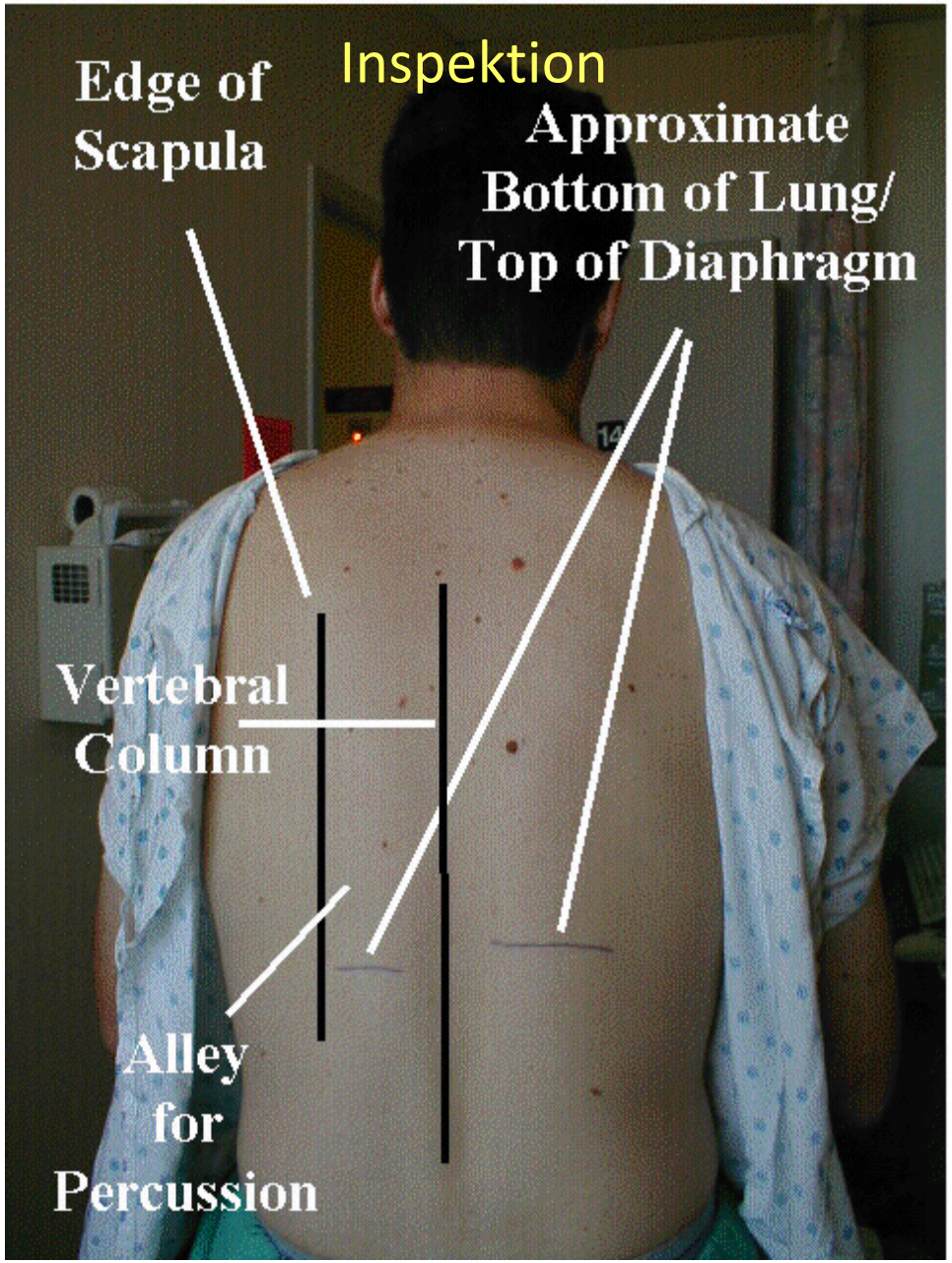
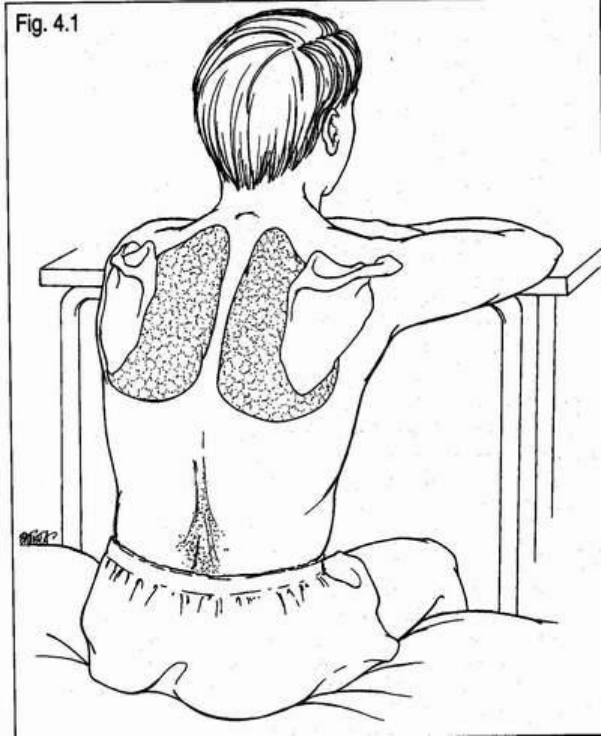
Auskultation

Perkussion

Inspektion





Different thorax shapes may have influence on lung function

Reasons for chest pain

- **Cardiovascular**
- AMI
- Aortic dissection
- Myocarditis
- Pericarditis
- **Chest wall**
- Cervical disc disease
- Costochondritis
- Fibrositis
- Herpes zoster (before the rash)
- Neuropathic pain
- Rib fracture
- Sternoclavicular arthritis
- **Psychiatric**
- Affective disorders (eg, depression)
- Anxiety disorders
- Hyperventilation
- Panic disorder
- Primary anxiety
- Somatiform disorders
- Thought disorders (eg, fixed delusions)

- **Gastrointestinal**
- Biliary
- Cholangitis
- Cholecystitis
- Choledocholithiasis
- Colic
- **Esophageal**
- Esophagitis
- Spasm
- RefluxRupture
- Pancreatitis
- Peptic ulcer disease
  - Nonperforating
  - Perforating
- **Pulmonary**
- Pleuritis
- Pneumonia
- Pulmonary embolus
- Pneumothorax
- cancer

Diagnoses when patient comes to doctor for chest pain !
All ages ..

1 år follow-up

Reason	Prevalens (%)
Muscle skeletal system	36
Stomach (GI)	19
Heart	16
Stabile angina	10.5
Unstabil angina	1.5
Andre	3.8
Psykriatrisk	8
lung	5
Uknown	16

Klinkman et al. J Fam Pract 1994; 38: 345

Cardiac ischaemic pain

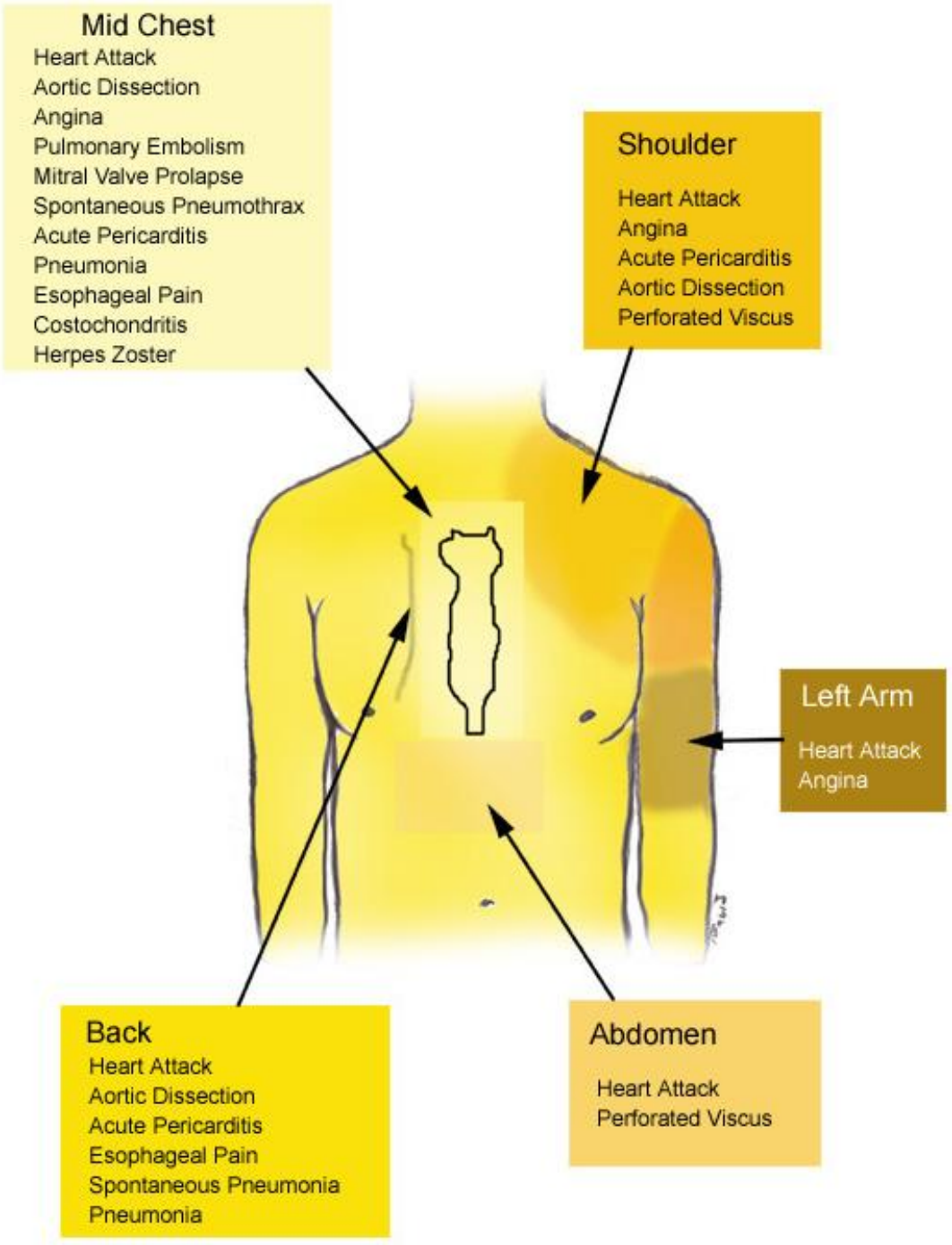
Angina
Acute coronary syndrome
(Dissecting aortic aneurysm)
(Oesophageal pain)
(pericardiatis)

