Radiologic Diagnosis of ILD in Clinical Practice

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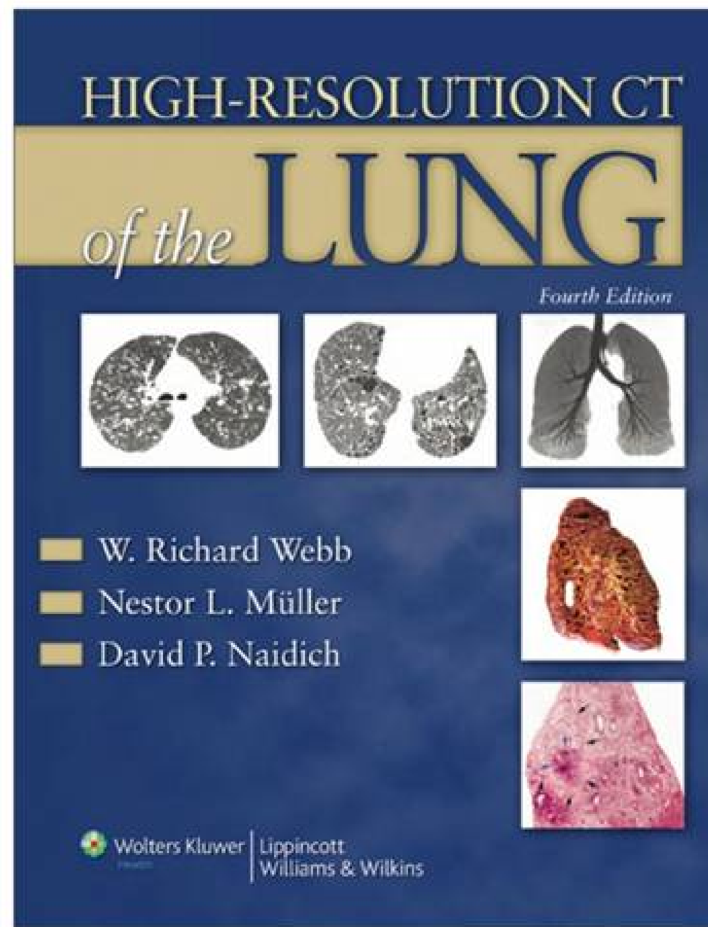
(960 X 720)

Interstitial lung disease (ILD)



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Idiopathic Interstitial Pneumonias (IIPs)

History

HRCT

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Liebow & Carrington (1969)

- Usual interstitial pneumonia (UIP)
- Desquamtive interstitial pneumonia (DIP)
- Bronchiolitis obliterans interstitial pneumonia and diffuse alveolar damage (BIP-DAD)
- Lymphoid interstitial pneumonia (LIP)
- Giant cell interstitial pneumonia (GIP)

Katzenstein (1997)

- Usual interstitial pneumonia (UIP)
- Desquamative interstitial pneumonia/respiratory bronchiolitis interstitial lung disease (DIP/RB-ILD)
- Acute interstitial pneumonia (AIP)
- Nonspecific interstitial pneumonia (NSIP)

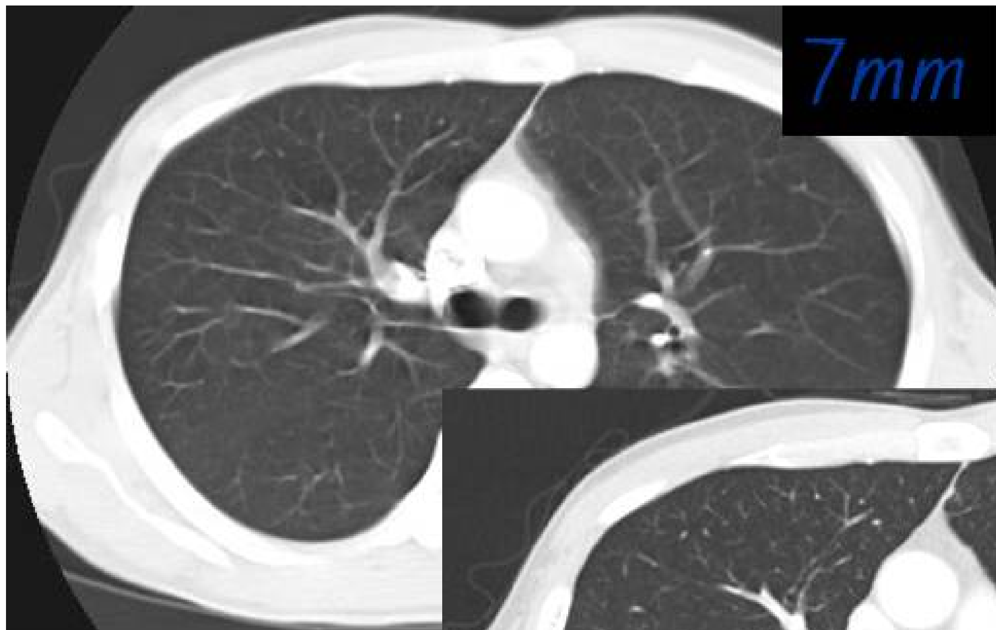
2002 ATS/ERS Consensus: Histologic patterns

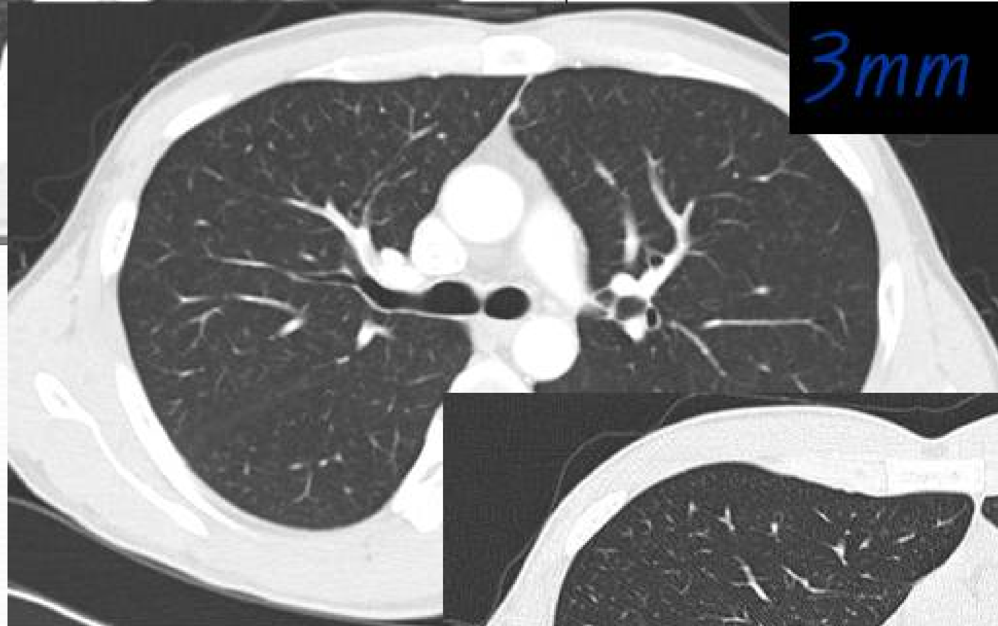
- Usual interstitial pneumonia (UIP)
- Nonspecific interstitial pneumonia (NSIP)
- Organizing pneumonia (COP)
- Diffuse alveolar damage (DAD)
- Respiratory bronchiolitis (RB)
- Desquamtive interstitial pneumonia (DIP)
- Lymphoid interstitial pneumonia (LIP)

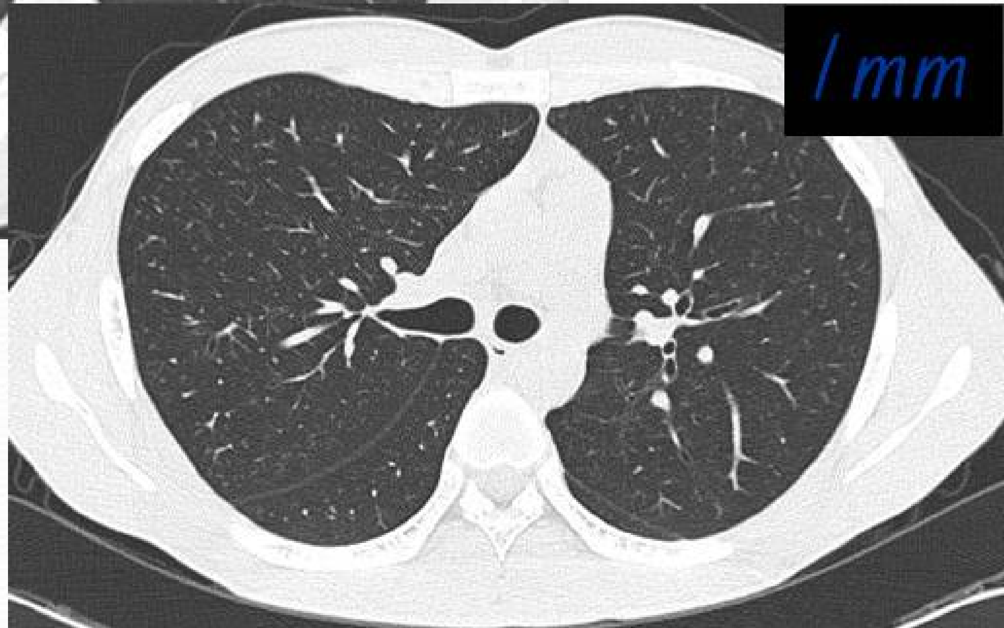
Am J Respir Crit Care Med 2002; 165: 277-304

HRCT

- Thin slice thickness (1-1.5mm)
- Small FOV
- Reconstruction : sharp, high spatial frequency, bone algorithm, high-resolution algorithm







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(960 X 720)

HRCT

- Thin slice thickness (1-1.5mm)
- Small FOV
- Reconstruction : sharp, high spatial frequency, bone algorithm, high-resolution algorithm

MDCT

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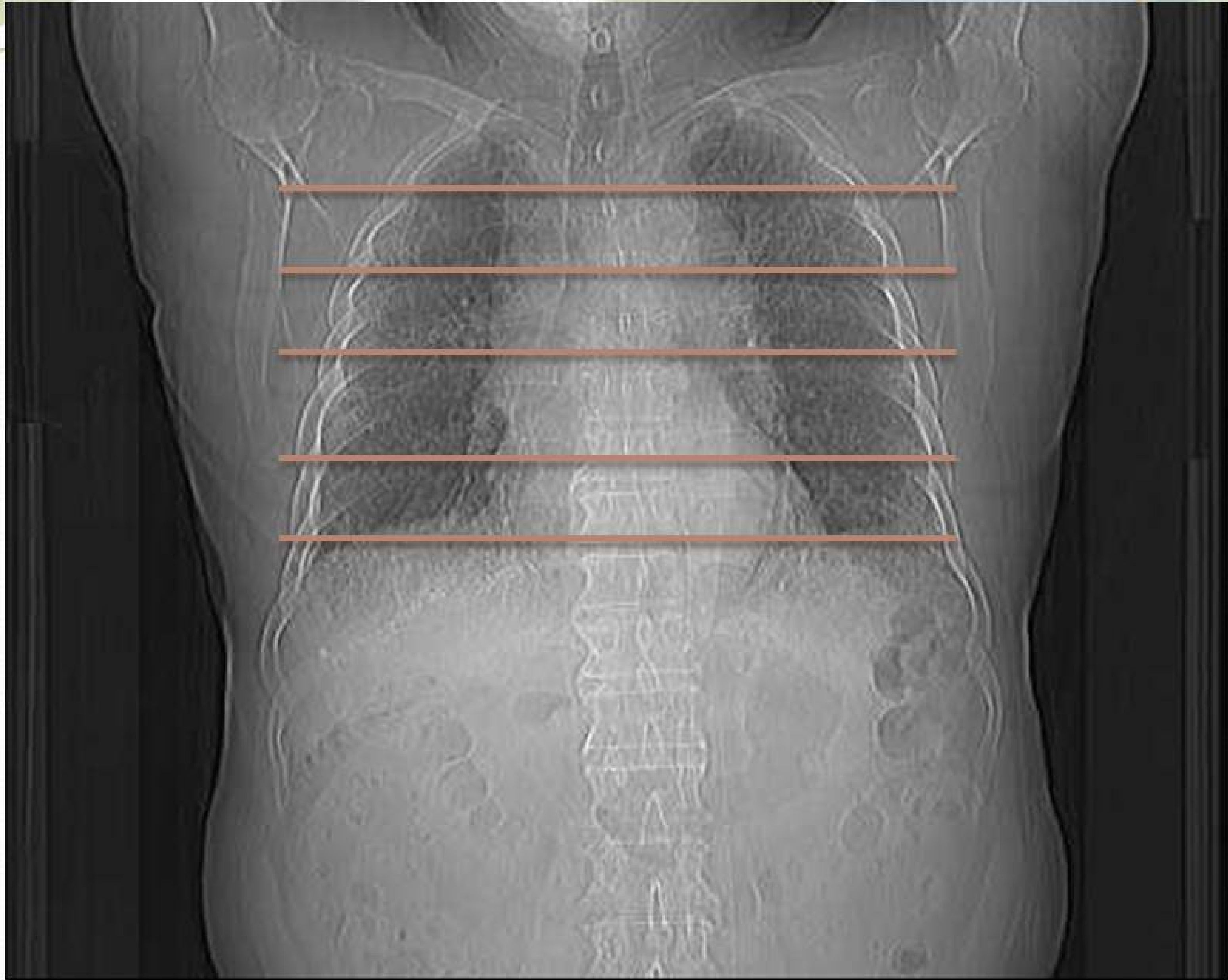

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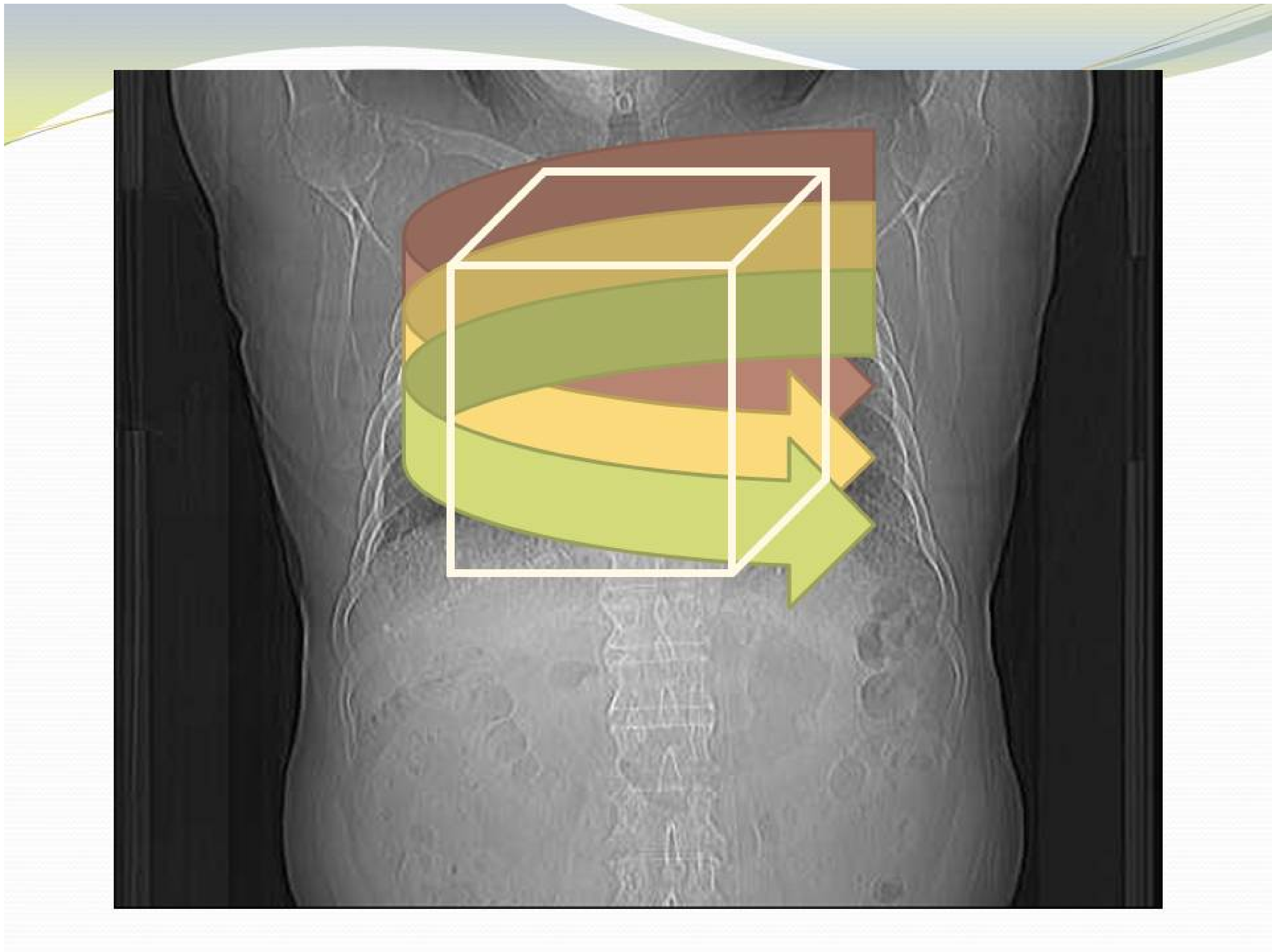

