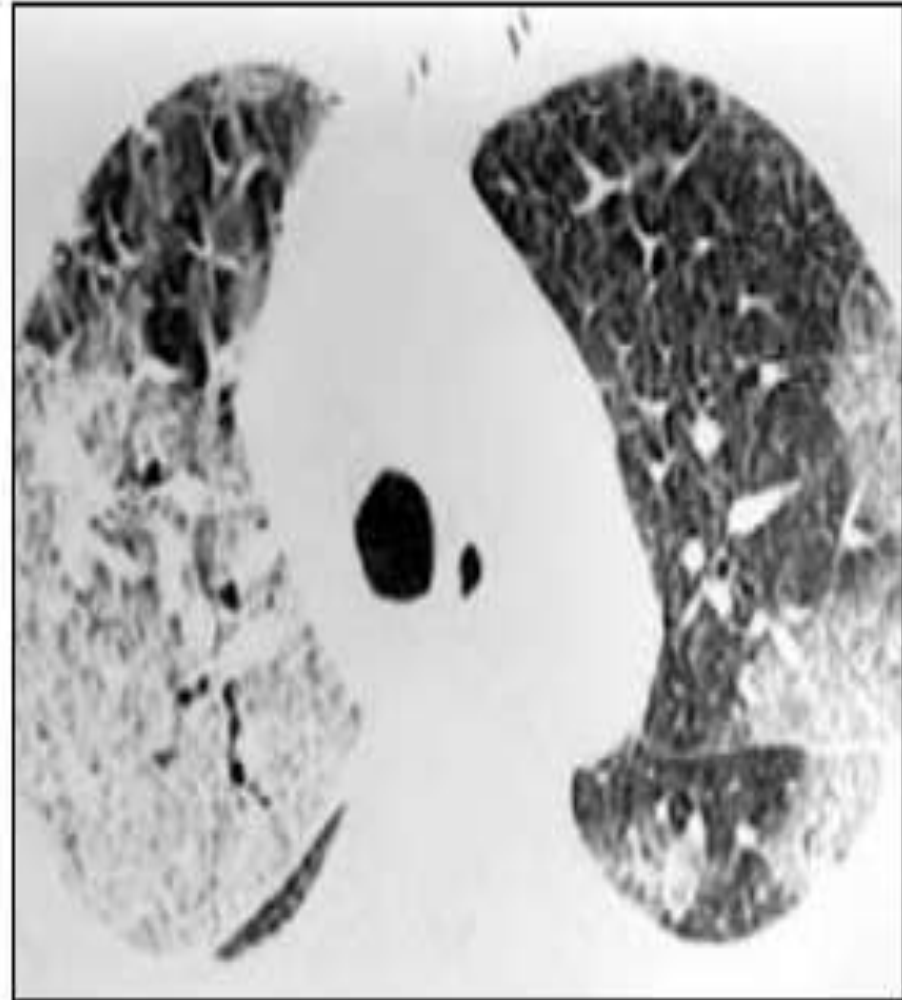


# Desquamative interstitial pneumonitis

Alveoli filling with macrophages.

CT –lower lung zones  
peripheral

UIP –similar with more  
honeycombing & traction  
bronchiectasis.



# Collagen vascular disease

Multisystem disorders characterized  
By vascular changes, fibrosis,  
Inflammation of connective tissue.

SLE, RA , Polymyositis, Sjogren's.

CT- GGO (63-100%)

Is a sign of ACTIVE inflammation  
In absence of significant  
Honeycombing, bronchiectasis, fibrosis.