Pleuritic pain

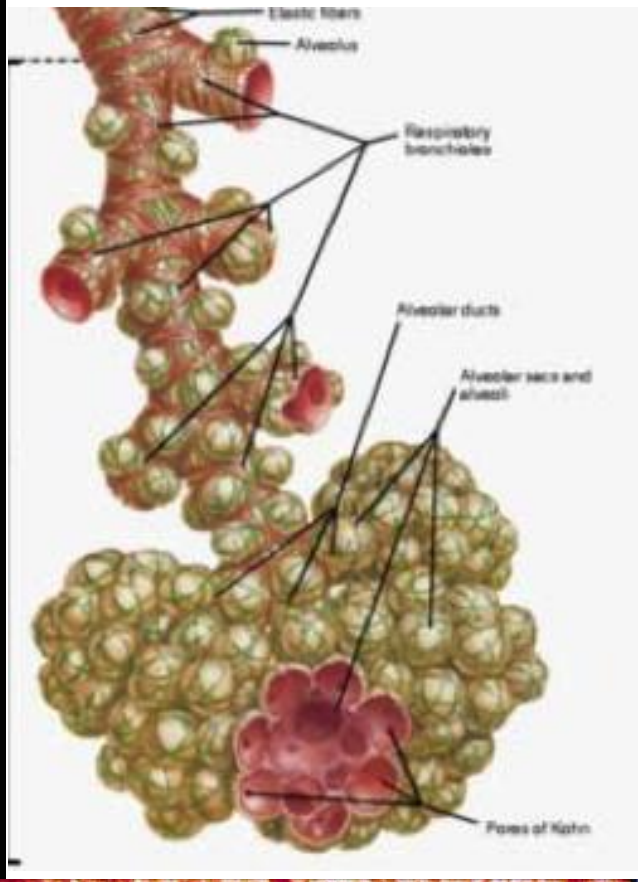
Pnuemonia
Pulmonary embolism
Pneumothrorax
Rib injury
(pericarditis)

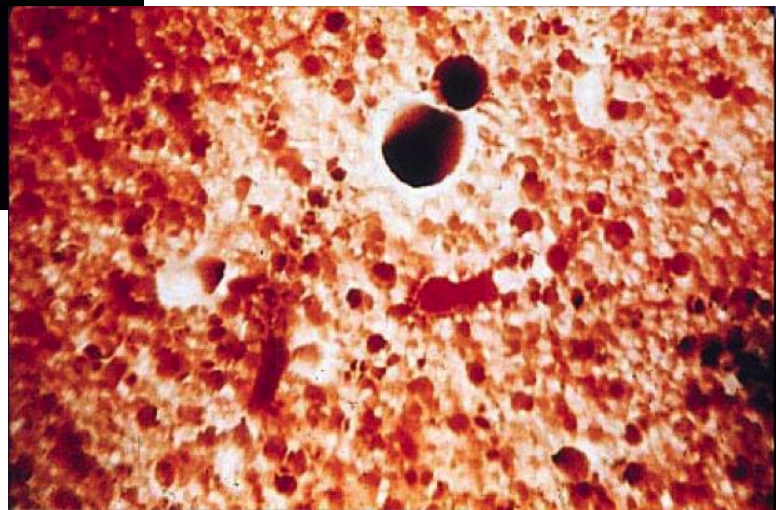
Atypical pain

Non-specific chest pain
Oesophageal pain
Cardiac pain
Gastric/biliary pain
Chest wall pain
Pericarditis
Dissecting aortic aneurysm



Why do so few patients with lung disases have pain in the start of their disease med smerter??





No pain receptores !!

62 years old man

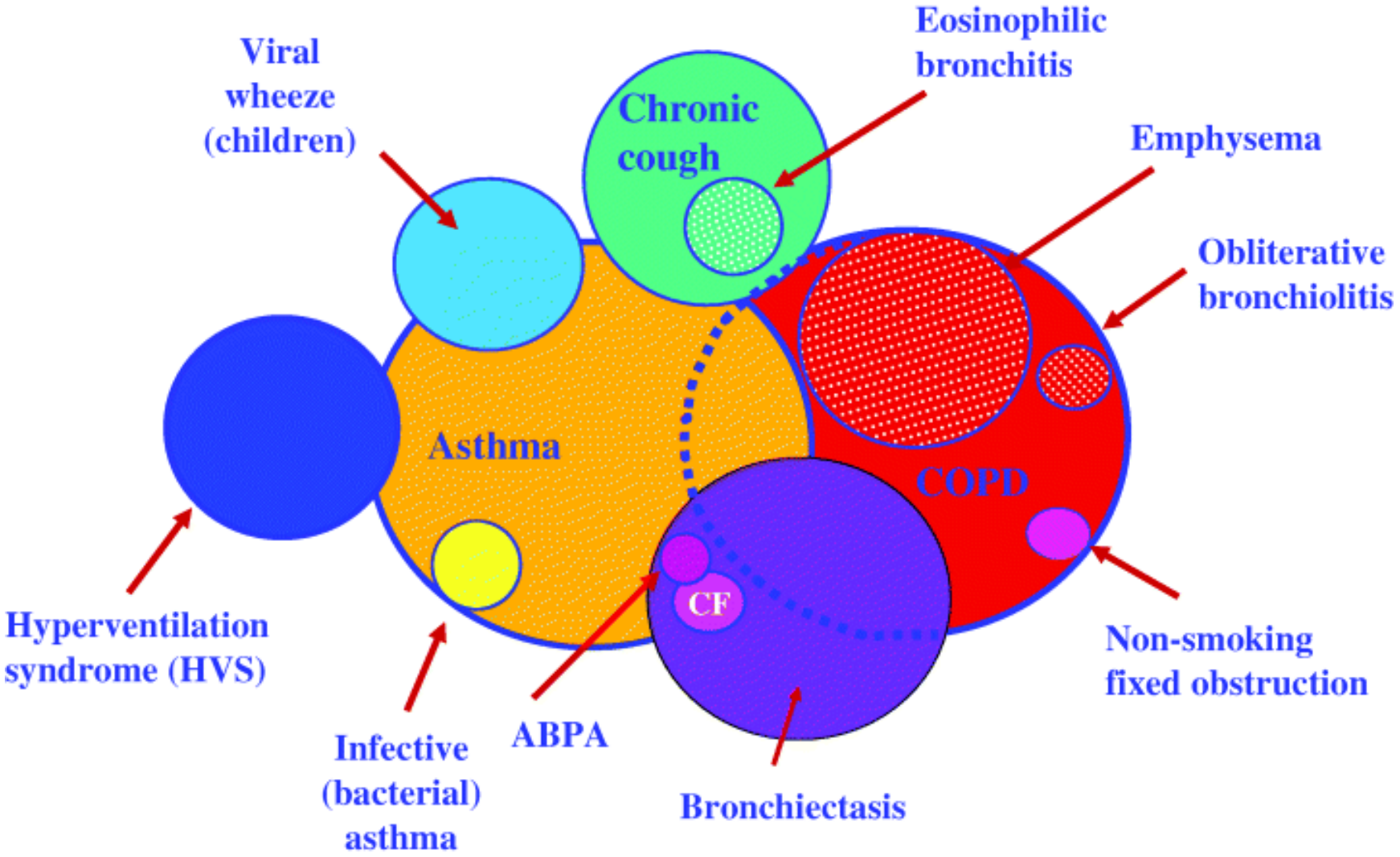
Debut haemoptysis

No Pain !!