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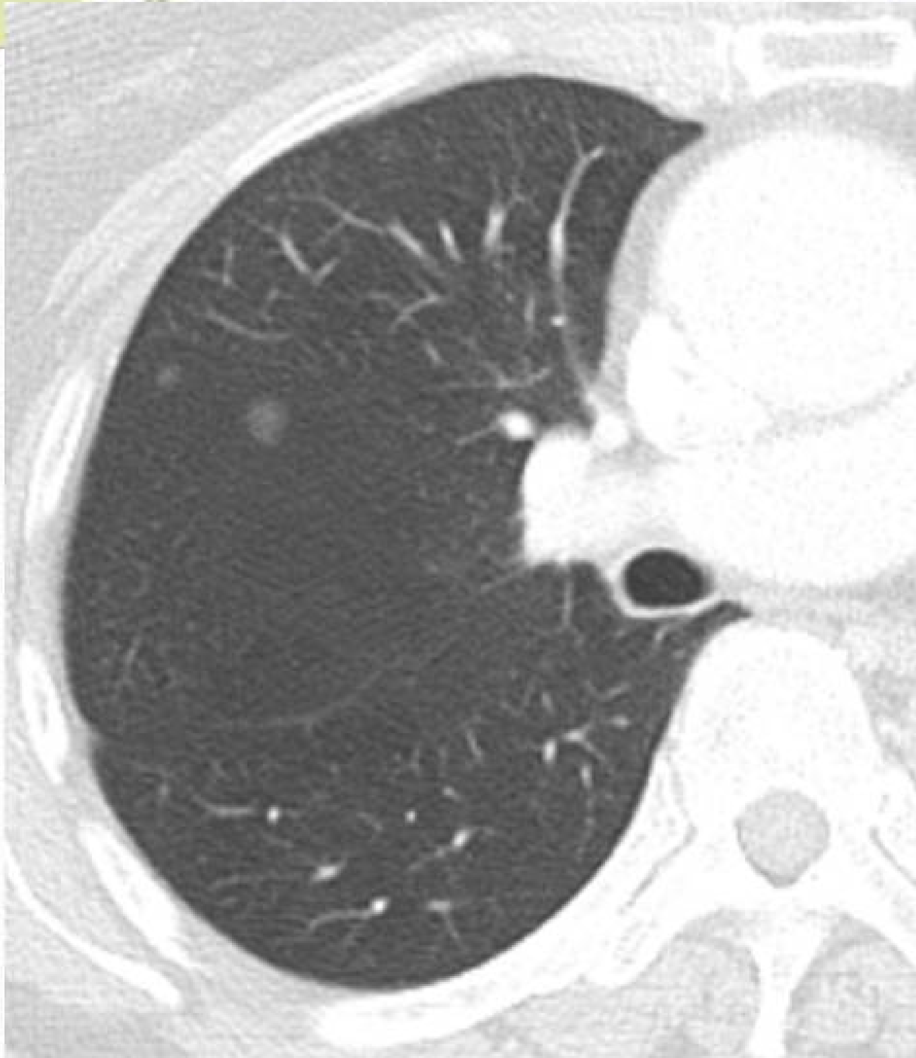
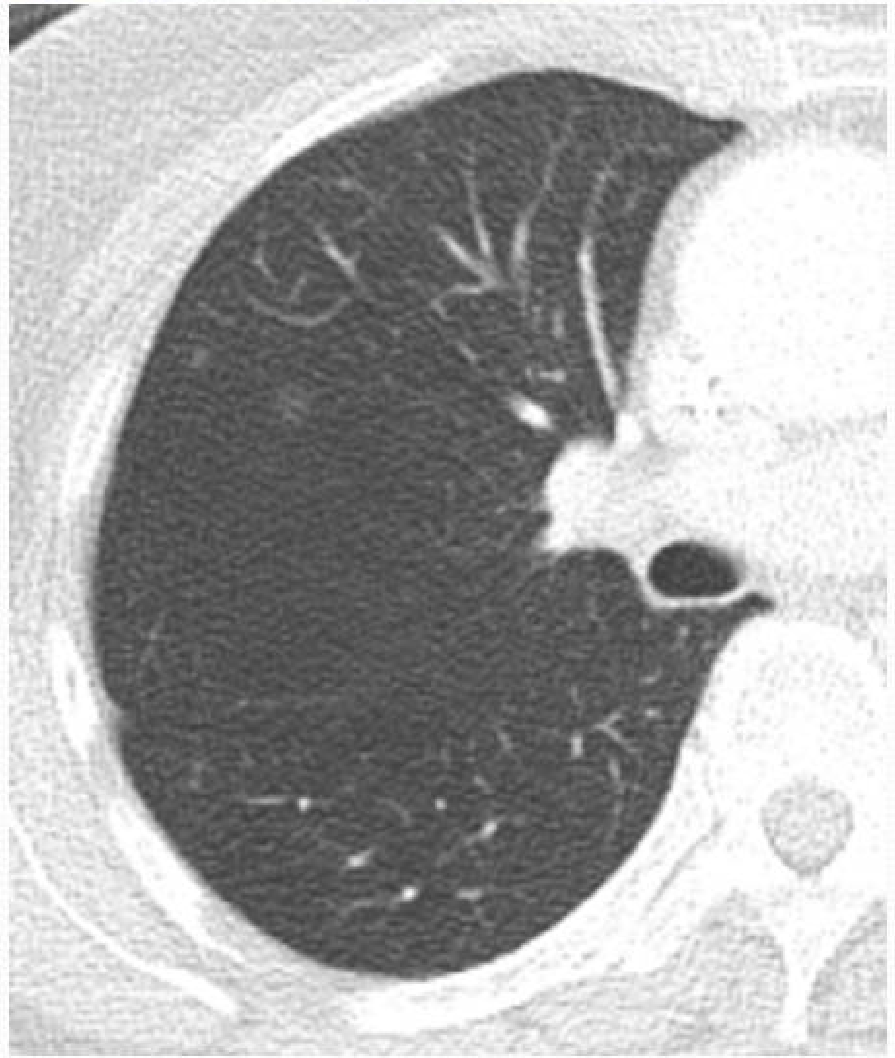

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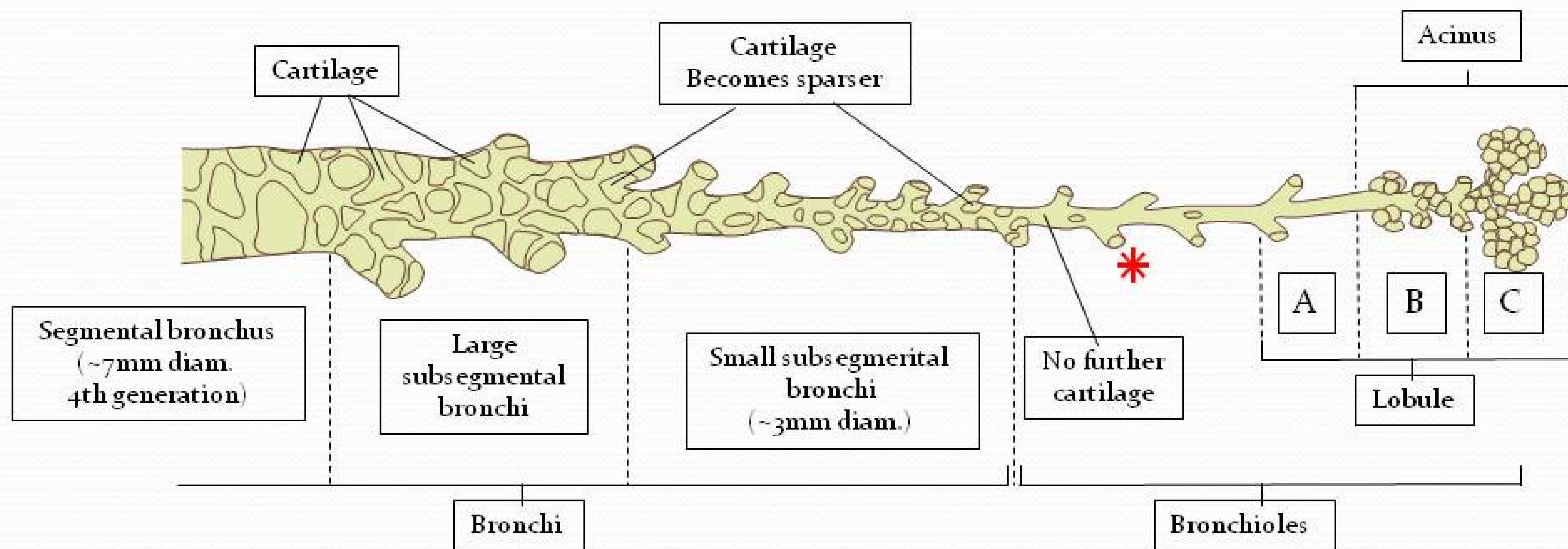
HRCT



✱ Approx level beyond which
bronchioles not visible on HRCT
(1.5mm diam. 8th generation)

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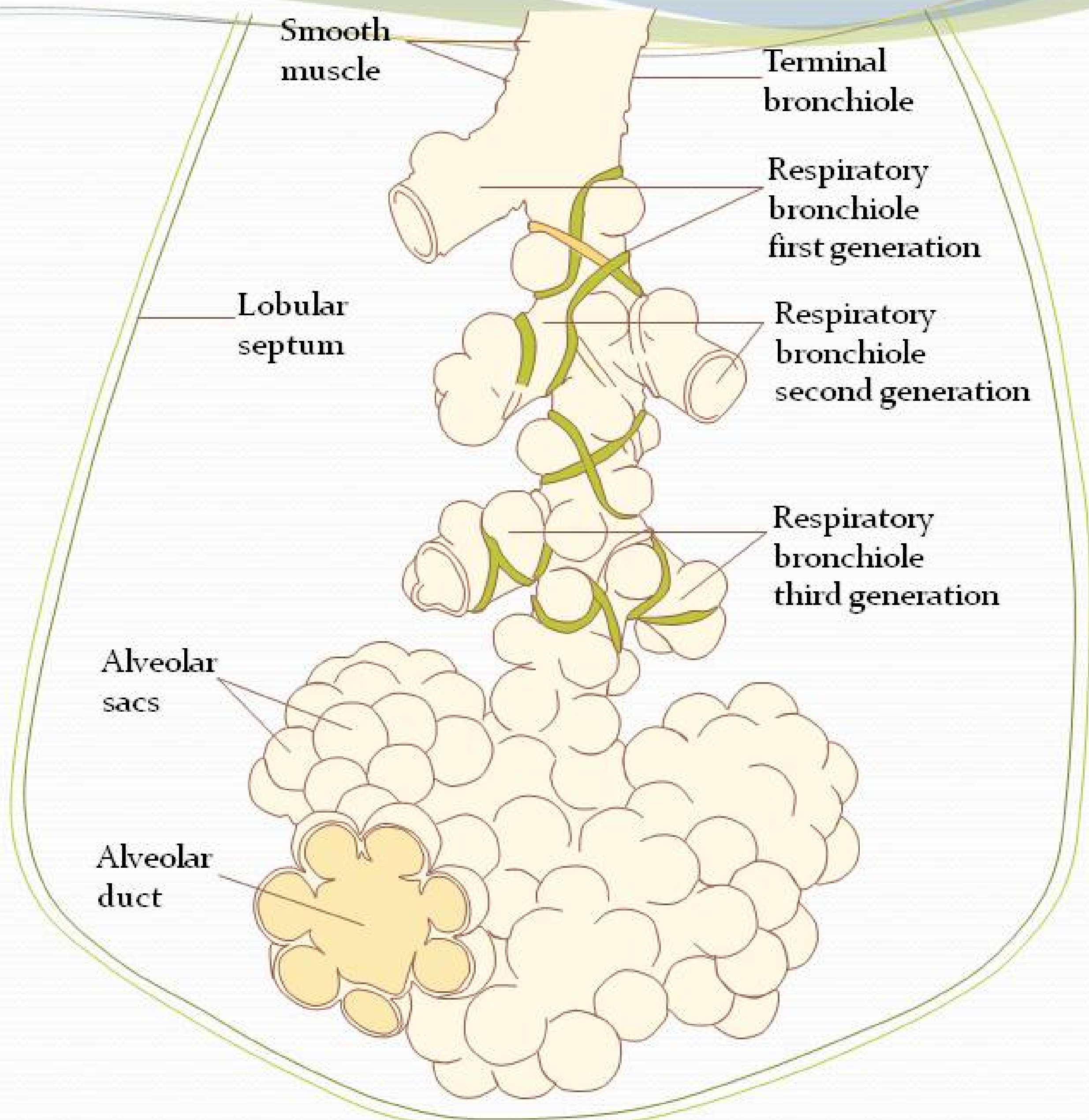
HRCT



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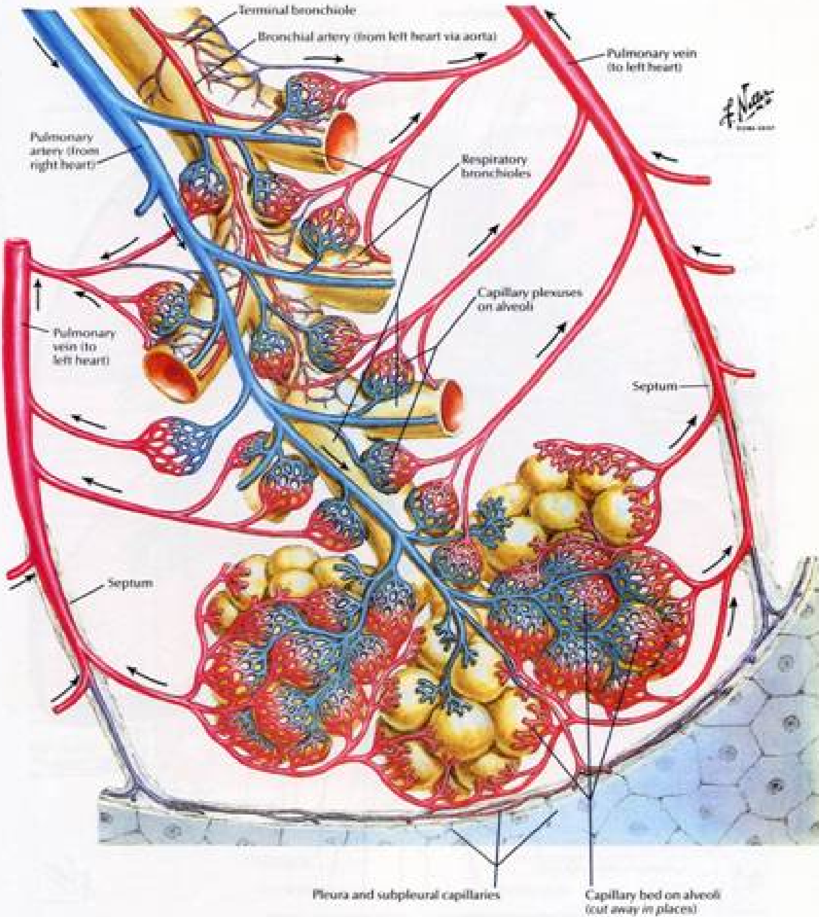
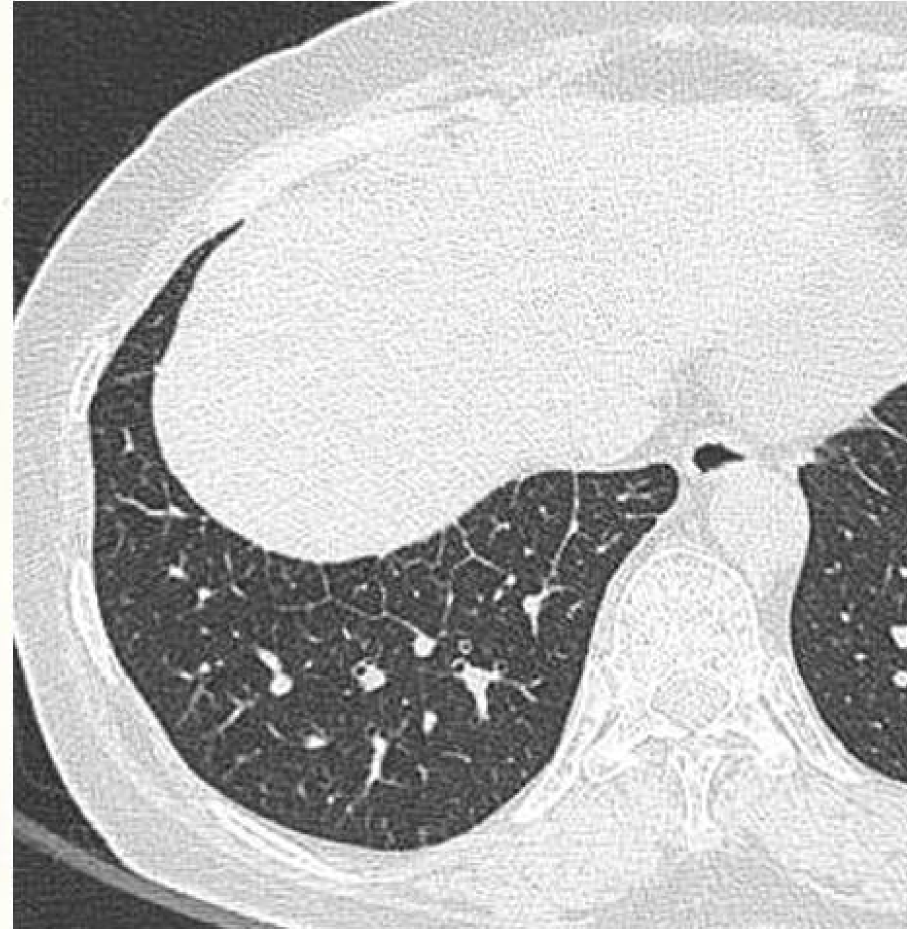
HRCT