Site of Biopsy

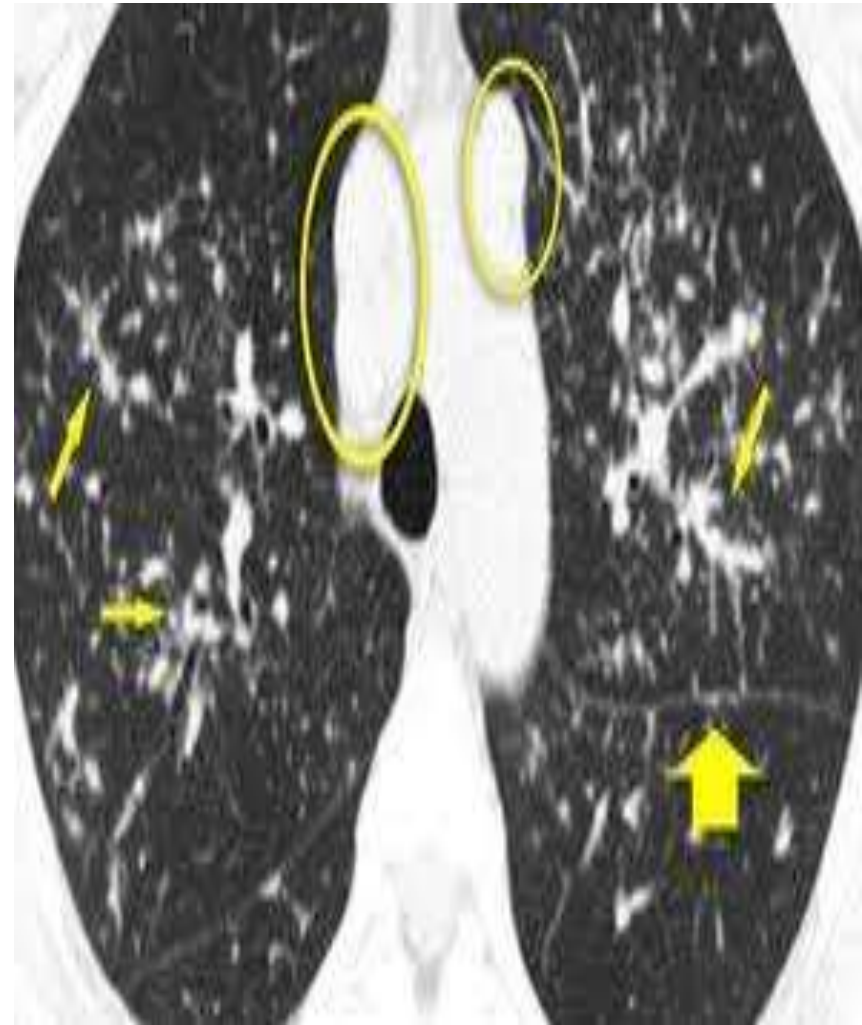
Treatment Planning.

Response to Treatment.



# Centrilobular / Bronchovascular

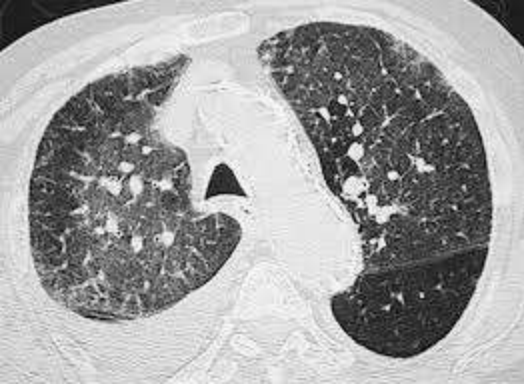
- Eosinophilic pneumonia
- Sarcoidosis
- Extrinsic allergic alveolitis
- Respiratory Bronchiolitis.





# To Conclude...

Scenario	Disease Category	Differential Diagnoses
Immunosuppressed (HIV, transplant)	Opportunistic infections	PCP, CMV, HSV, RSV, other viruses
Bone marrow suppression	Opportunistic infections Acute alveolar disease Miscellaneous	PCP, CMV, HSV, RSV, other viruses DAH Drug toxicity
Slowly progressive dyspnea	Chronic interstitial disease Miscellaneous	HP, DIP, AIP, NSIP, RBILD, sarcoidosis BOOP, PAP, BAC
IP/OP acute dyspnea	Acute alveolar disease	CHF, ARDS, noncardiogenic edema, DAH
Debilitated hospital patient	Acute alveolar disease	CHF, ARDS, volume overload



- Thank you...