Remember

Pulmonary embolism	Pleuritic	Usually lateral aspect of chest wall
Infection	Pleuritic or somatic	Usually lateral aspect of chest wall
Pneumothorax	Pleuritic	Usually lateral aspect of chest wall

Pulmonary embolism	Breathlessness, unilateral swollen leg	Sudden	Non-specific S-T changes, tachycardia	Recent trauma or surgery, venous stasis or hypercoagulability
Infection	bronchi, bronchial breathing	Variable	None	ough, sputum, fever
Pneumothorax	Breathlessness	Sudden	None	COPD, trauma, tall, thin, young people

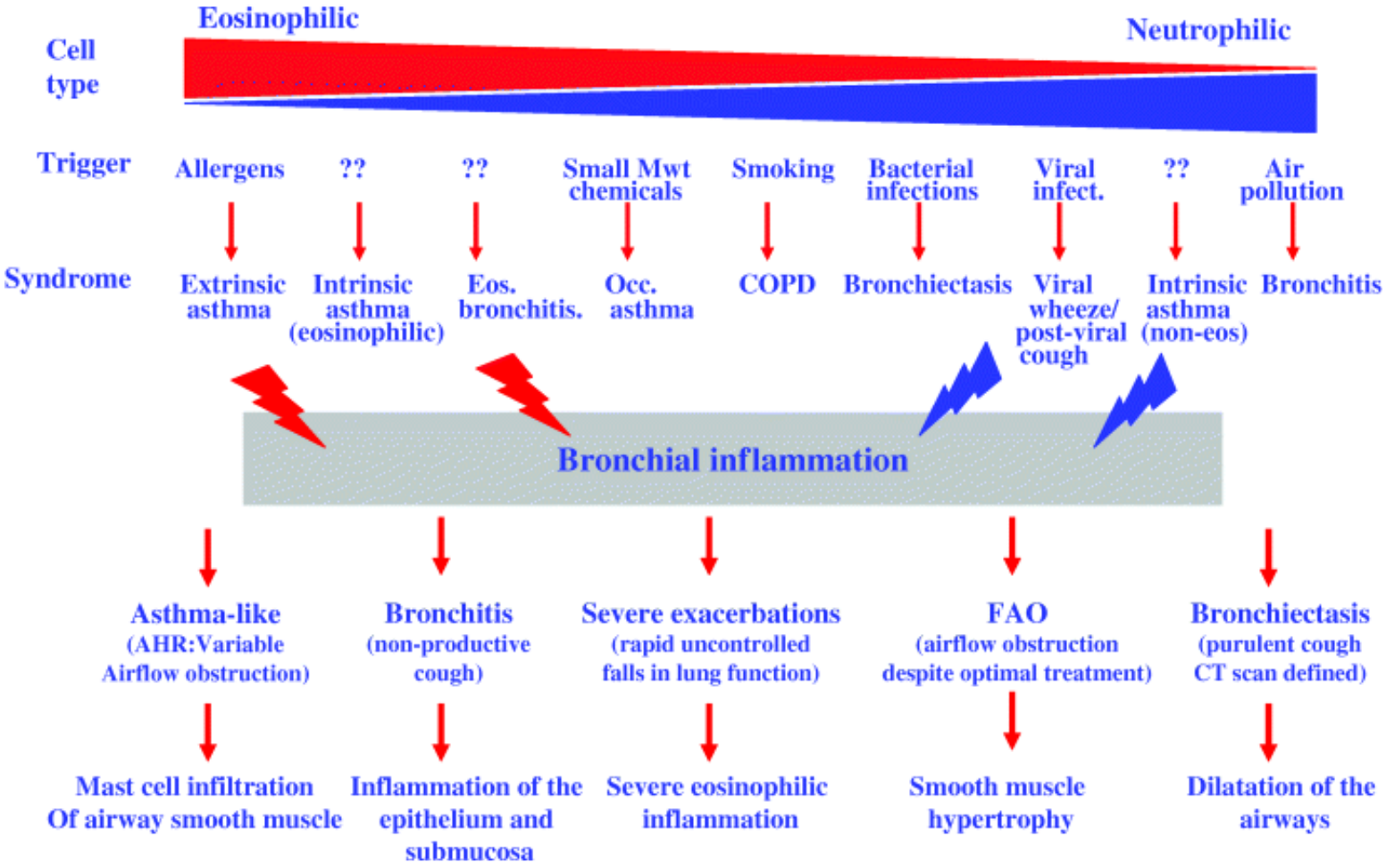


Wardlaw AJ et al. Multidimensional phenotyping: towards a new taxonomy for airway disease. *Clin Exp Allergy* 2005;35:1254-62.

Causes of isolated chronic cough

Primary Cause of Cough	No. of patients (%)
Rhinitis	24
Asthma	17.6
Postviral	13.2
Eosinophilic bronchitis	13.2
Gastroesophageal reflux	7.7
Unexplained	6.6
COPD	6.6
Bronchiectasis	5.5
ACE inhibitor-induced cough	4.4
Lung cancer	2.2
Cryptogenic fibrosing alveolitis	1.1

Brightling CE et al. AJRCCM 1999



Wardlaw AJ et al. Multidimensional phenotyping: towards a new taxonomy for airway disease. *Clin Exp Allergy* 2005;35:1254-62.

BRONCHIECTASIS

Definition: Abnormal and permanent dilation of bronchi.

Focal or diffuse distribution

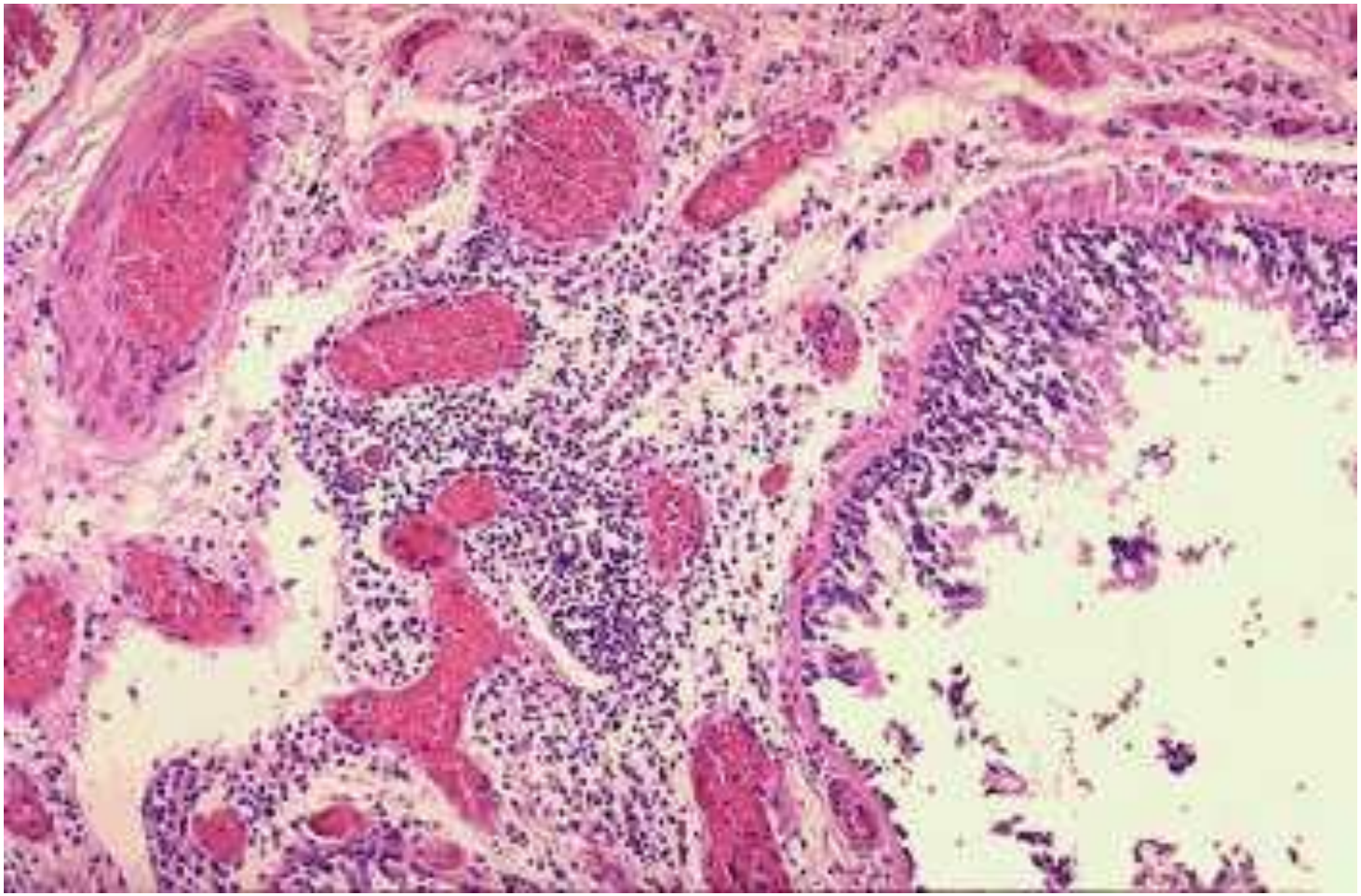
Clinical consequences – chronic and recurrent infection and

Pooling of secretions in dilated airways.

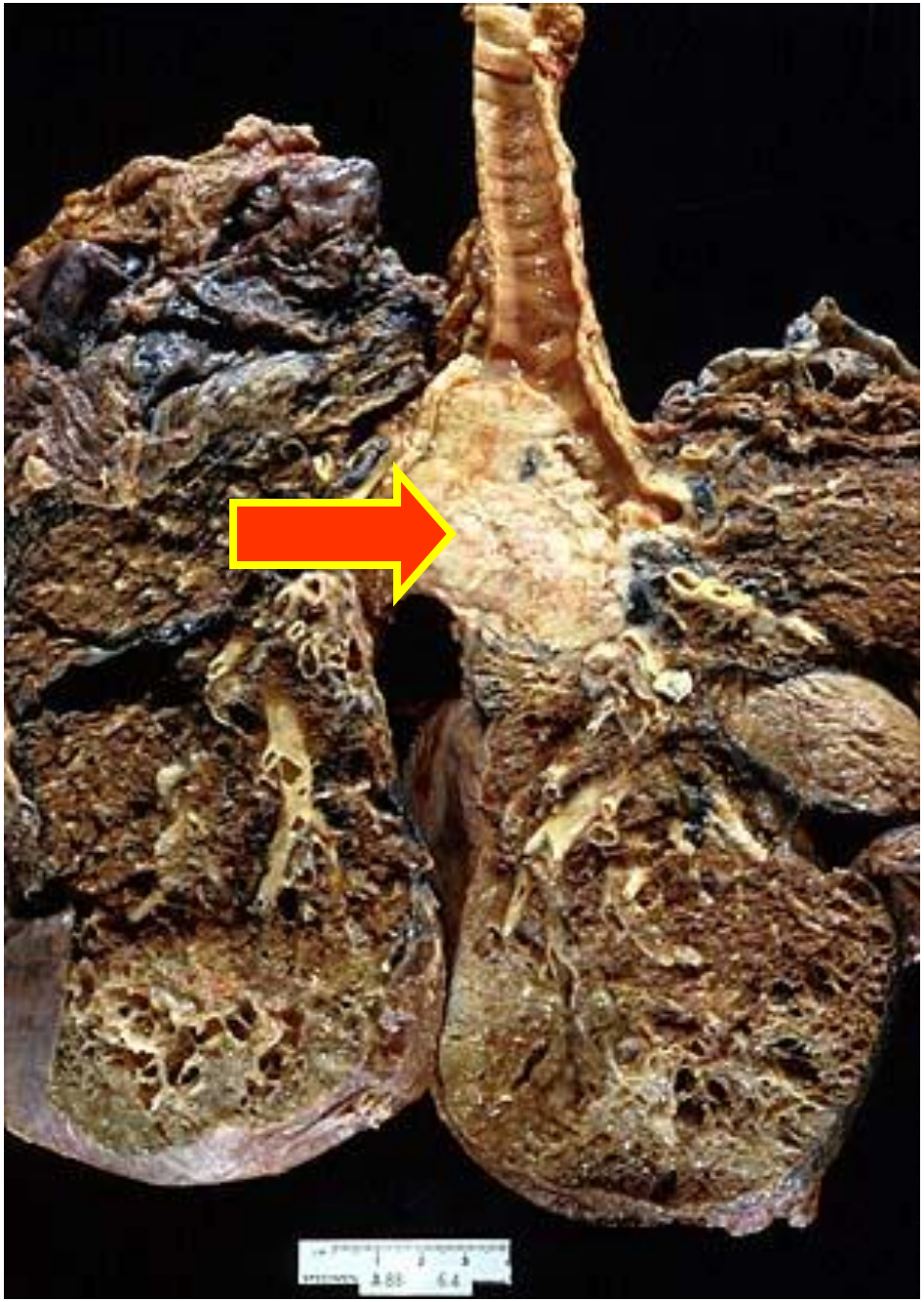
Classification (ex: microscope):