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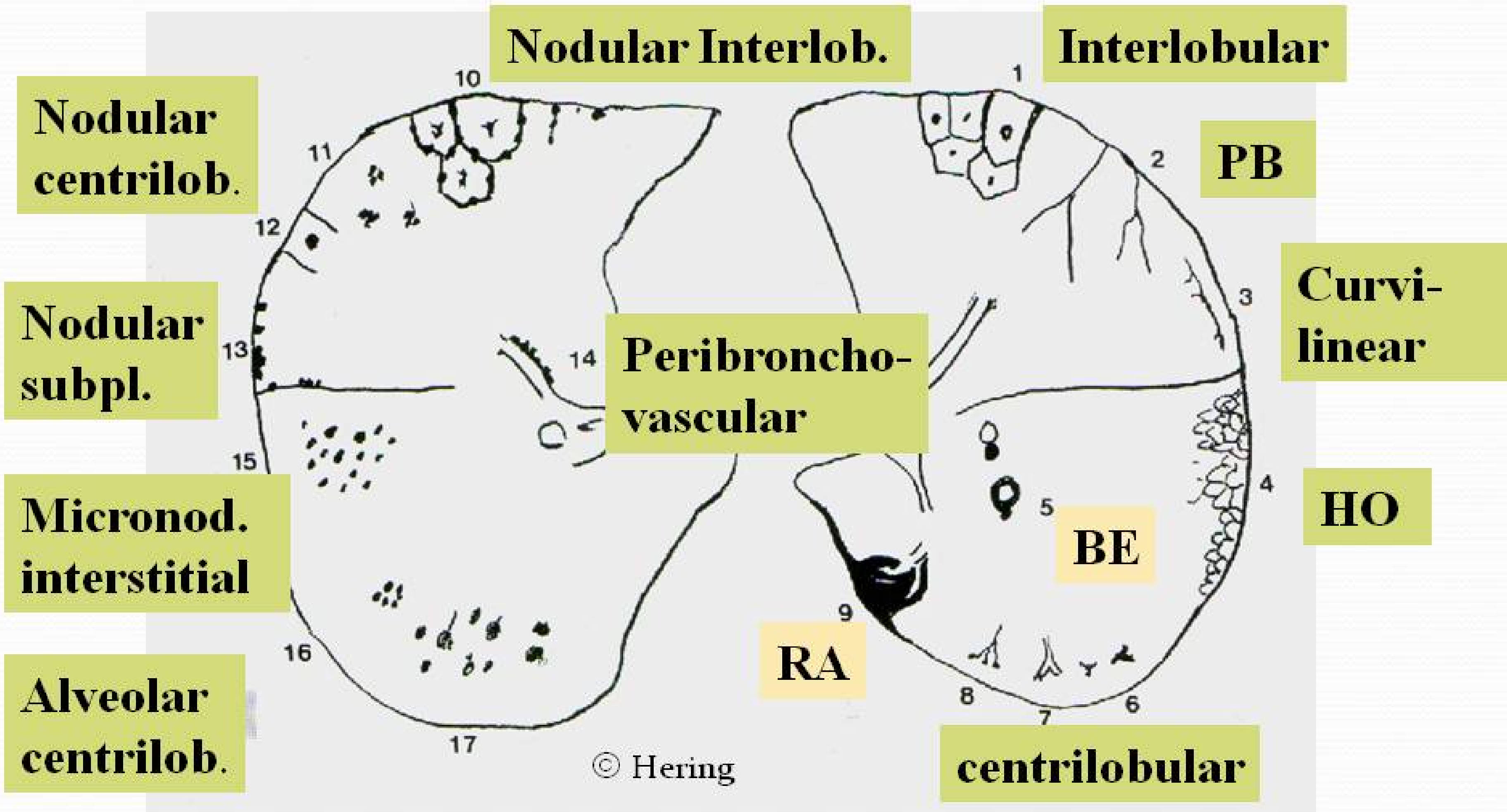
HRCT



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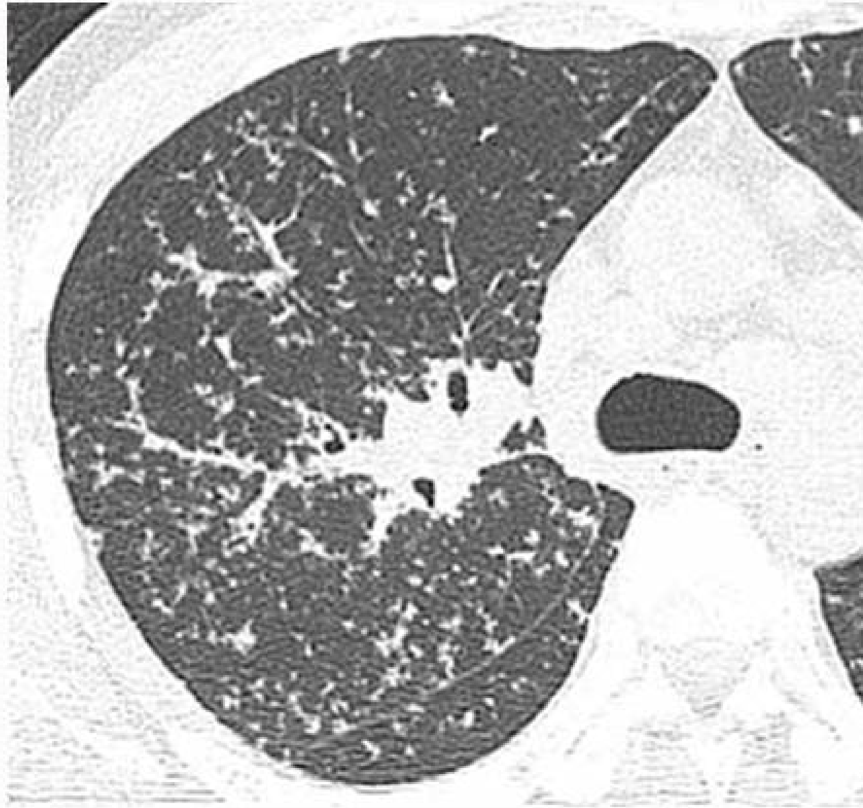
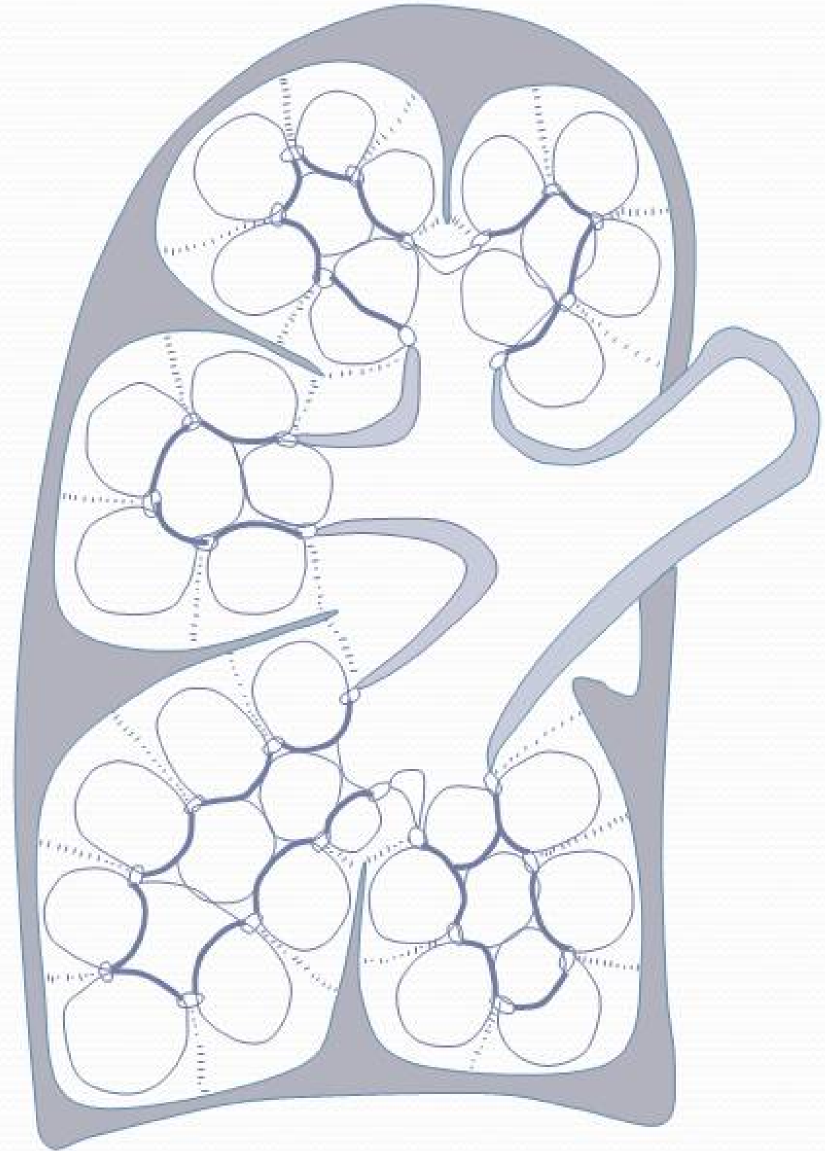
HRCT

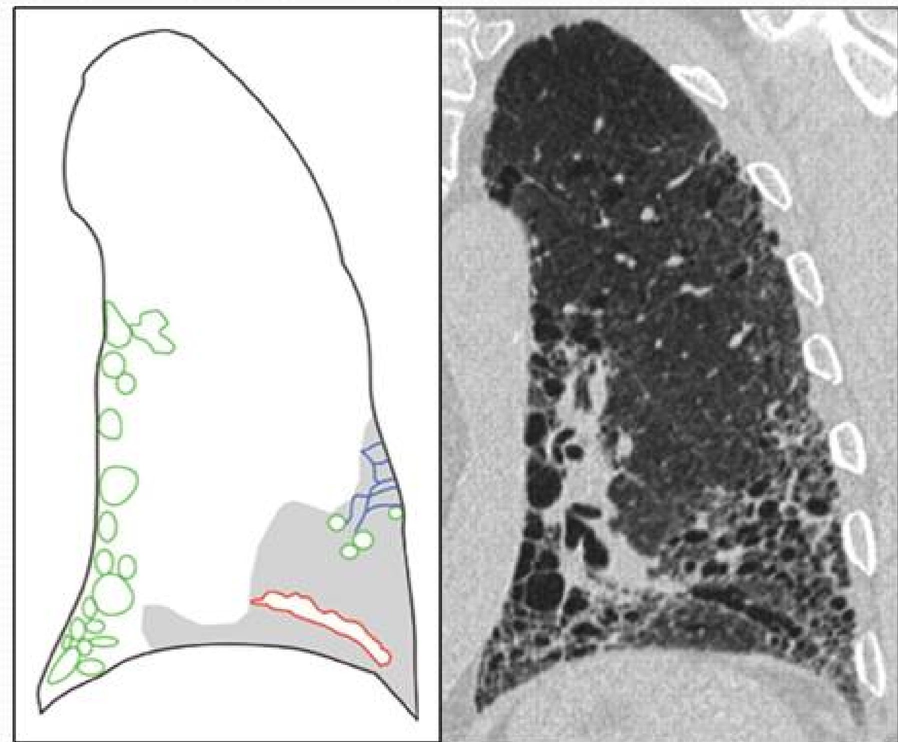




HRCT-pattern analysis

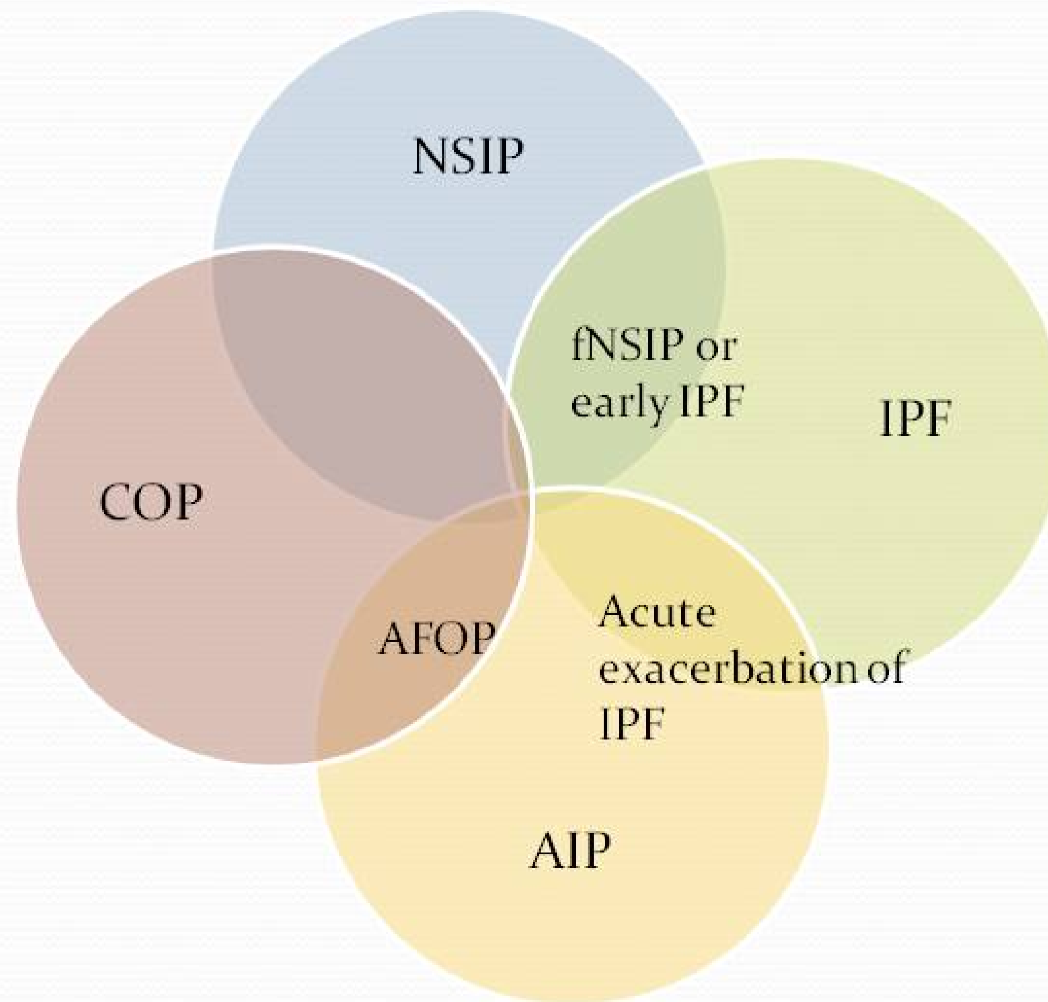
- Acute/subacute/chronic
- Interstitial/bronchiocentric
- Distribution
  - Upper/mid/lower
  - Central/peripheral/both

UIP



Radiographics 2007;27:595-615

HRCT-pattern analysis



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2013 ATS-ERS Consensus

Major idiopathic interstitial pneumonias	
	Idiopathic pulmonary fibrosis (IPF)
	Idiopathic nonspecific interstitial pneumonia (NSIP)
	Respiratory bronchiolitis-interstitial lung disease (RB-ILD)
	Desquamative interstitial pneumonia (DIP)
	Cryptogenic organizing pneumonia (COP)
	Acute interstitial pneumonia (AIP)
Rare idiopathic interstitial pneumonias	
	Idiopathic lymphoid interstitial pneumonia (LIP)
	Idiopathic pleuroparenchymal fibroelastosis (IPPFE)
Unclassifiable idiopathic interstitial pneumonias *	

Am J Respir Crit Care Med 2013; 188: 733-748

2013 Update of IIPs

1. 'Cryptogenic fibrosing alveolitis' is removed.
2. NSIP is accepted as a distinct clinical entity: removal of the term 'provisional'
3. Major IIPs, rare IIPs, and unclassifiable cases
4. Rare histologic pattern of AFOP and IP with a bronchiolocentric distribution are recognized
5. Major IIPs: 1. chronic fibrosing (IPF and NSIP), 2. smoking-related (RB-ILD and DIP), 3. acute/subacute IIPS (COP and AIP)
6. Clinical disease behavior classification is proposed.
7. Molecular and genetic features are reviewed.

Am J Respir Crit Care Med 2013; 188: 733-748

Important differential diagnostic consideration

- Hypersensitivity pneumonitis
- Collagen vascular disease
- Familial interstitial pneumonia
- Coexisting patterns

Am J Respir Crit Care Med 2013; 188: 733-748

Multidisplanary Approach !

- Clinician, Radiologist, Pathologist
- The multidisciplinary approach does not lessen the importance of lung biopsy in the diagnosis of IIPs; rather, it defines the settings where biopsy is more informative than HRCT and those where biopsy is not needed.
- Also, once a pathologist has recognized a histologic pattern (e.g., NSIP or OP), the clinician should reconsider potential causes (e.g., HP, CVD, and drug exposure).

Am J Respir Crit Care Med 2013; 188: 733-748

Chronic Fibrosing IIPs

Idiopathic pulmonary fibrosis (IPF)

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Idiopathic pulmonary fibrosis

- Three levels of certainty based on HRCT findings
  - UIP
  - Possible UIP
  - Inconsistent UIP
- Four levels of certainty for pathologic diagnosis
  - UIP
  - Probable UIP
  - Possible UIP
  - Not UIP

Am J Respir Crit Care Med 2011; 183: 788-824

UIP pattern at HRCT

UIP pattern (All Four Features)	Possible UIP pattern (All Three Features)
Subpleural, basal predominance	Subpleural, basal predominance
Reticular abnormality	Reticular abnormality
Honeycombing with or without traction bronchiectasis	
Absence of features listed as inconsistent with UIP pattern	Absence of features listed as inconsistent with UIP pattern

Am J Respir Crit Care Med 2011;183: 788-824

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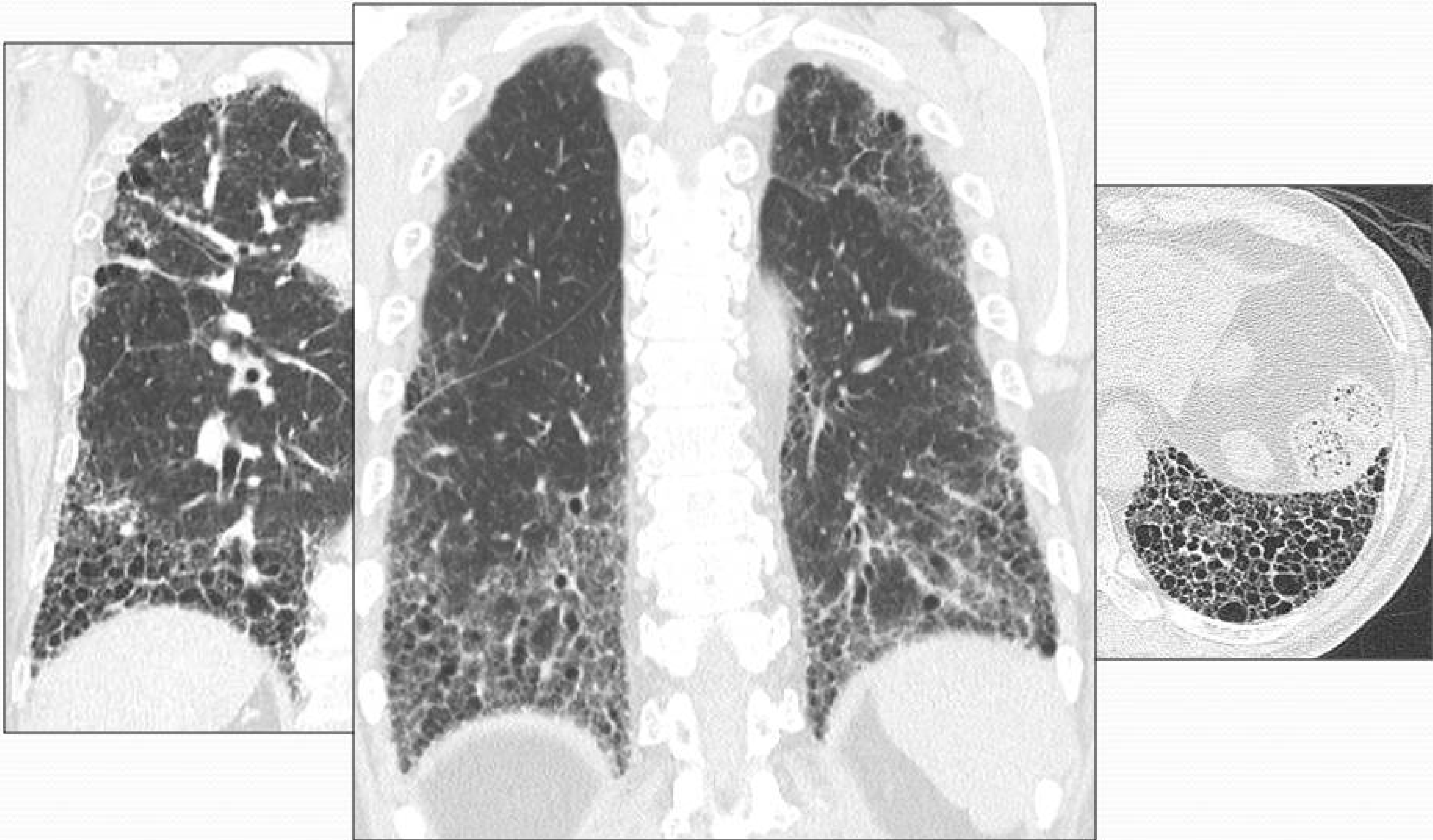
UIP pattern at HRCT