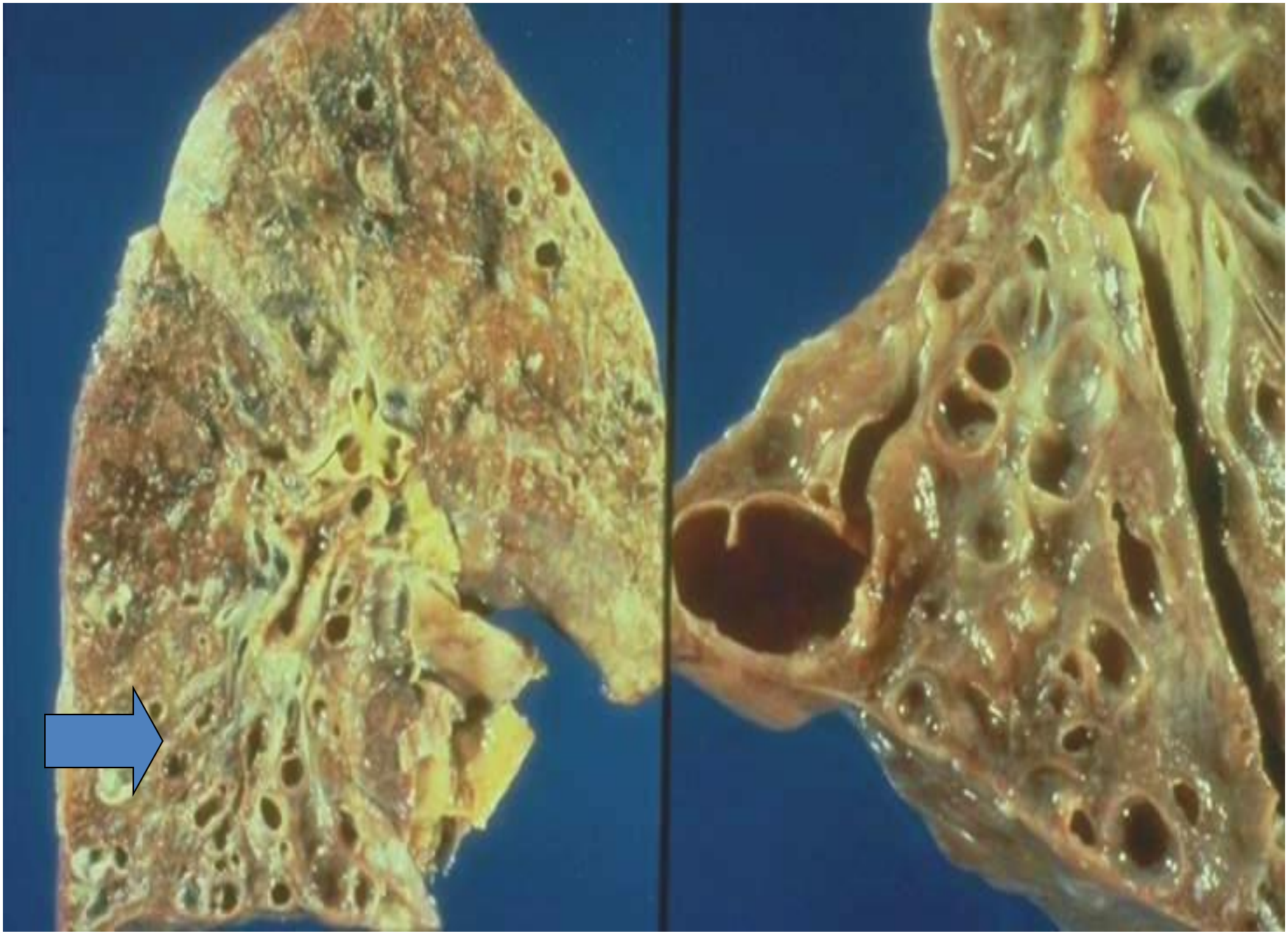
1. Cylindrical (fusiform)
2. Saccular
3. Varicose

Bronchiectasis



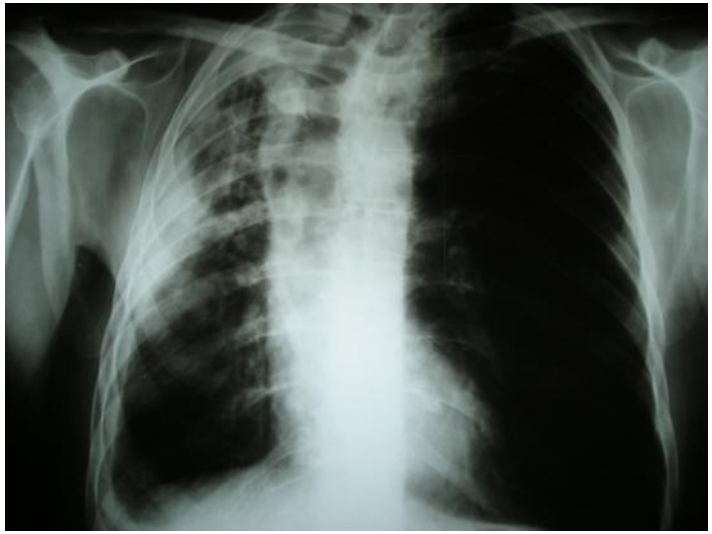
Bronchiectasis:

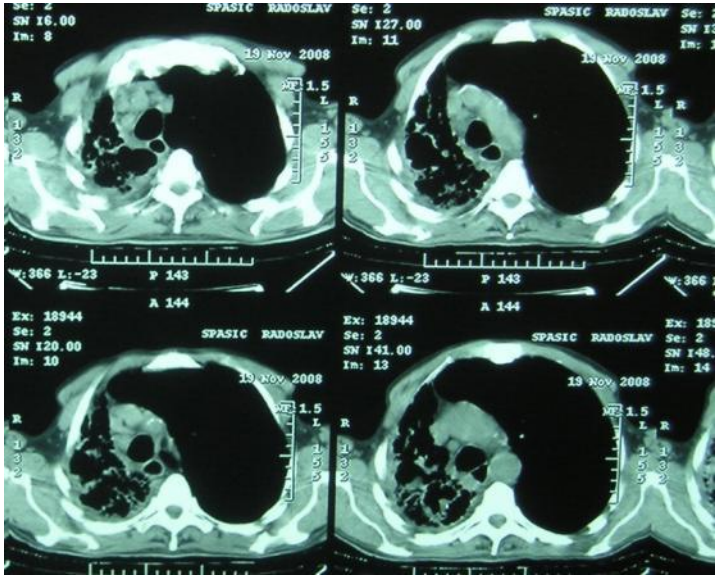


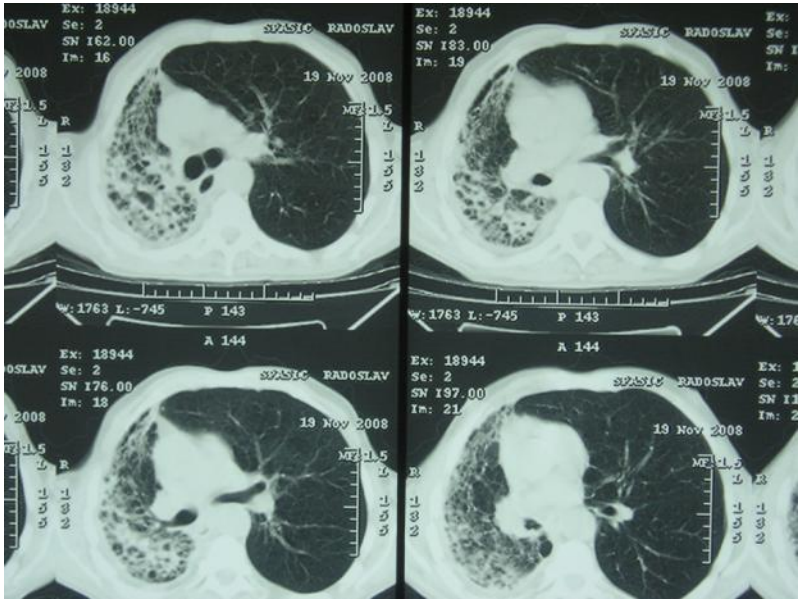


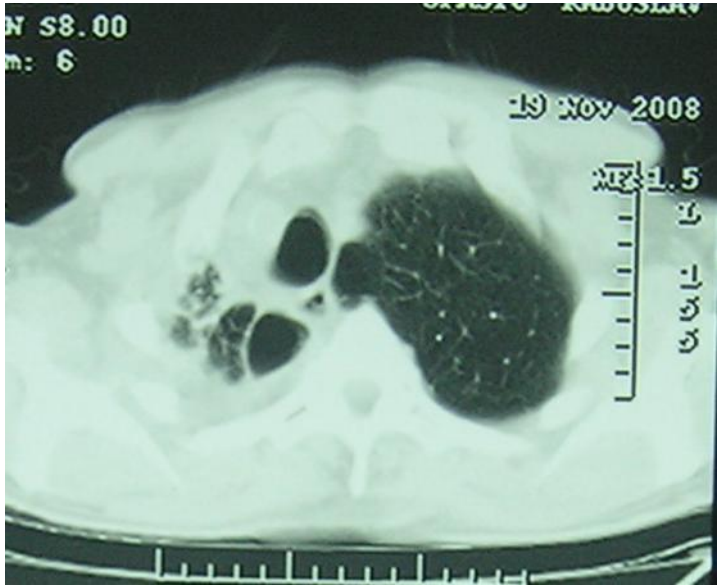
Saccular Bronchiectasis:

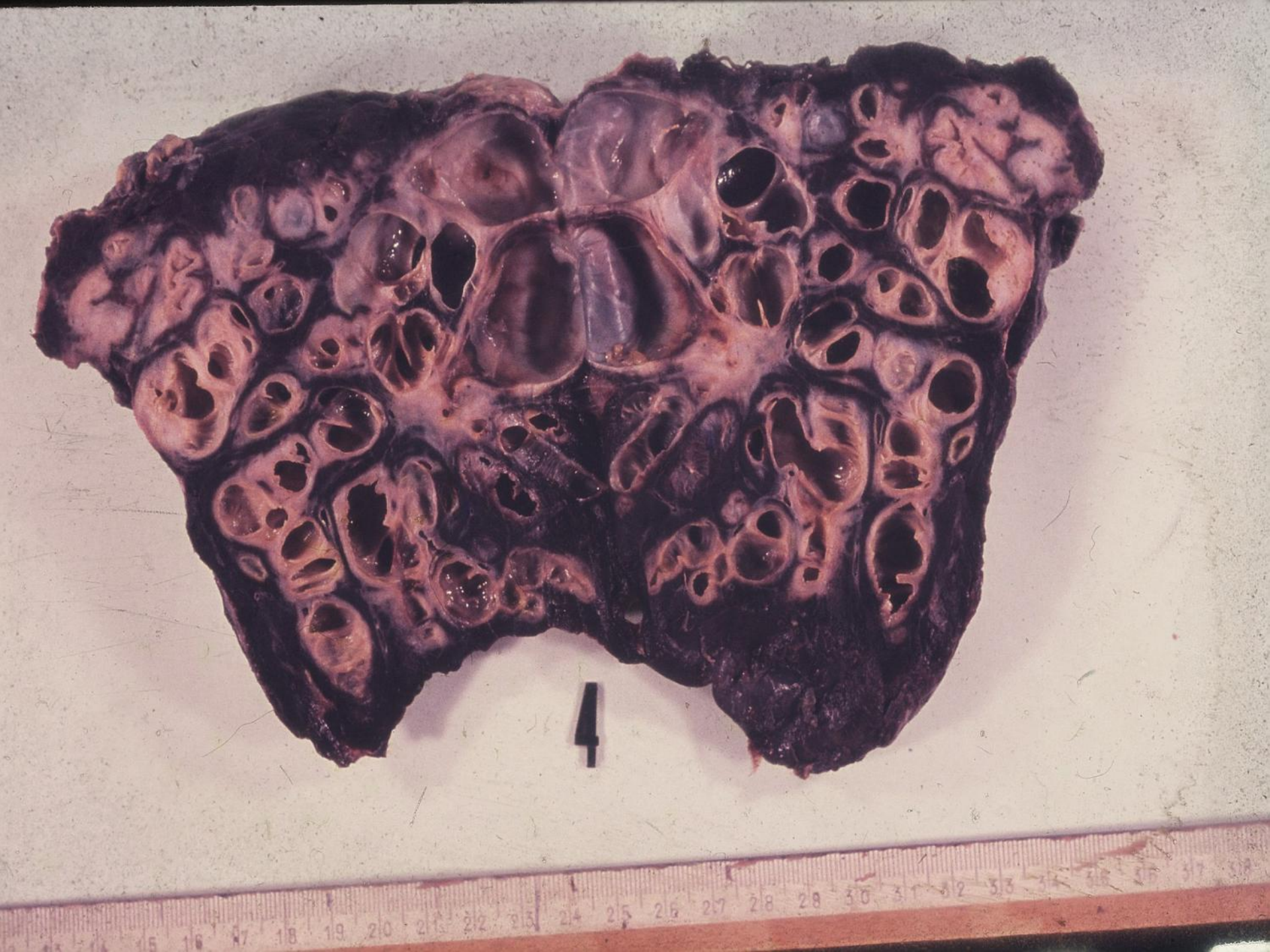
Destroyed lung- bronchiectasis







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Pathogenesis - Bronchiectasis

- Obstruction
- Infection.
- Excess Mucous secretion
- Retention of secretion
- Secondary infection
- Destruction of bronchial wall
- Irregular, fixed inflamed dilated bronchus filled with pus.

Aetiology:
A. Infections-Micro-organisms

- Measles and Pertussis
- Adeno & Influenza virus
- Bacterial infection with virulent organisms: S.aureus, Klebsiella Anaerobes
- Atypical mycobacteria
- Mycoplasma
- HIV
- Tuberculosis
- Fungi
- Tumor
- Cystic fibrosis
- Ciliar dyskinesia

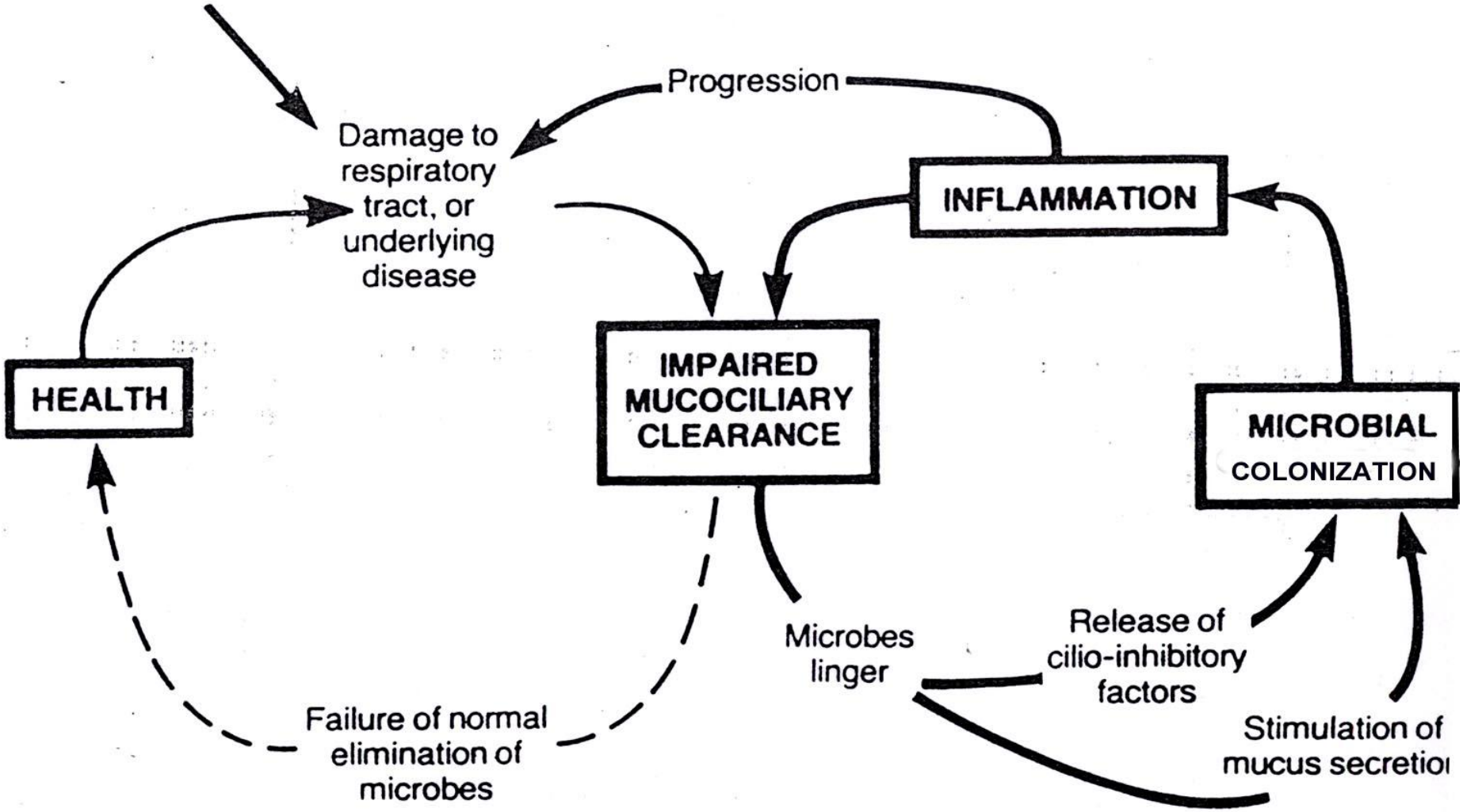


Figure 1. A 'vicious circle' hypothesis of the pathogenesis of bronchiectasis.