Inconsistent with UIP Pattern (Any of the Seven Features)
• Upper or mid-lung predominance
• Peribronchovascular predominance
• Extensive ground glass abnormality (extent > reticular abnormality)
• Profuse micronodules (bilateral, predominantly upper lobes)
• Discrete cysts (multiple, bilateral, away from areas of honeycombing)
• Diffuse mosaic attenuation/air-trapping (bilateral, in three or more lobes)
• Consolidation in bronchopulmonary segment(s)/lobe(s)

Am J Respir Crit Care Med 2011;183: 788-824

Typical UIP



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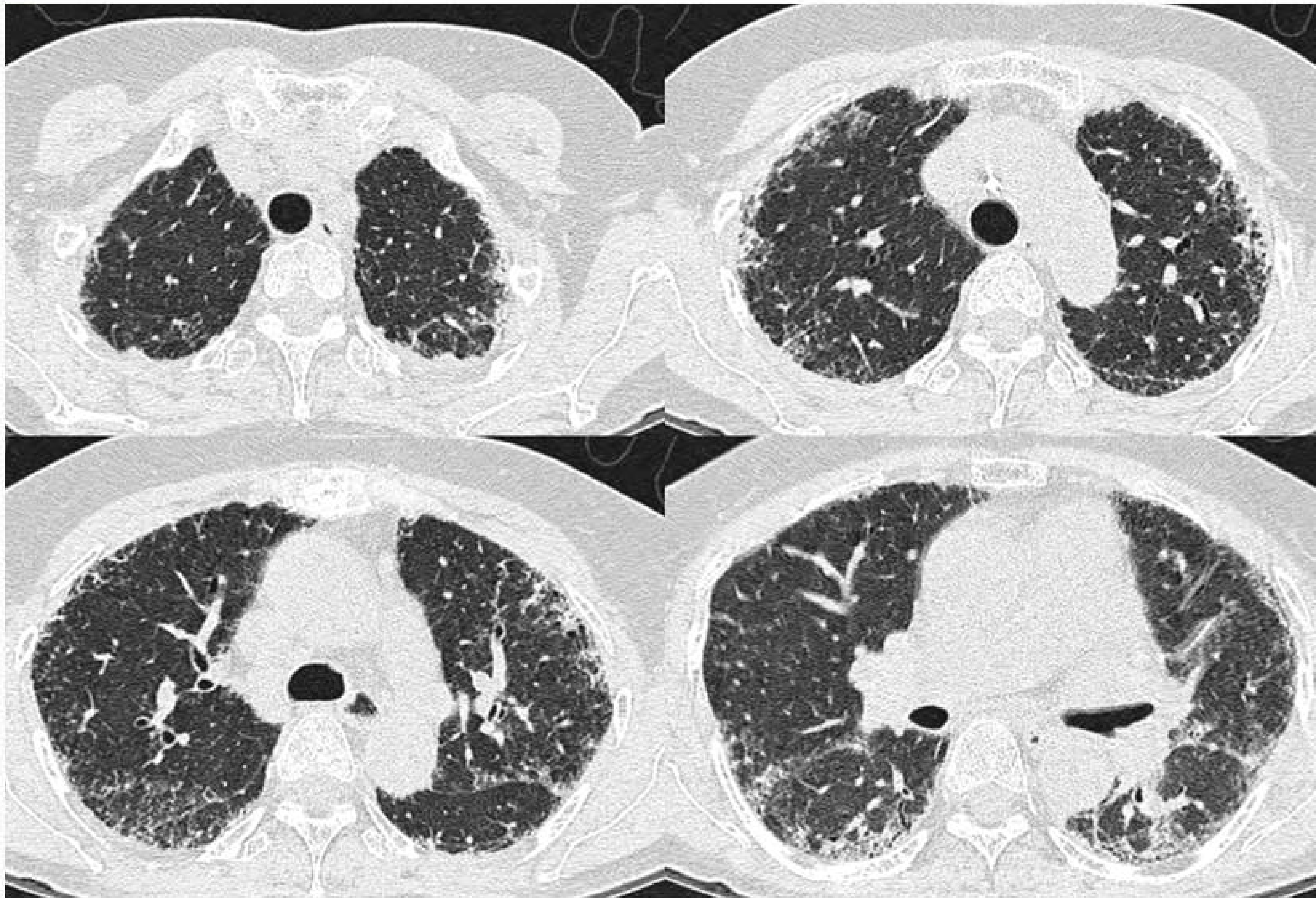

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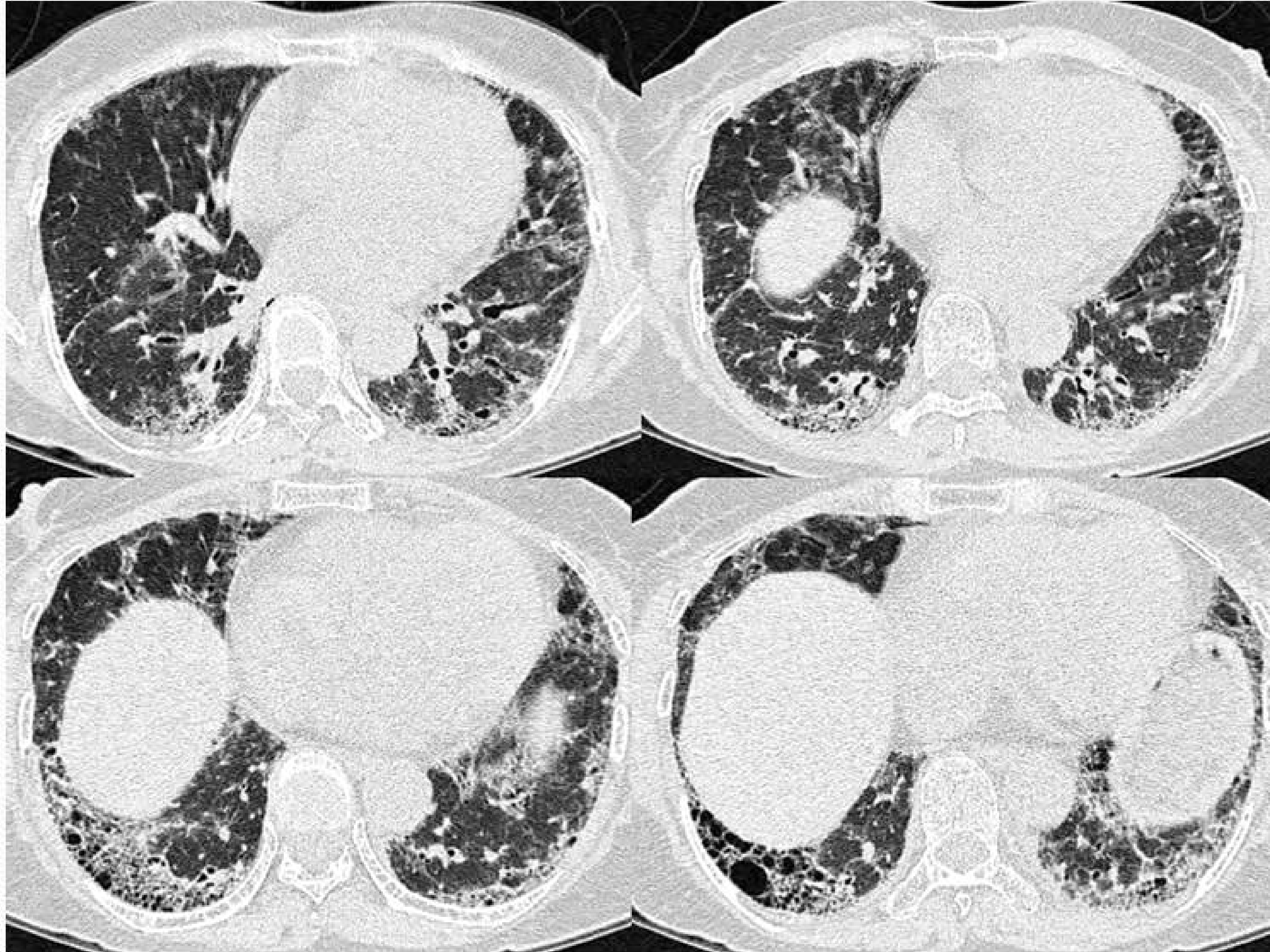

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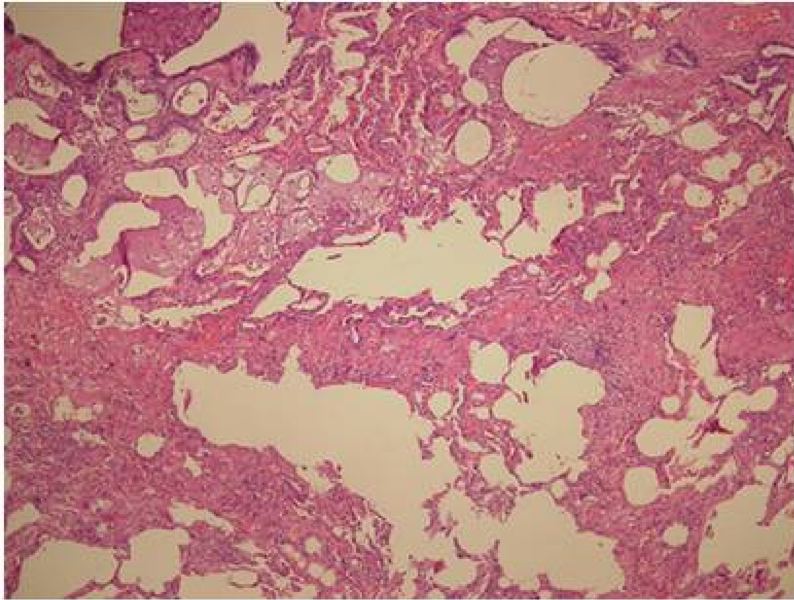
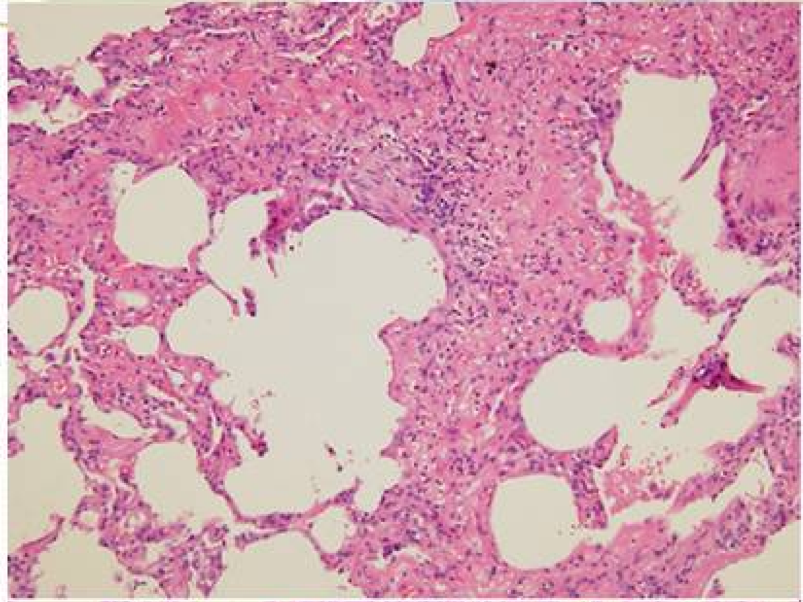
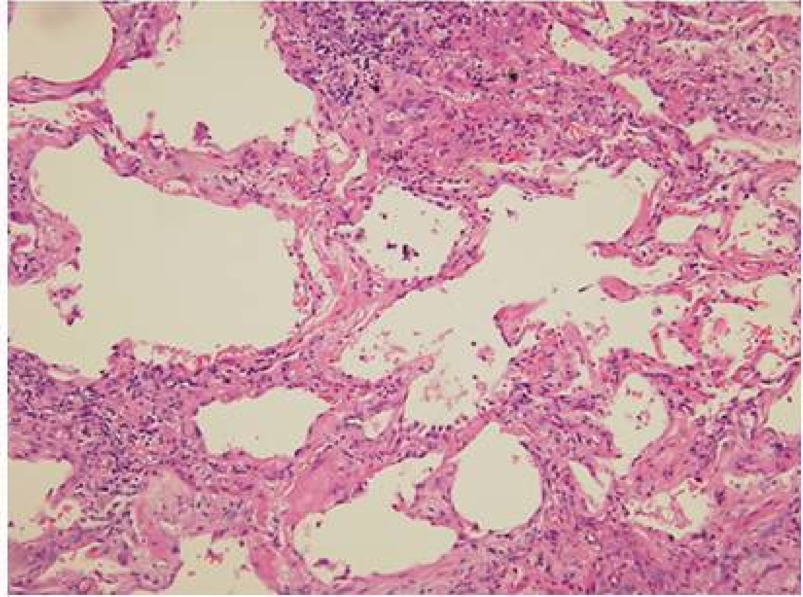

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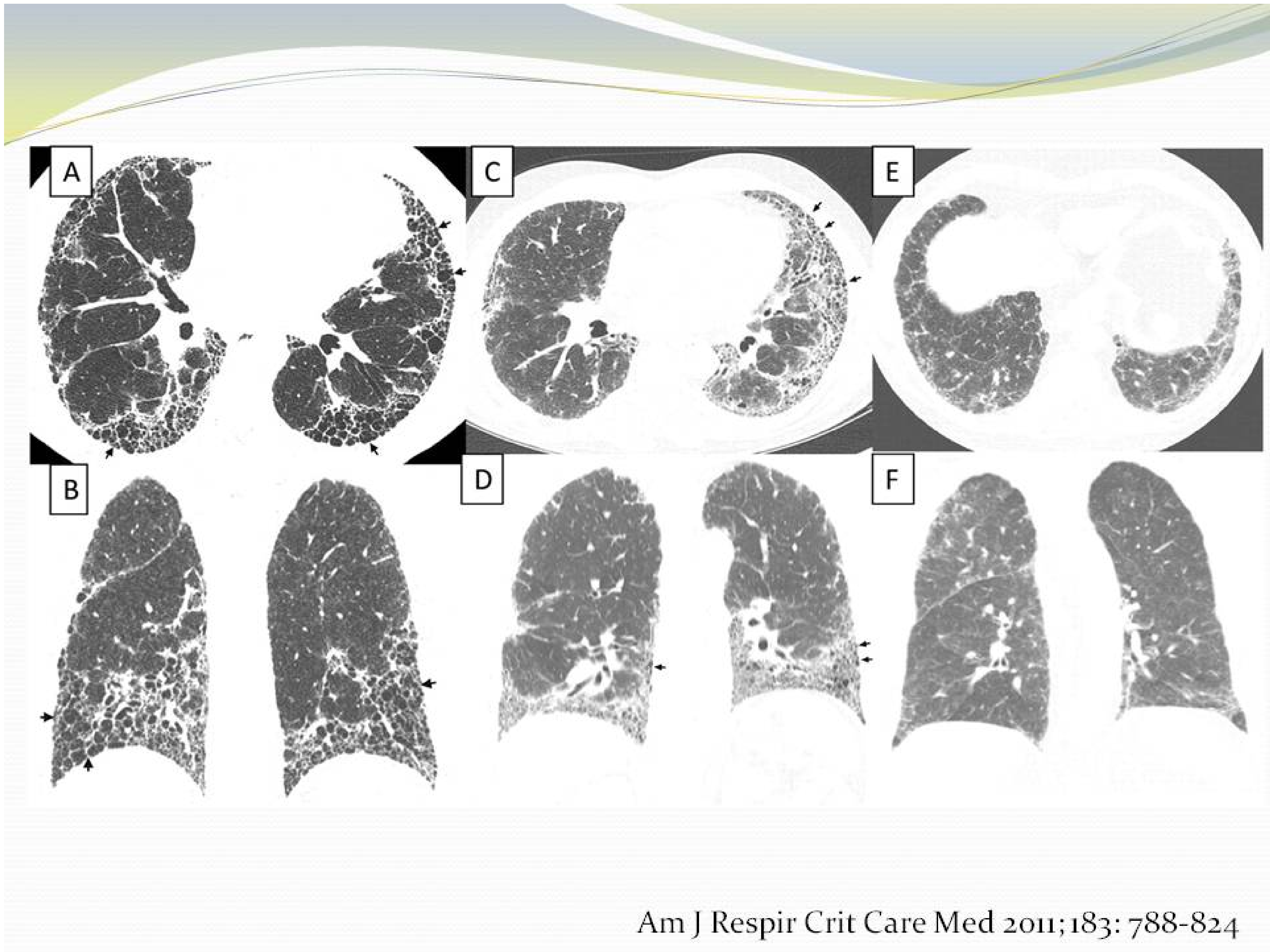