CLINICAL MANIFESTATIONS

- Persistent or recurrent cough with purulent sputum.
- Haemoptysis
- Initiating episode: Severe pneumonia, **or** insidious onset of symptoms **or** asymptomatic or non-productive cough – dry bronchiectasis in upper lobe,
- Dyspnoea, wheezing – widespread bronchiectasis or underlying COPD.
- Exacerbation of infection: Sputum volume increase, purulence or blood.

PHYSICAL EXAMINATION

- Any combination of rhonchi, creps or wheezes.
- Clubbing of digits.
- Chronic hypoxaemia $\rightarrow$ cor pulmonale $\rightarrow$ R heart failure
- Amiloidosis (rare)

Epidemiology

Increasing frequency in the 21th century

2005: in the USA:

110 000 pts treated for nonCF bronchiectasis

18-34 years: 4.2/100 000

>75 years: 272/10 000

- ***Most frequently: in older women***

➢ ***Causes:***

Widespread use of HRCT

Increase in Non-TB Mycobacterial infections

Reasons for increase of bronchiectasis in developing countries

- emergence of drug-resistant microorganisms
- Increasing frequency of MDR TB

Irregular and inadequate treatment

cessation of medication shortly after symptom improvement

lack of check-ups after treatment

Recurrent pulmonary infections

S. Eren et al. J Thorac Cardiovasc Surg 2007;134:392-398

Bronchiectasis – limited disease

- **Left side predominance (58.7 – 73%)**
- **Lower lobes predominance**
- **Bilateral disease (9-21%)**

- **Unilateral -** *single lobe*
- **Unilateral -** *> single lobe*
- **Bilateral -**

DIAGNOSIS - 1

- Clinical
- Radiology: Chest XR: May be non-specific

  mild disease – normal XRC

  advanced disease – cysts + fluid levels

  peribronchial thickening, “tram tracks”, “ring shadows”

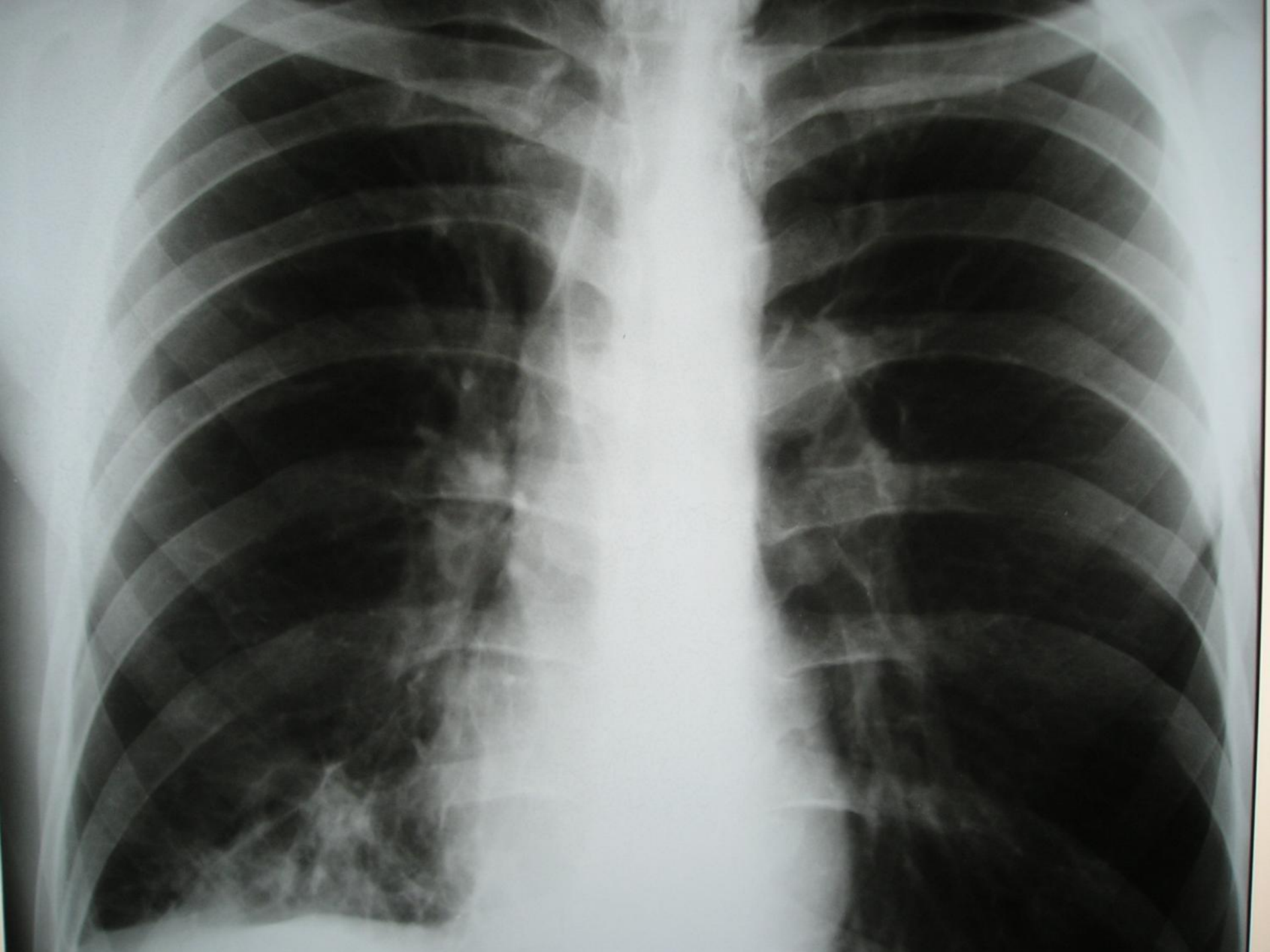
  CT Scan: Peribronchial thickening, dilated bronchioles.
- Sputum culture: Pseudomonas aeuruginosa, H.influenzae.

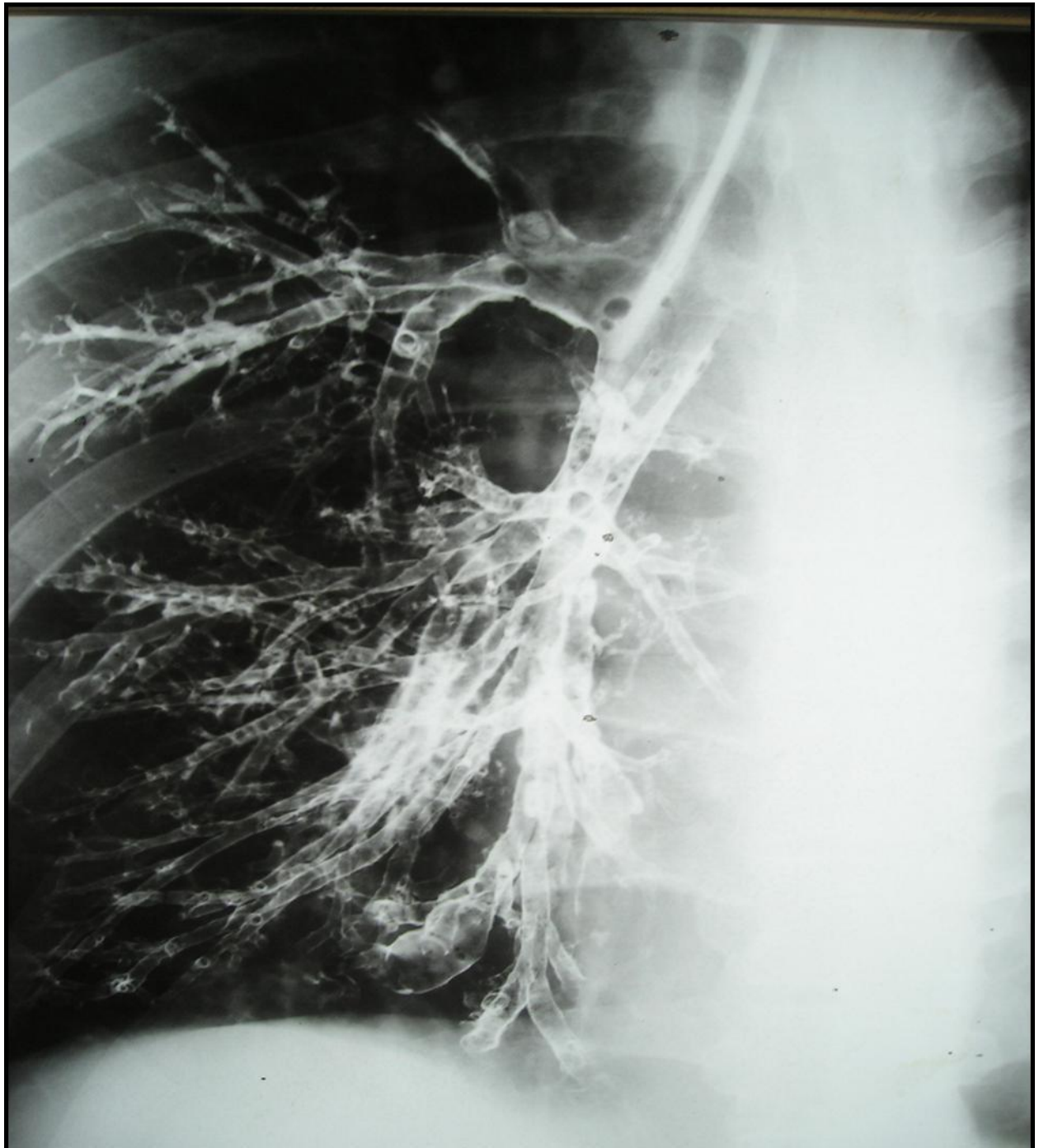
ANTERIOR

DIAGNOSIS - 2

- Lung function: Airflow obstruction – FEV1 decreased.

  Air trapping - RV increased
- Sweat test – increased sodium and chloride in cystic fibrosis
- Bronchoscopy: Obstruction – foreign body, tumor.
- Immunoglobulin
- Cilia function and structure – Kartagener syndrome.



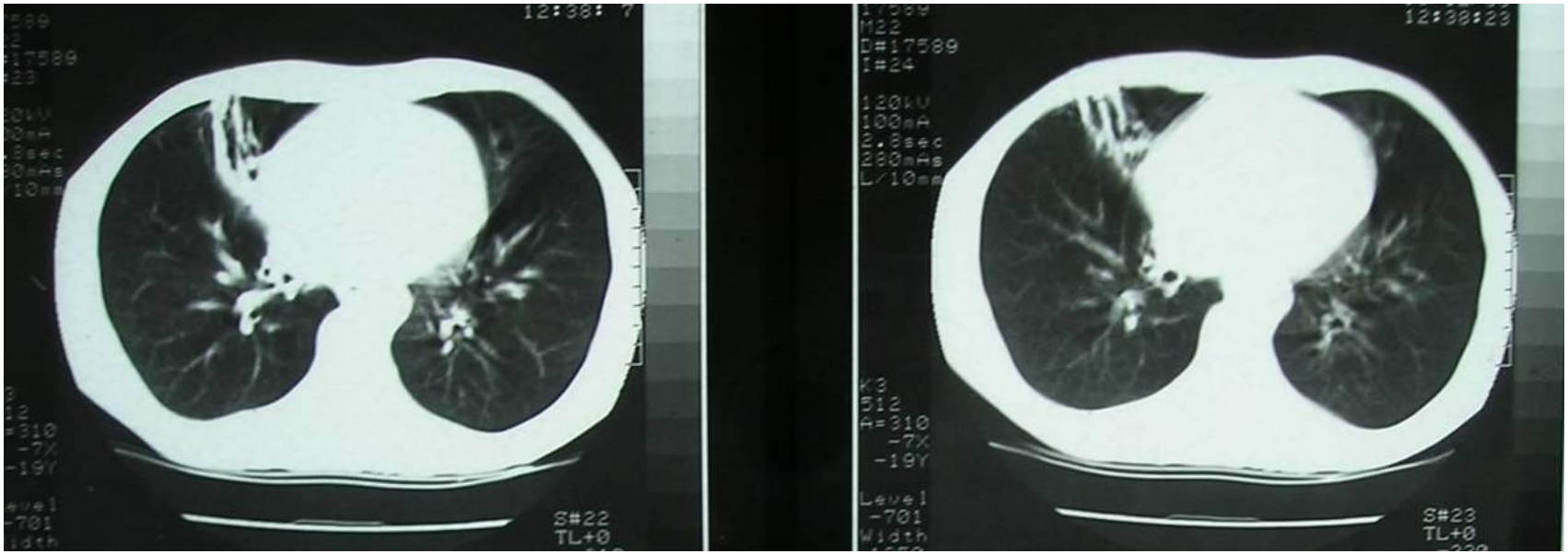


Contralateral Bronchography:

CT - experience

diagnostic value: excellent

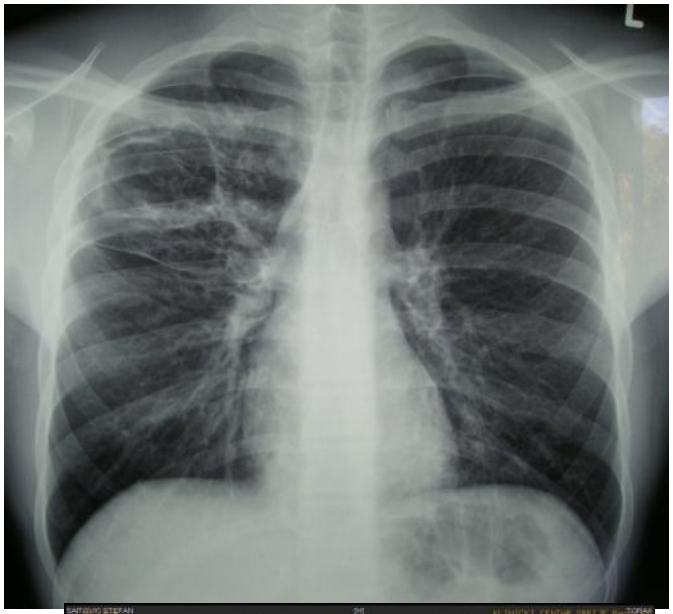
anatomic distribution: inferior to bronchography



R of the bronchus > R of the accompanying p. artery (1.5)

Loss of normal tapering of airway towards periphery (“tram tracks”)

CT pictures




STND/+
R
L


120
Mod.
0.60s/HE+ 39.4mm/rot
0.984:1/0.6sp
999 L = -684
GE MEDICAL SYSTE

TREATMENT - 1

- 4 Goals:
  1. Eliminate cause
  2. Improve tracheo bronchial clearance
  3. Control infection
  4. Reverse airflow obstruction

TREATMENT - 2

- 1. Immunoglobulin
  2. Antituberculous drugs if TB
  3. Corticosteroids (ABPA)
  4. Remove aspirated material

- Chest physical therapy
- Mucolytics
- Bronchodilators

TREATMENT - 3

- Antibiotics – short course, prolonged course, intermittent regular courses, inhalation.
- Initial empiric Rx: Ampi, Amox,

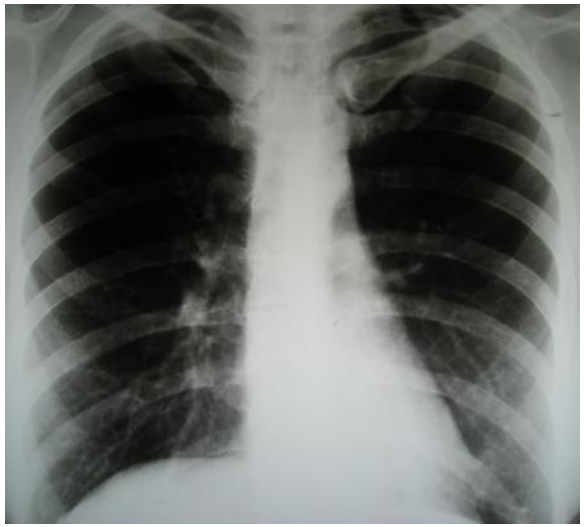
  Ps.aeruginosa – Quinolone, aminoglycoside, 3rd generation cephalosporin, pipracillin.
- Surgery:
- Oxygen and diuretics
- Lung transplant

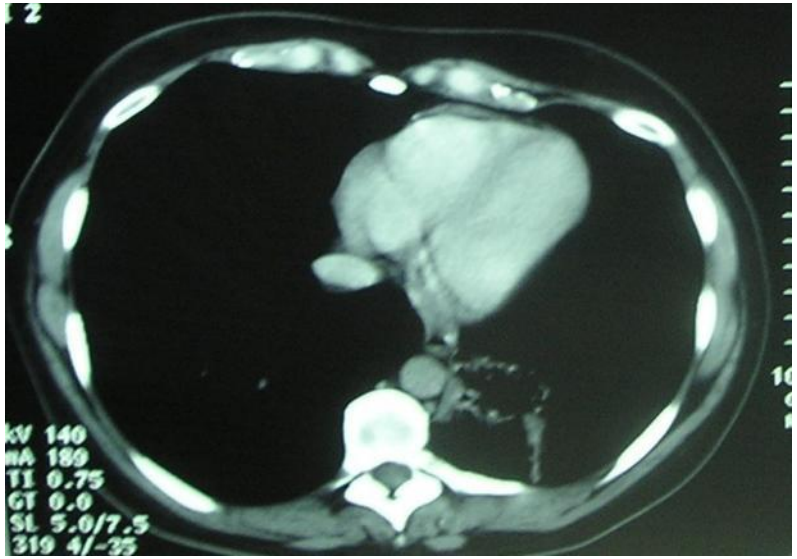
Limited disease – indications for the operation (%)

	recurrent infections	hemoptysis	abscess	undiagnosed lung mass	pnth	empyema	no symptoms
Fujimoto (n 92)	62.2	23.3	10	3.3		1.1	
Balkanli (n 238)	68.4	16.4					4.2
Kutlay (n 166)		3	1.8				
Prieto (n 119)	55	26.5	9	8	3		
Agasthian (n 134)	63.4	19.4	9	8.2			