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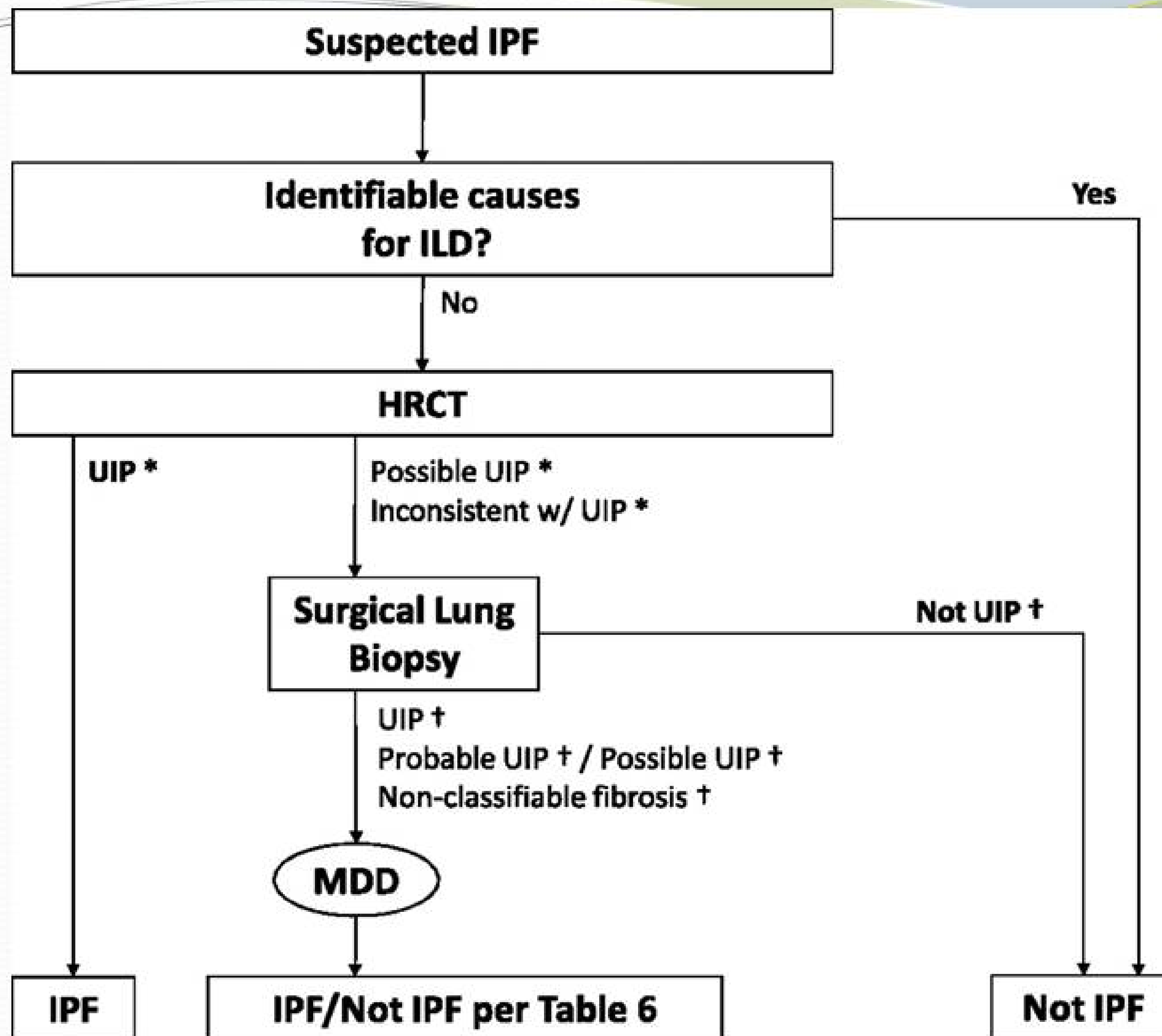

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HRCT pattern	Surgical Lung Bx Pattern (When Performed)	Diagnosis of IPF?
UIP	**UIP**	**YES**
	Probable UIP	
	Possible UIP	
	Nonclassifiable fibrosis	
	Not UIP	No
Possible UIP	**UIP**	**YES**
	Probable UIP	
	Possible UIP	Probable
	Nonclassifiable fibrosis	
	Not UIP	No
Inconsistent UIP	UIP √	Possible √
	Probable UIP	No
	Possible UIP	
	Nonclassifiable fibrosis	
	No UIP	

Am J Respir Crit Care Med 2011;183: 788-824

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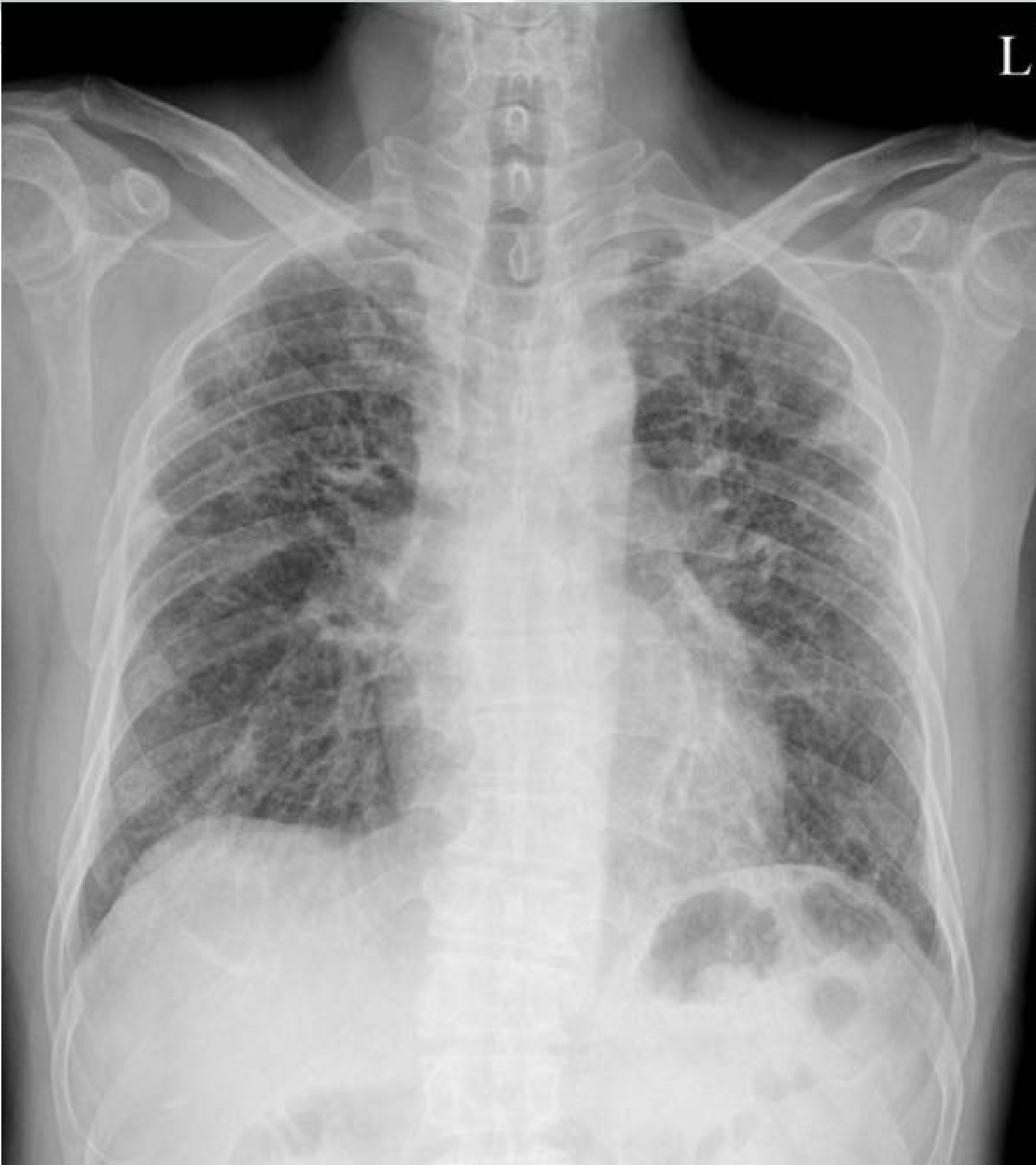
61/M



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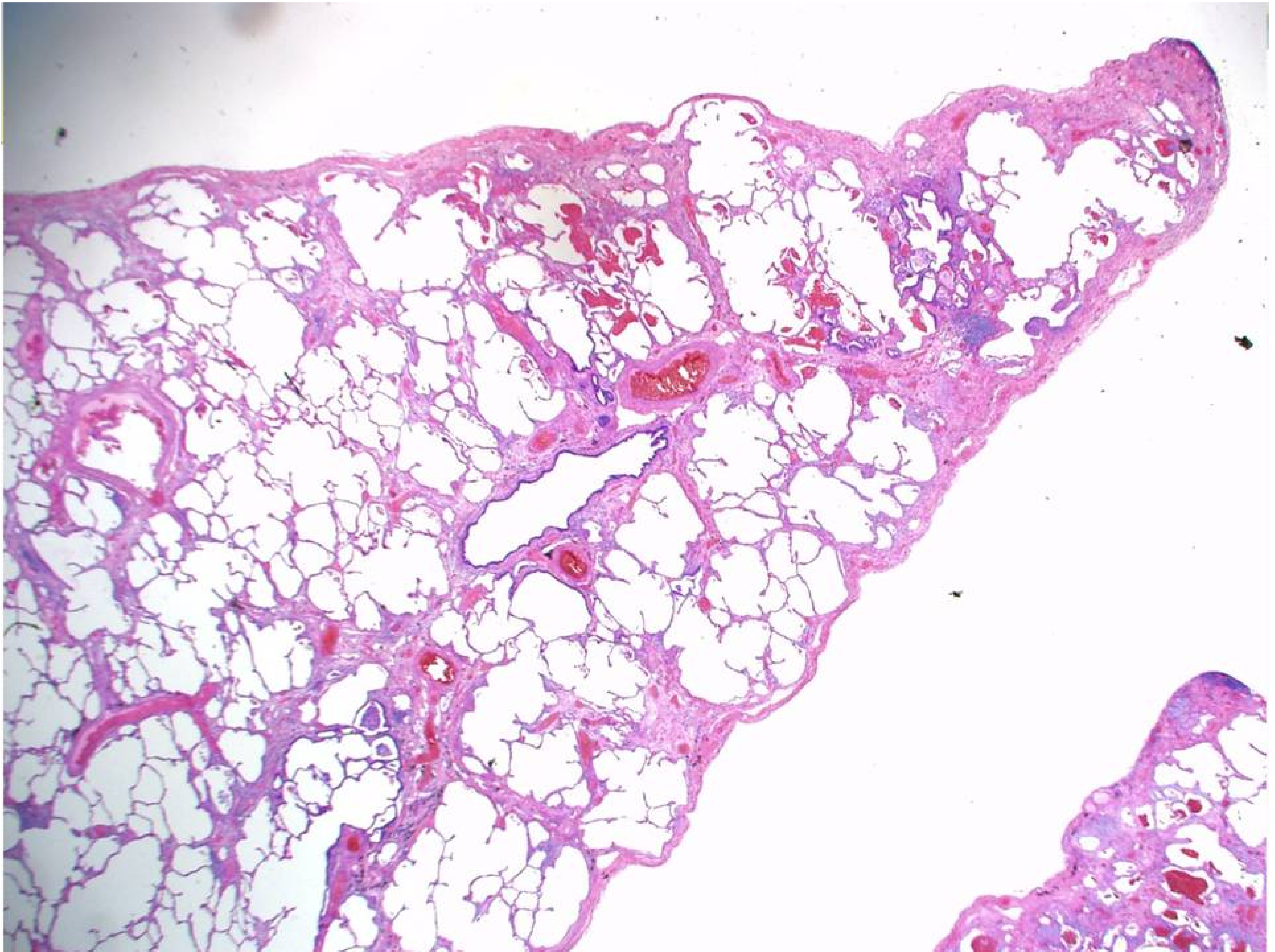

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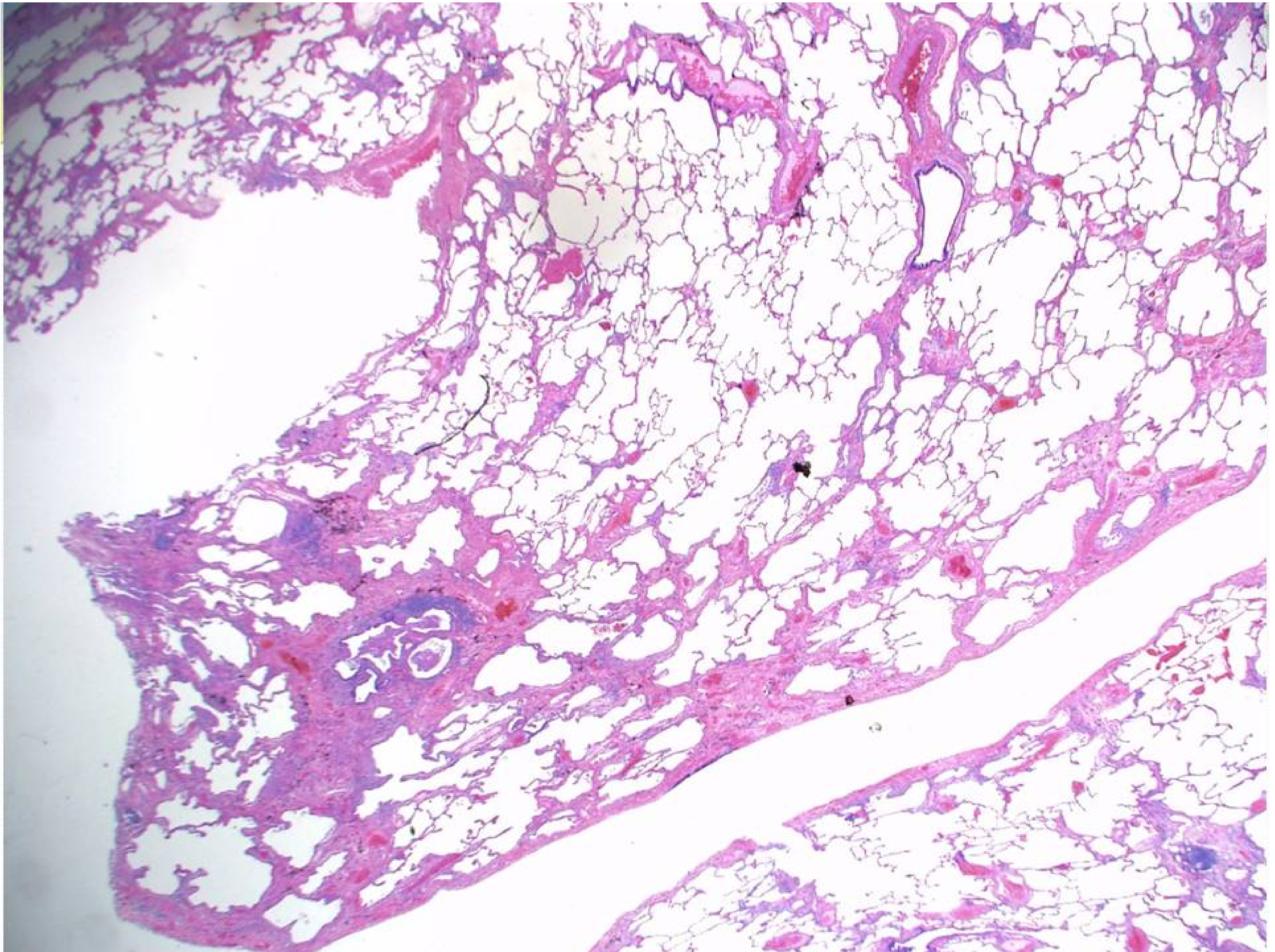

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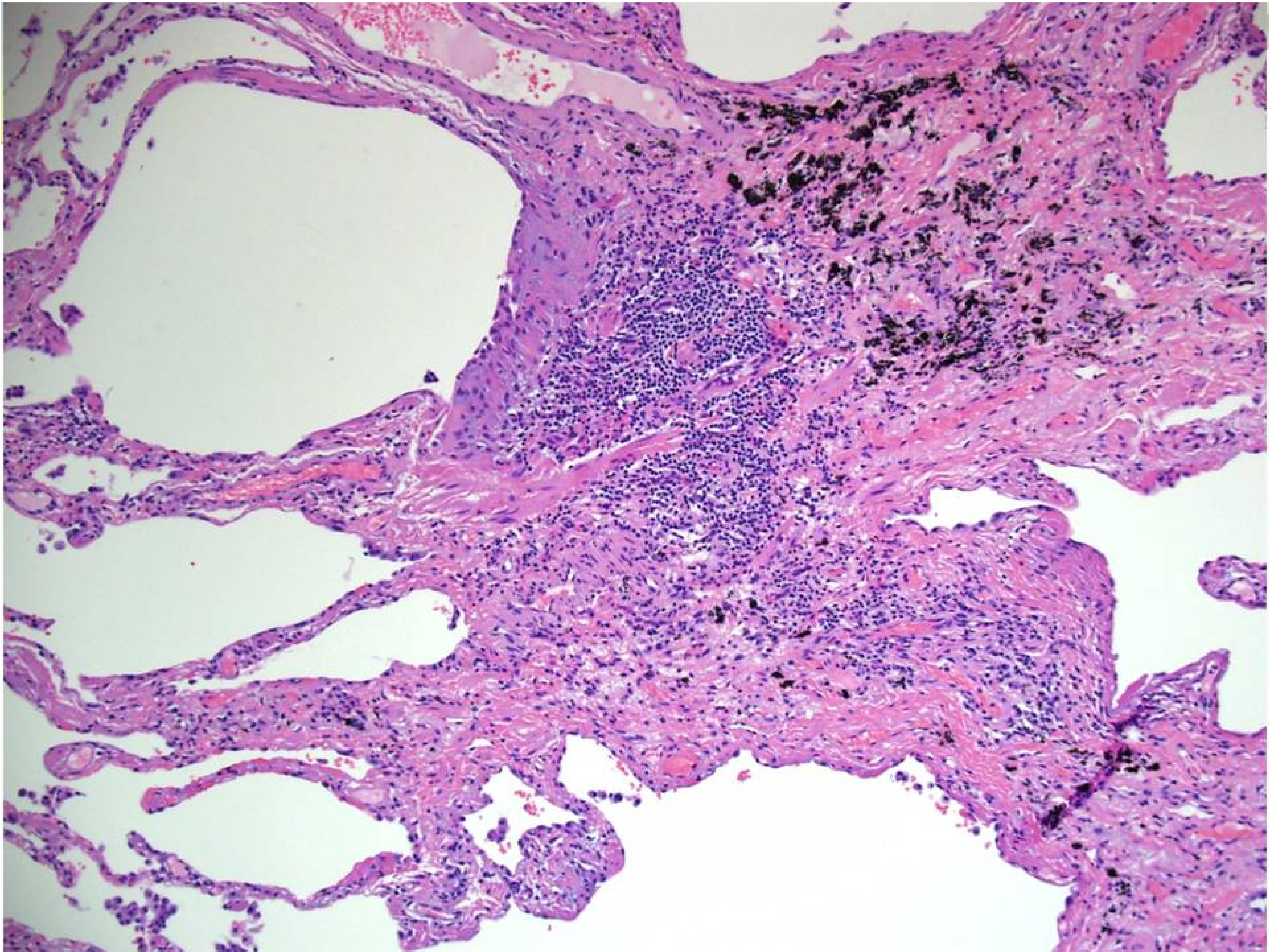

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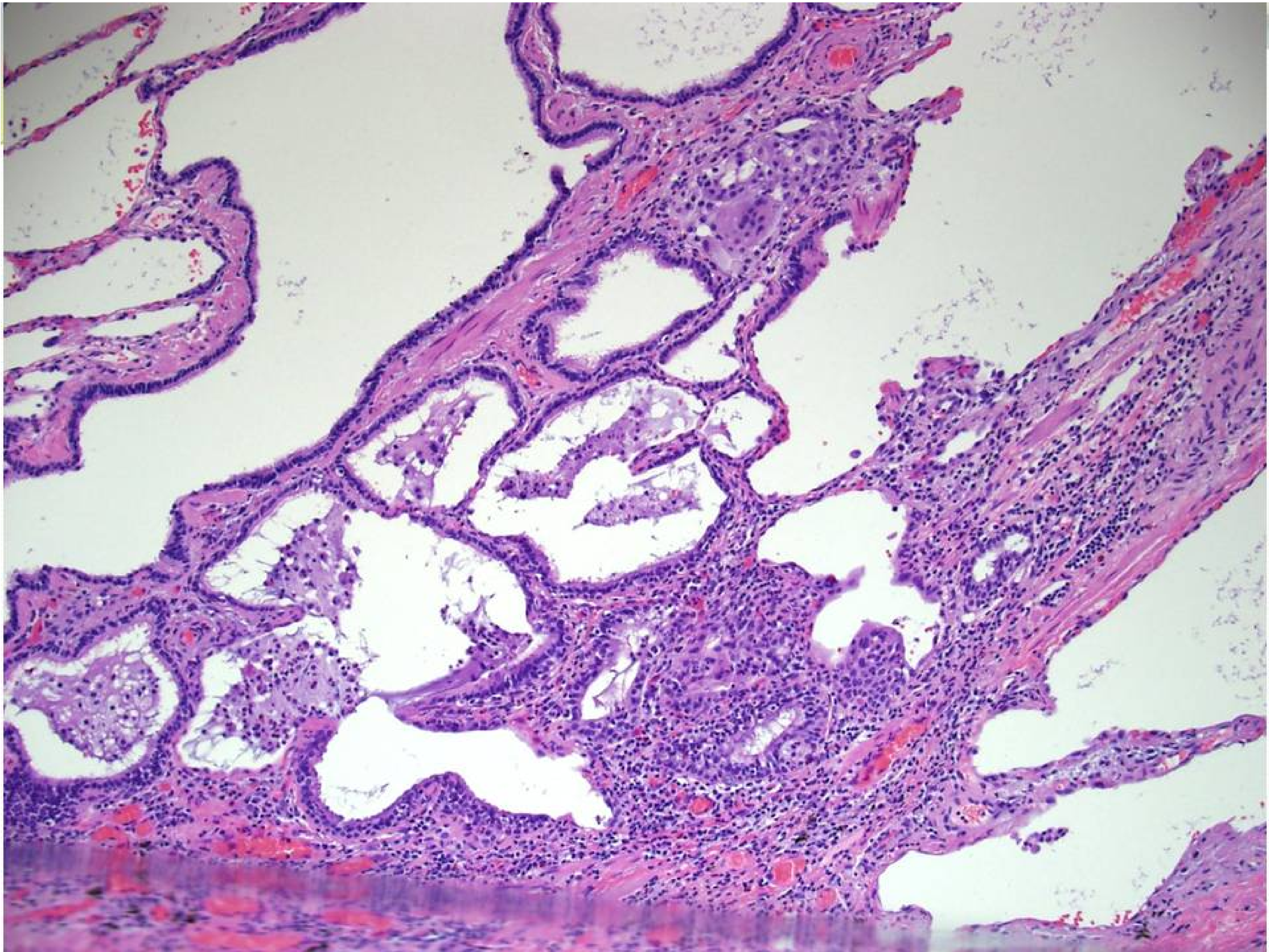

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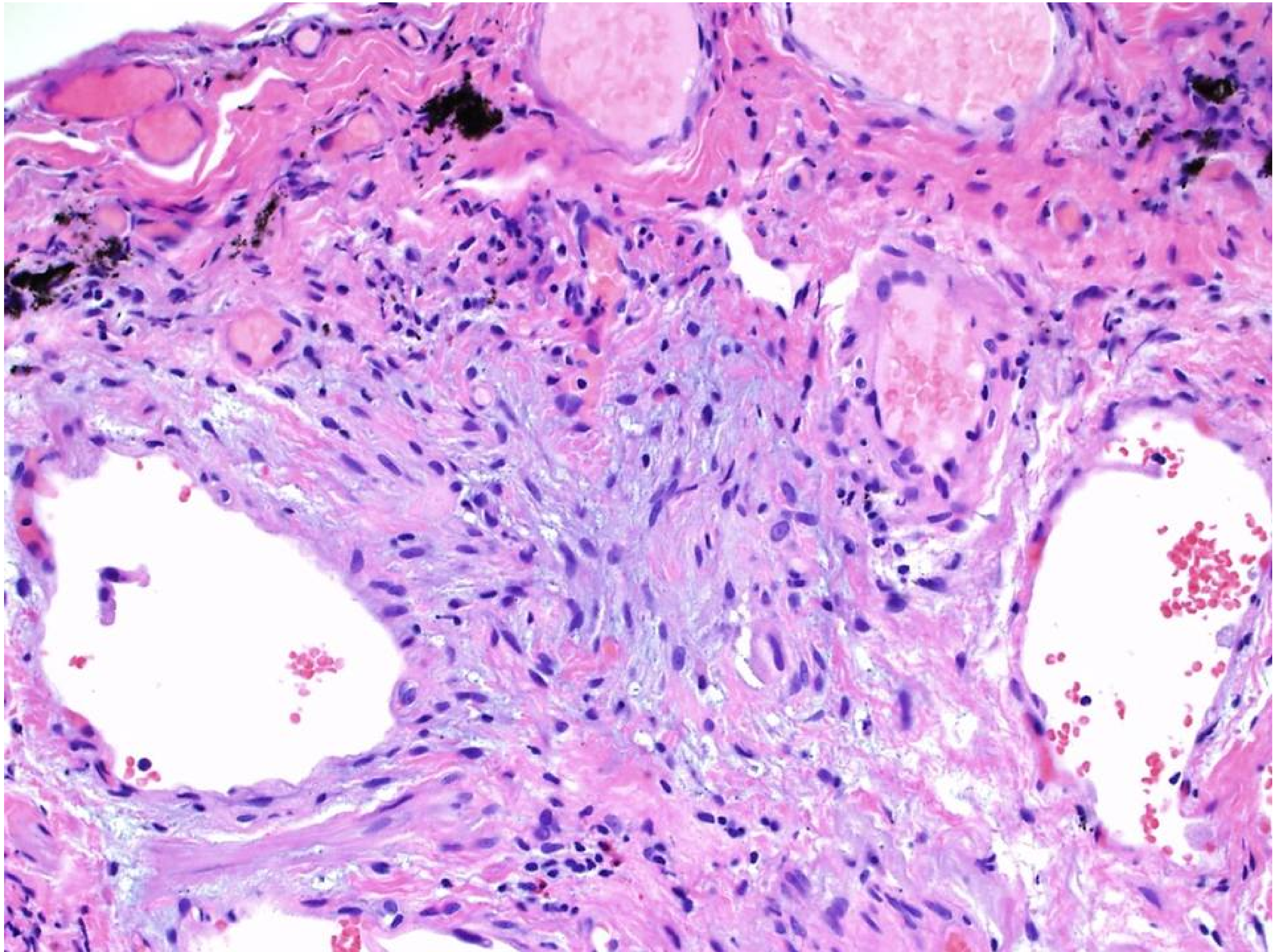

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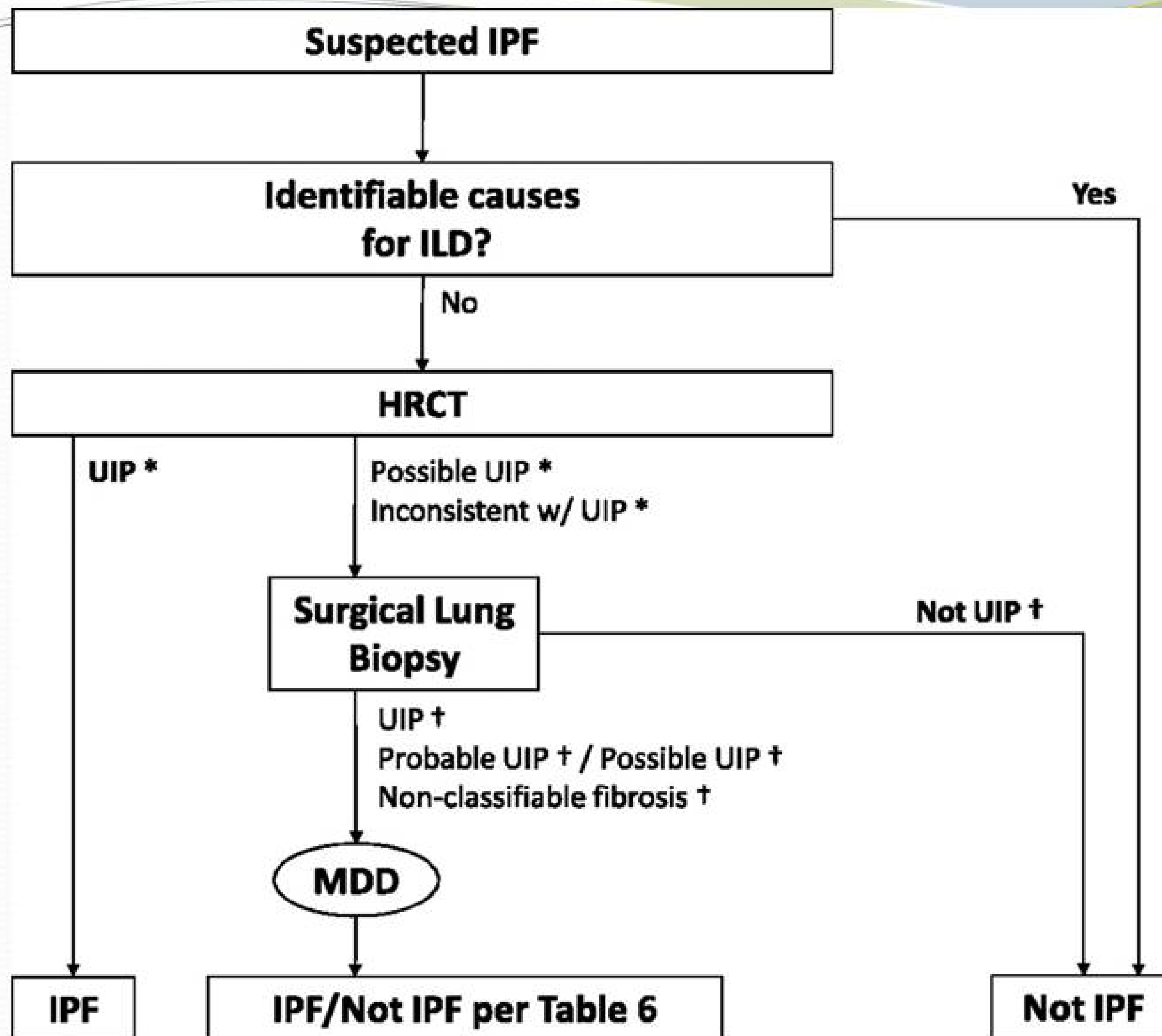

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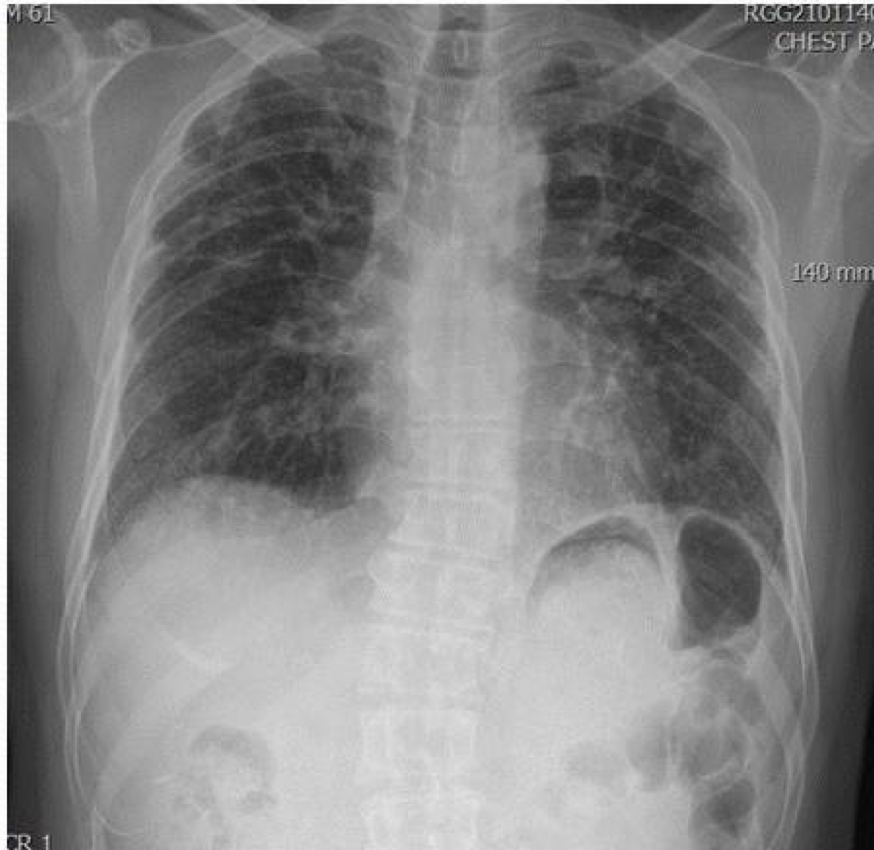
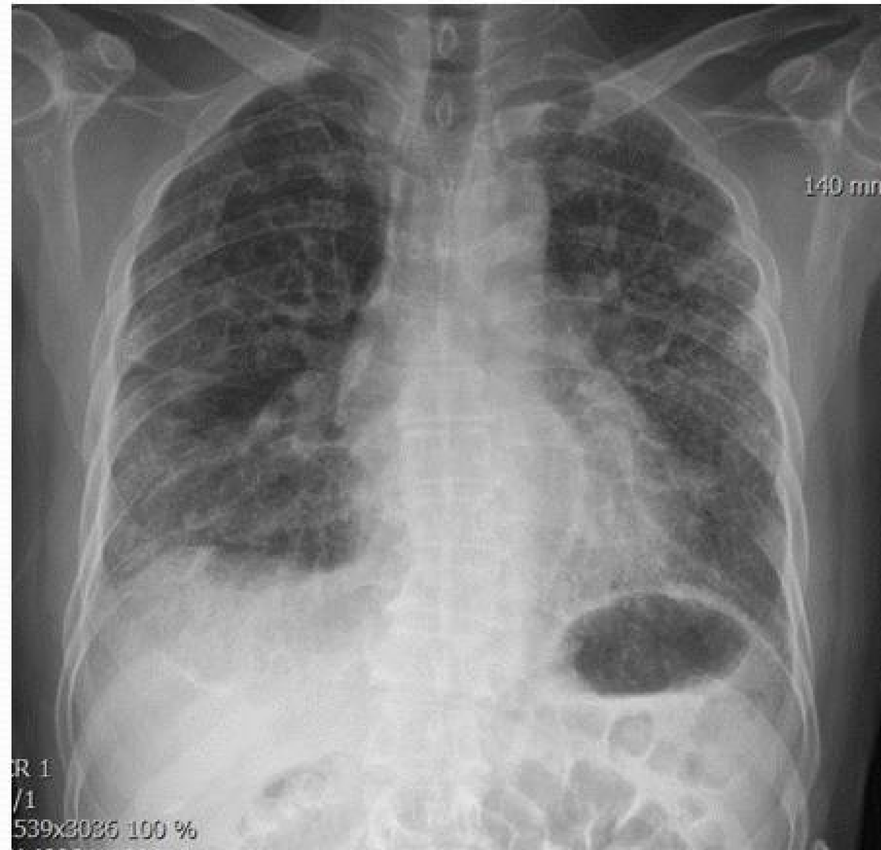
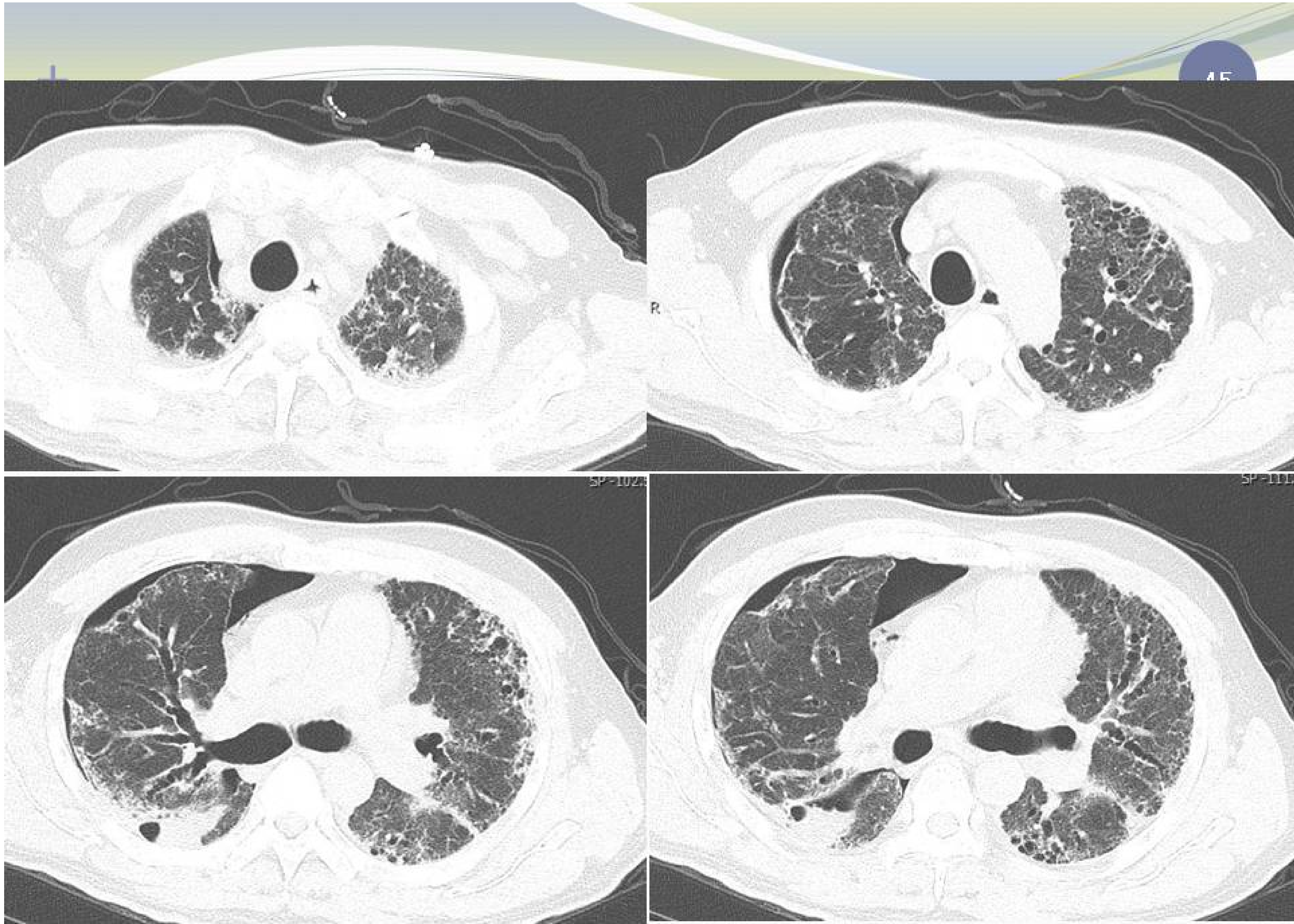
2months later







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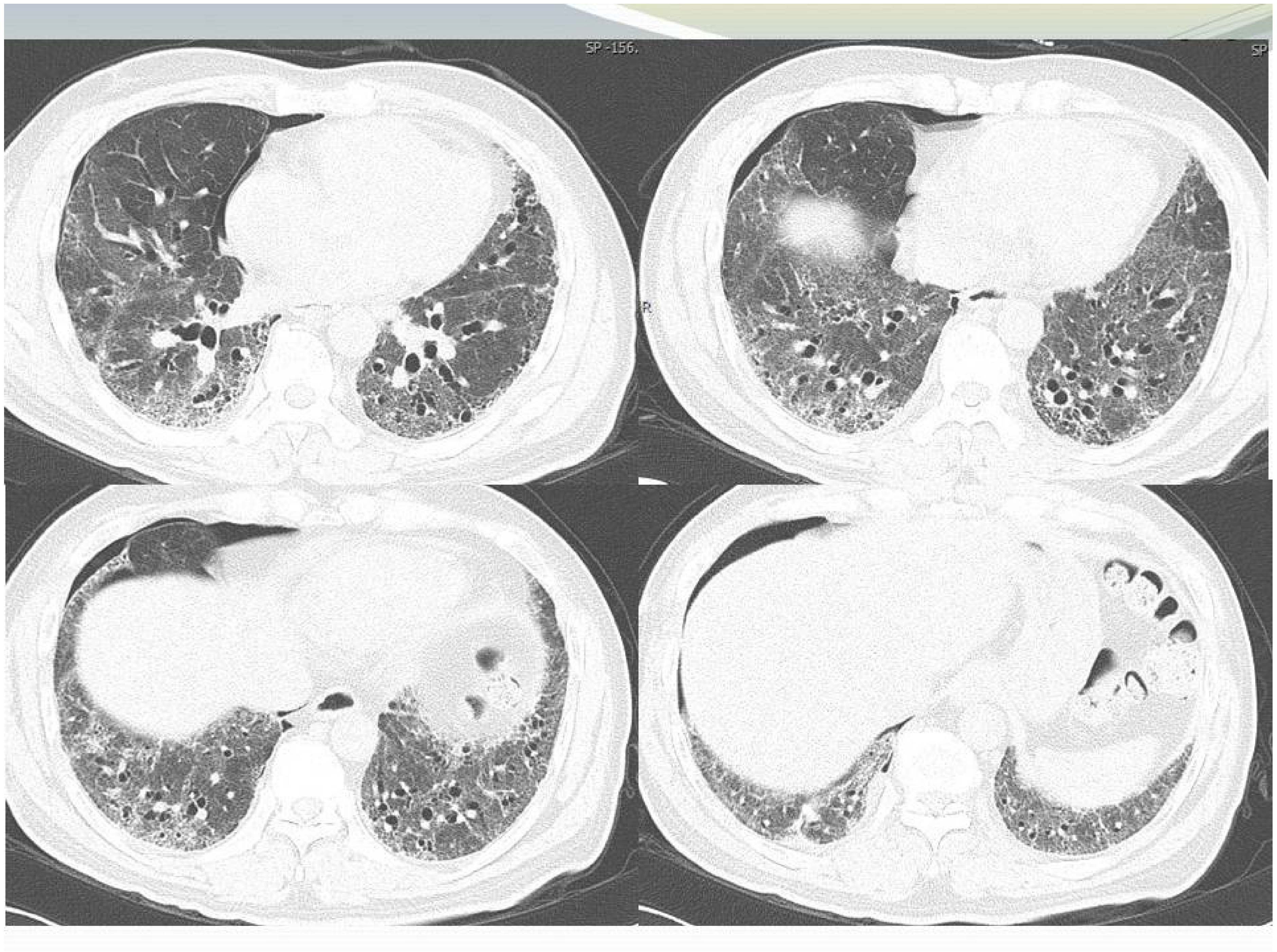

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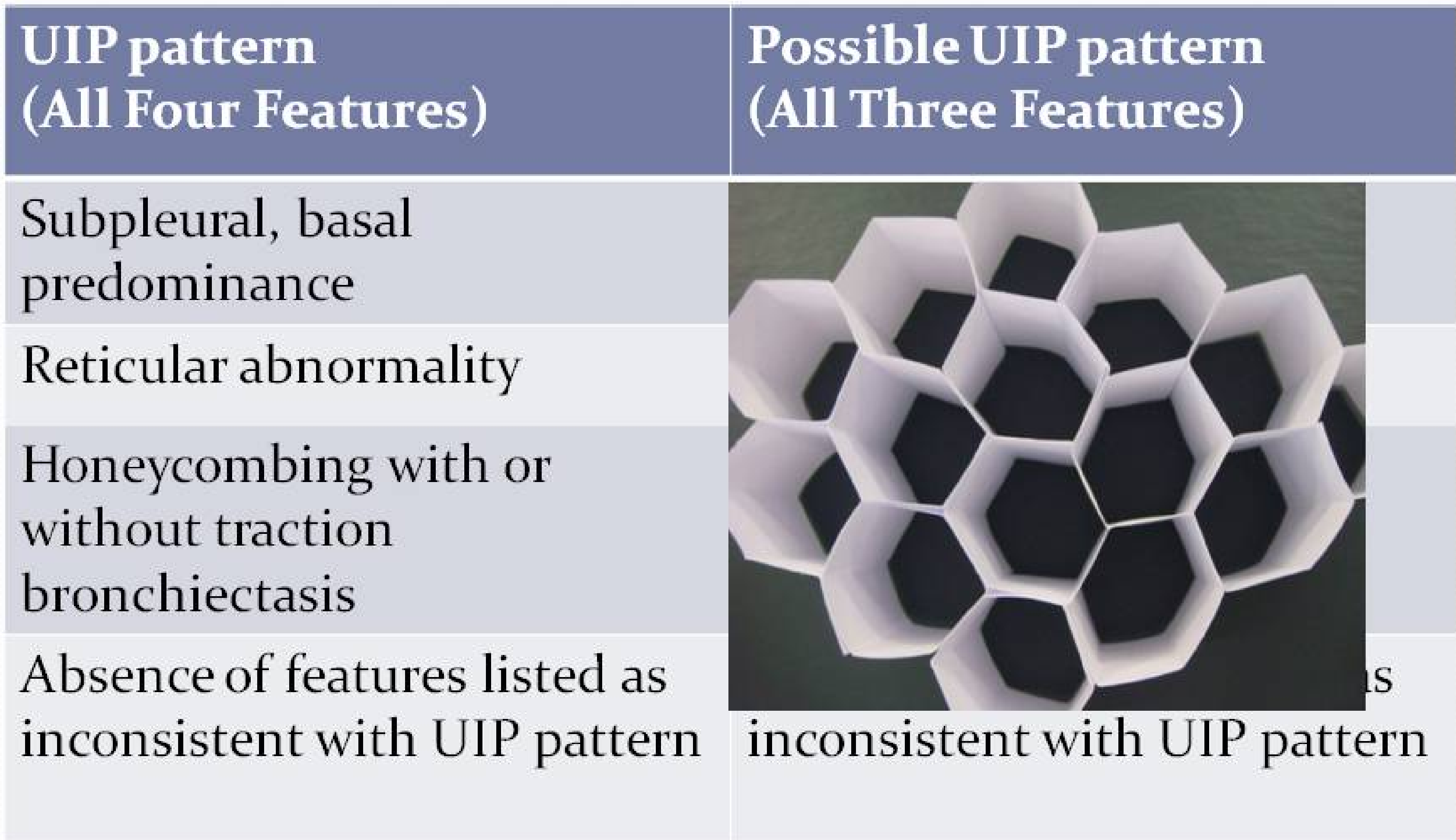

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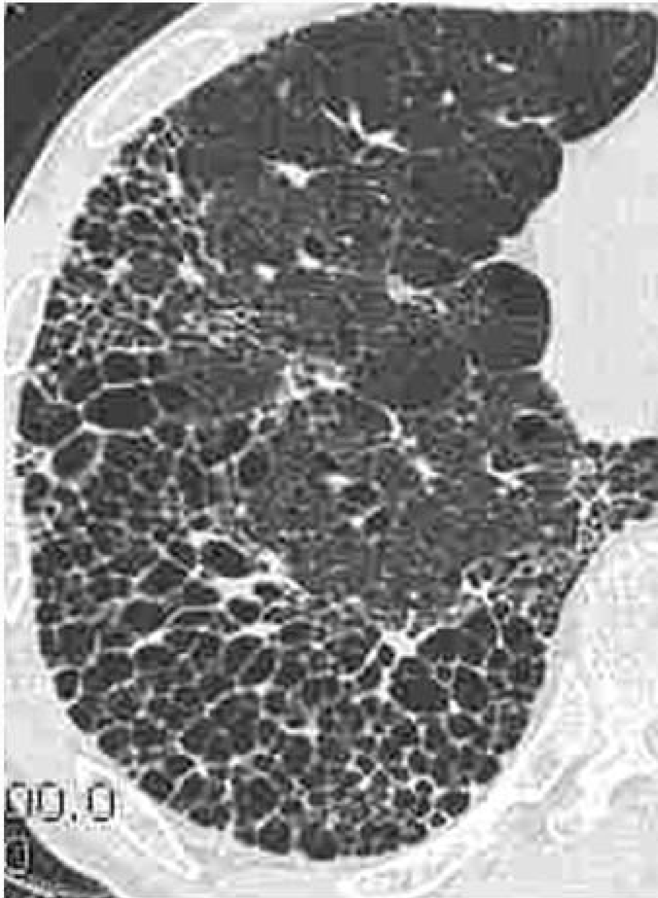
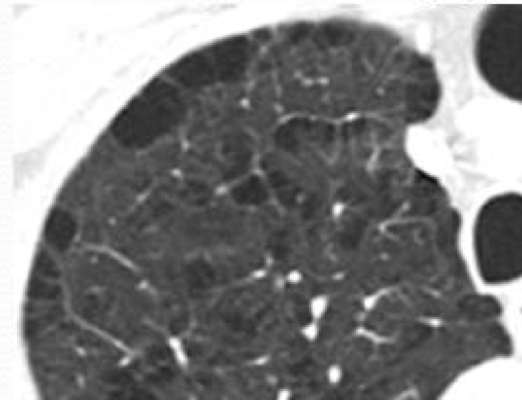
Honeycombing



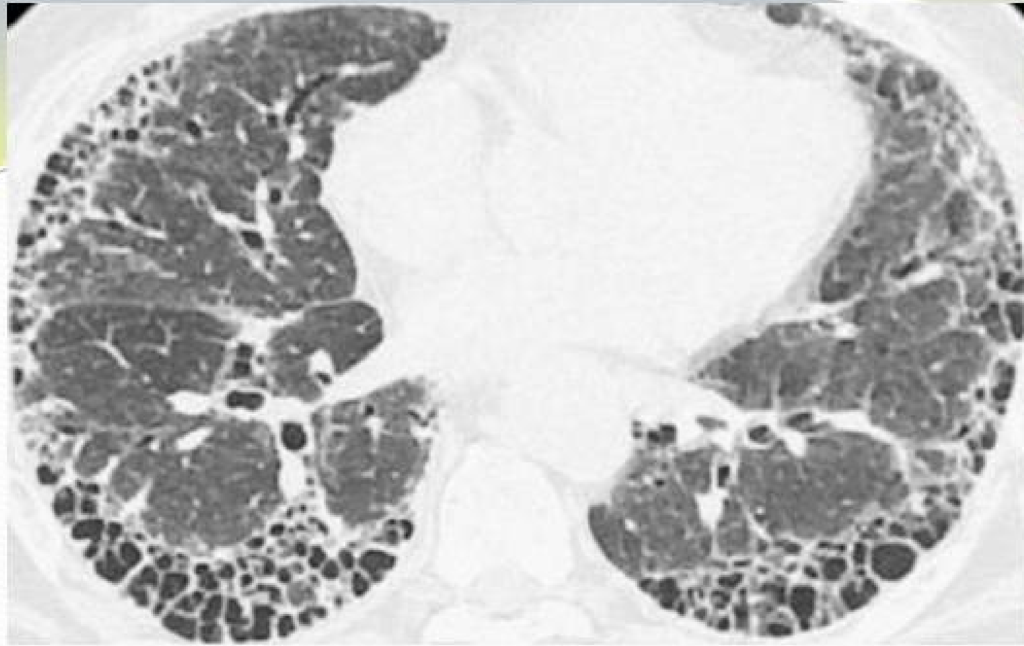
- Cysts of 3-10mm in diameter
- Sharing walls
- Several layers (≥2)
- DDx from reticulation, BE, or emphysema; no inner structure, no intervening parenchyma



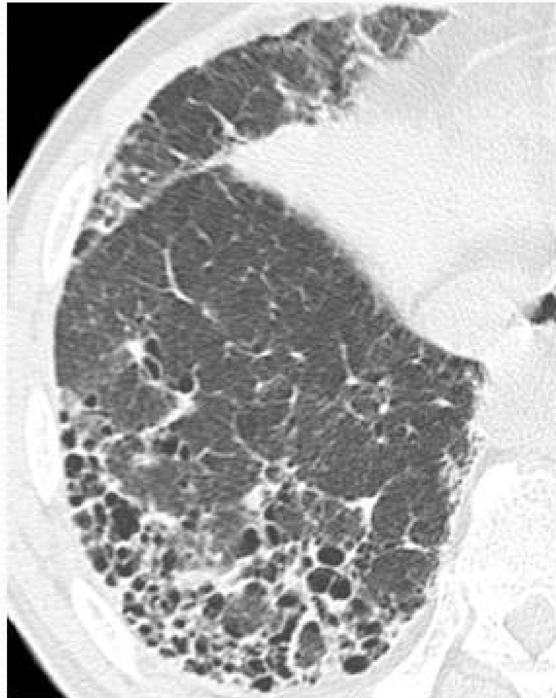
Interobserver Variability in CT assessment of HC

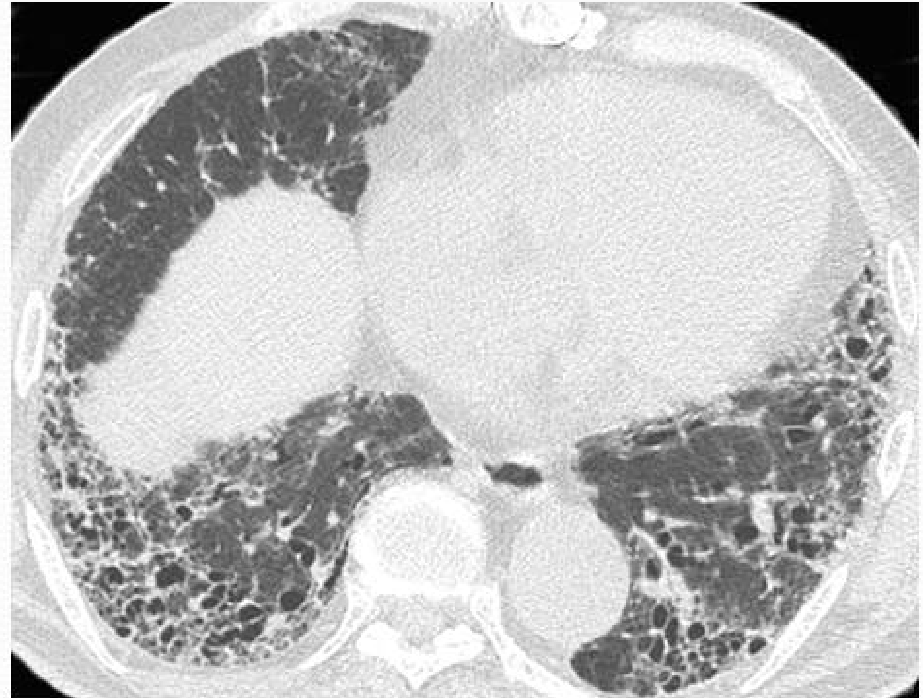
- Agreement of scores of honeycombing presence by 43 observers with the reference standard was moderate (Cohen weighted κ values: 0.40–0.58).
- In 29% of cases, there was disagreement on identification of honeycombing: honeycombing mixed with traction bronchiectasis, large cysts, and superimposed pulmonary emphysema.
- Identification of honeycombing at CT is subjective, and disagreement is largely caused by conditions that mimic honeycombing.

Radiology 2013 ;266(3):936-44



Radiology 2013 ;266(3):936-44





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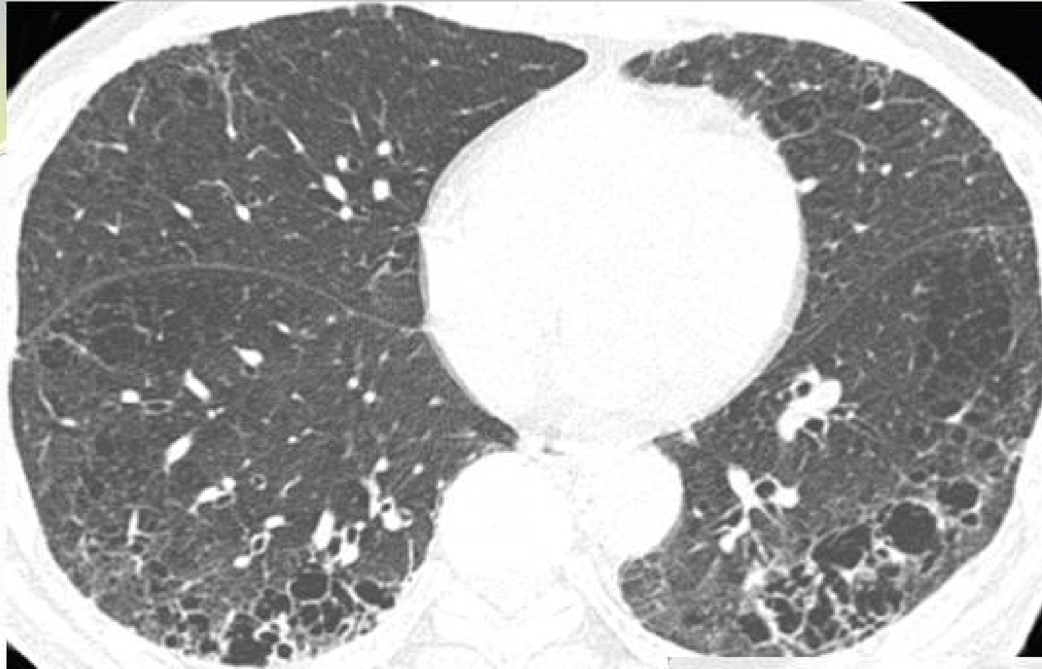

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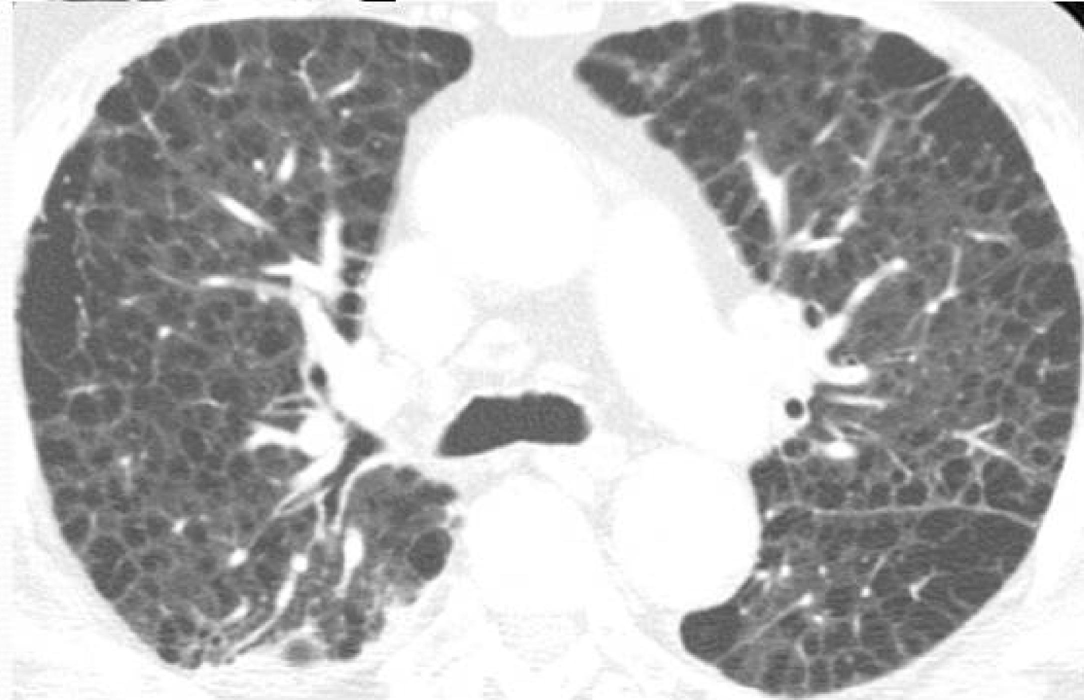

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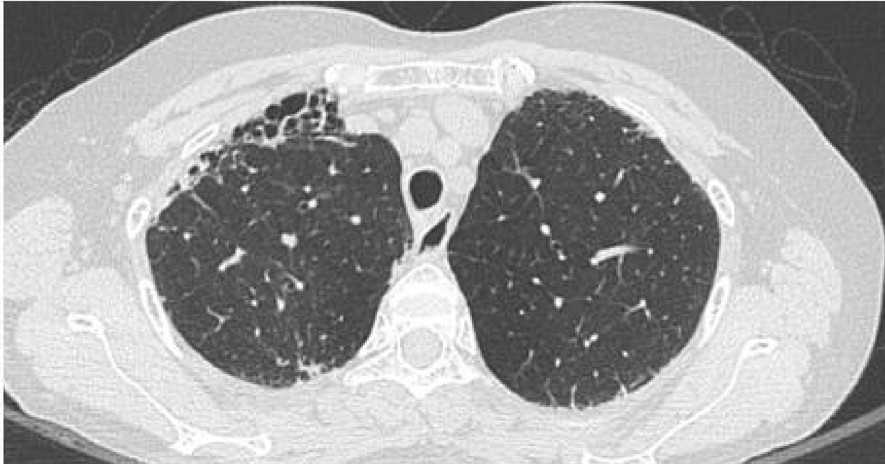
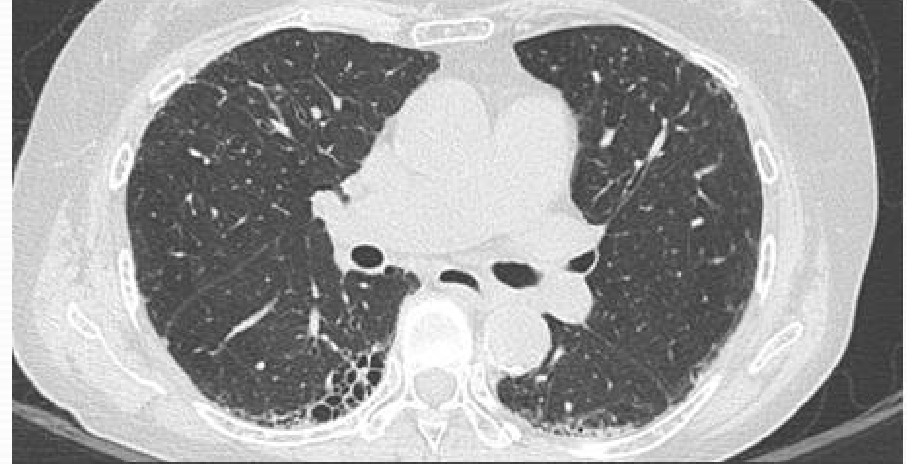
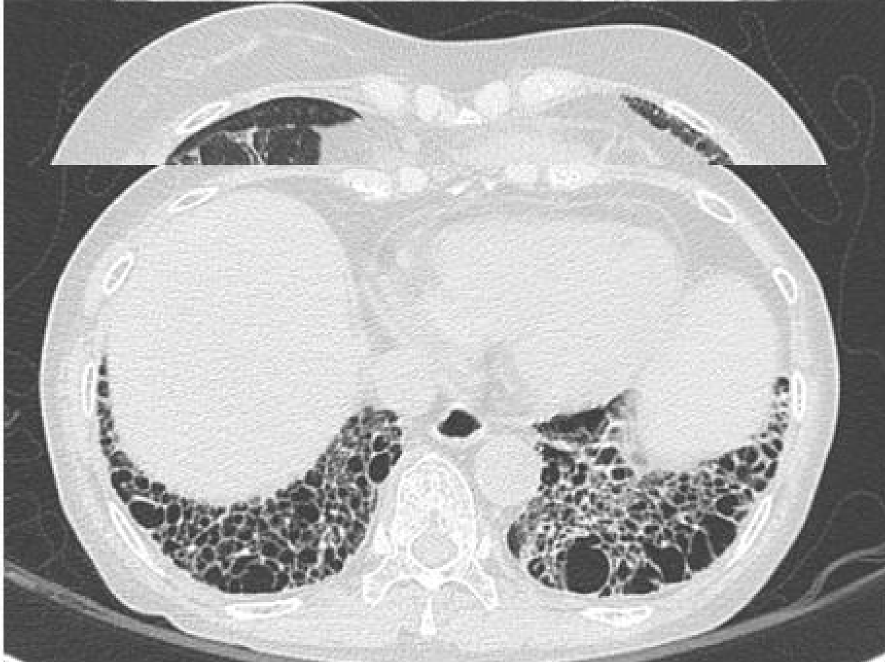
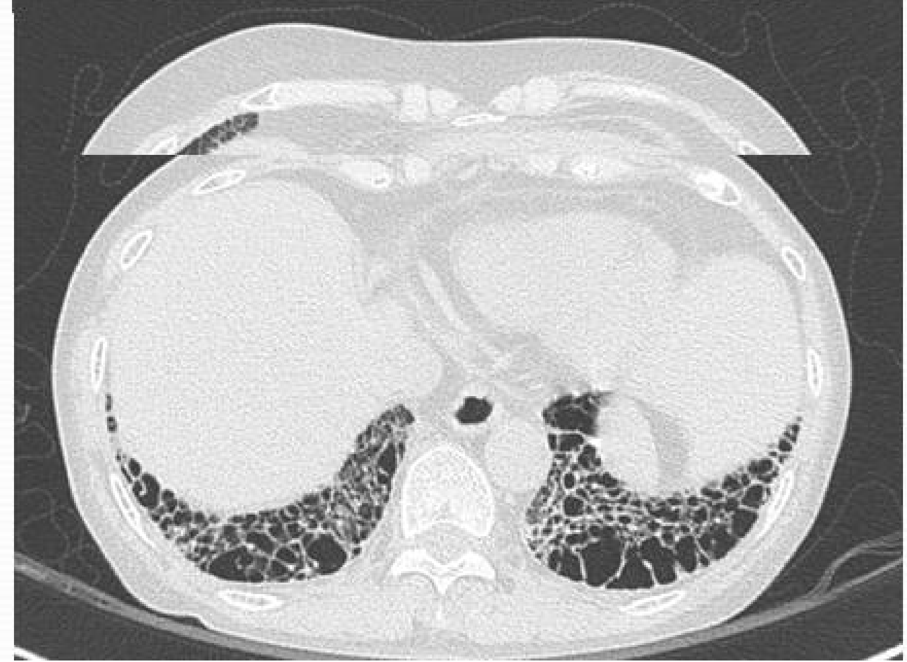
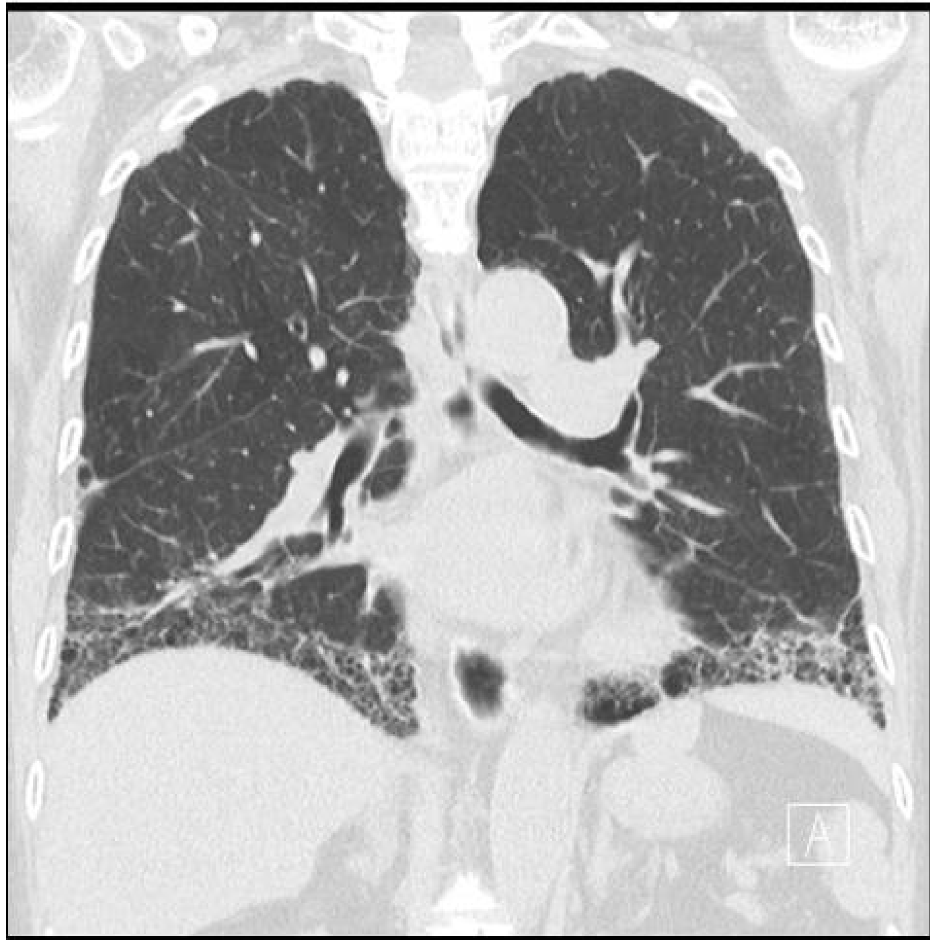
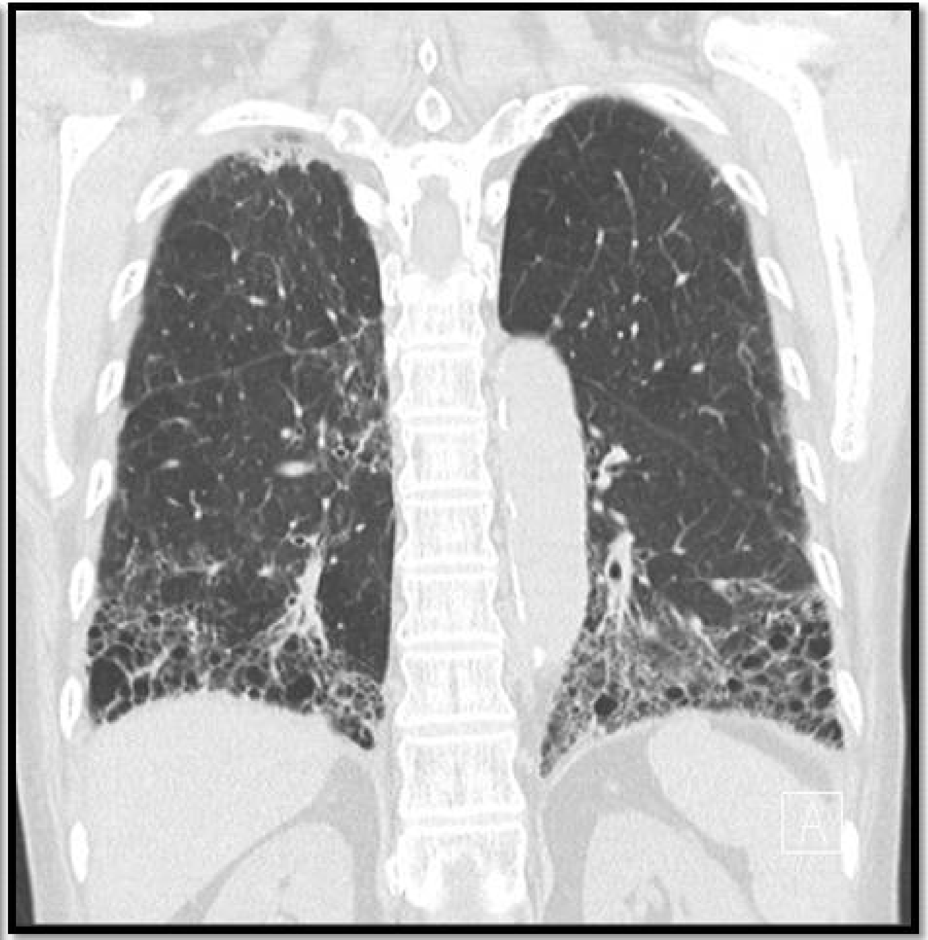
IPF CT pattern may be found in pts with

- Collagen vascular disease
- Occupational lung disease
- Familial pulmonary fibrosis
- Hypersensitivity pneumonitis
- Drug related pulmonary fibrosis

66/F





슬라이드54.JPG
(960 X 720)

Take home message

- New classification of IIPs
  - Major (6), rare (2+2), and unclassifiable IIPs
- HRCT
  - Reflect pathology of IIPs.
  - Crucial role in making diagnosis of IPF.
  - Multidisciplinary approach is needed.