1.5 exacerbations/year (North America, UK, Ireland) *Chest 1998; 113:1329–1334*

Well perfused bronchiectasis

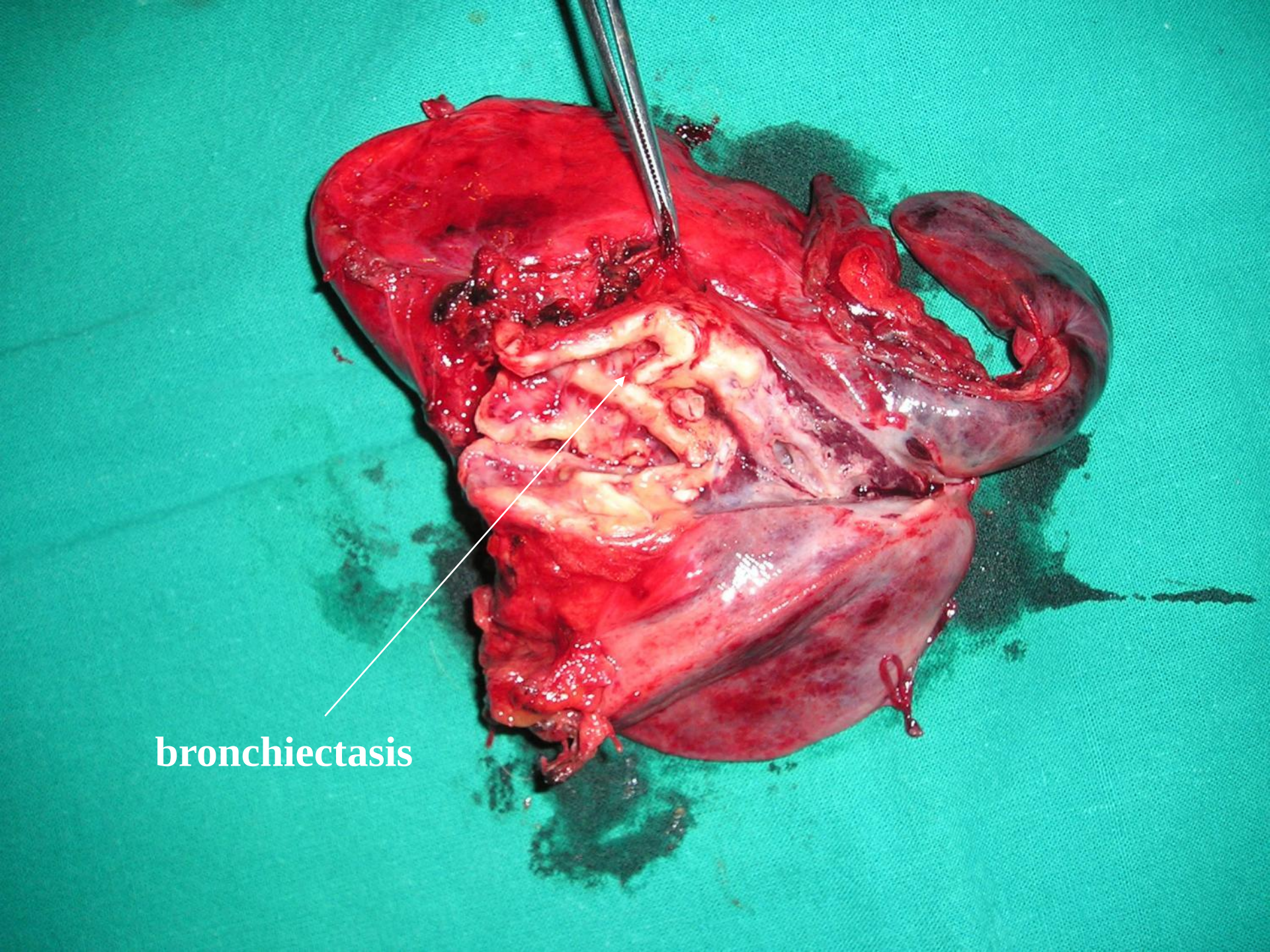


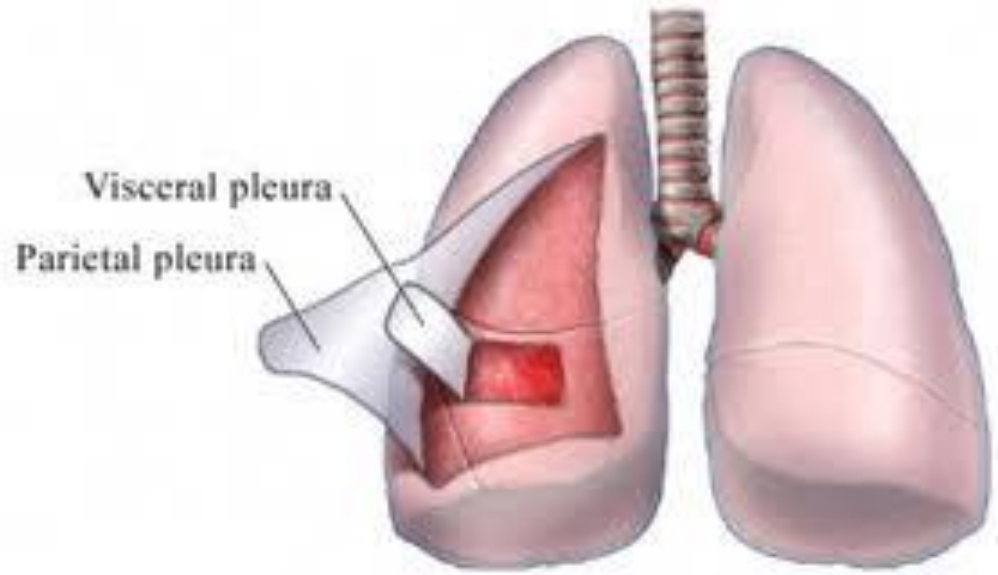


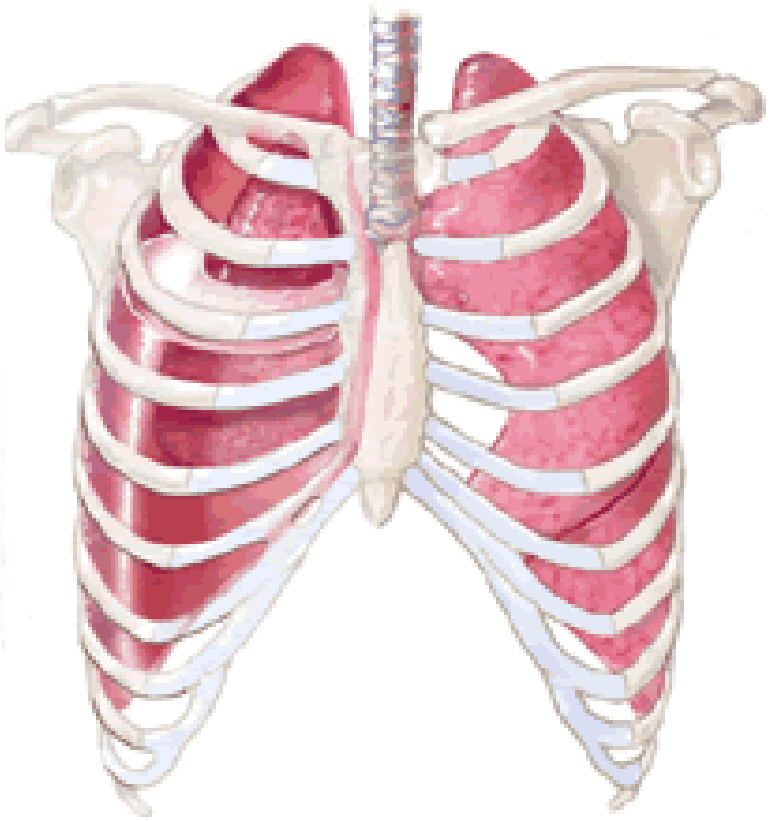
Well perfused bronchiectasis

Clear destruction

source of repeated infections


bronchiectasis





PLEURAL EFFUSIONS AND OTHER PLEURAL DISEASE: A SHORT OVERVIEW

Normal pleura

Two layers:

Visceral

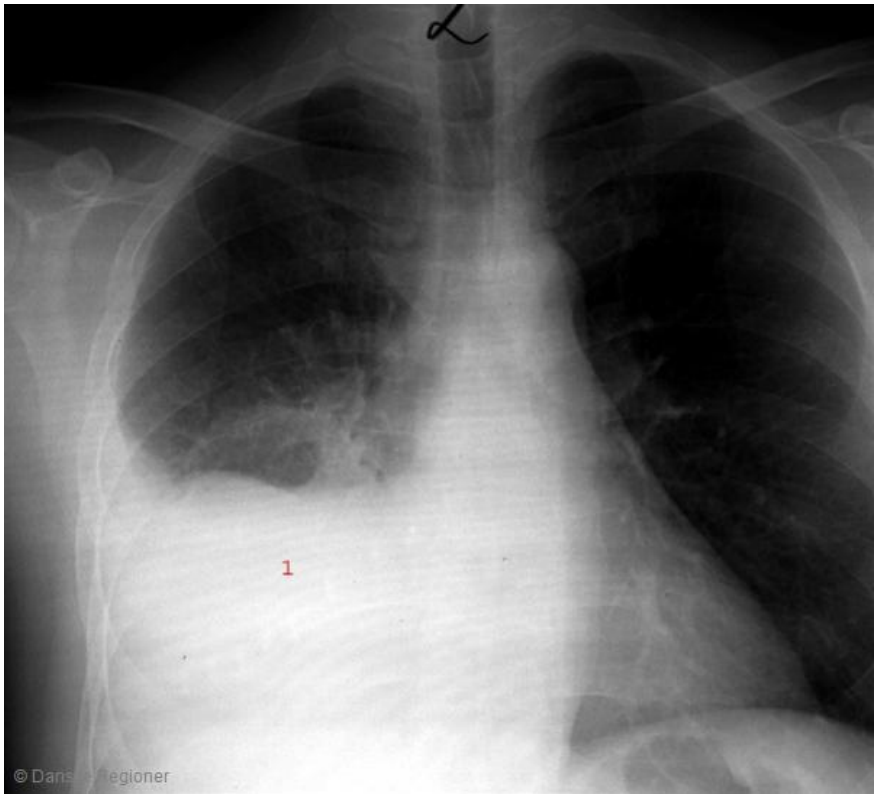
Parietal - accounts for most secretion and absorption of pleural fluid.

Normal values:

volume: 7-10ml

protein: 15g/L

cells: 1500/ uL



Pathogenesis of pleural effusion

Elevated capillary hydrostatic pressure – cardiac failure.

Reduced capillary oncotic pressure - hypoalbuminemia.

Enhanced capillary permeability - inflammation.

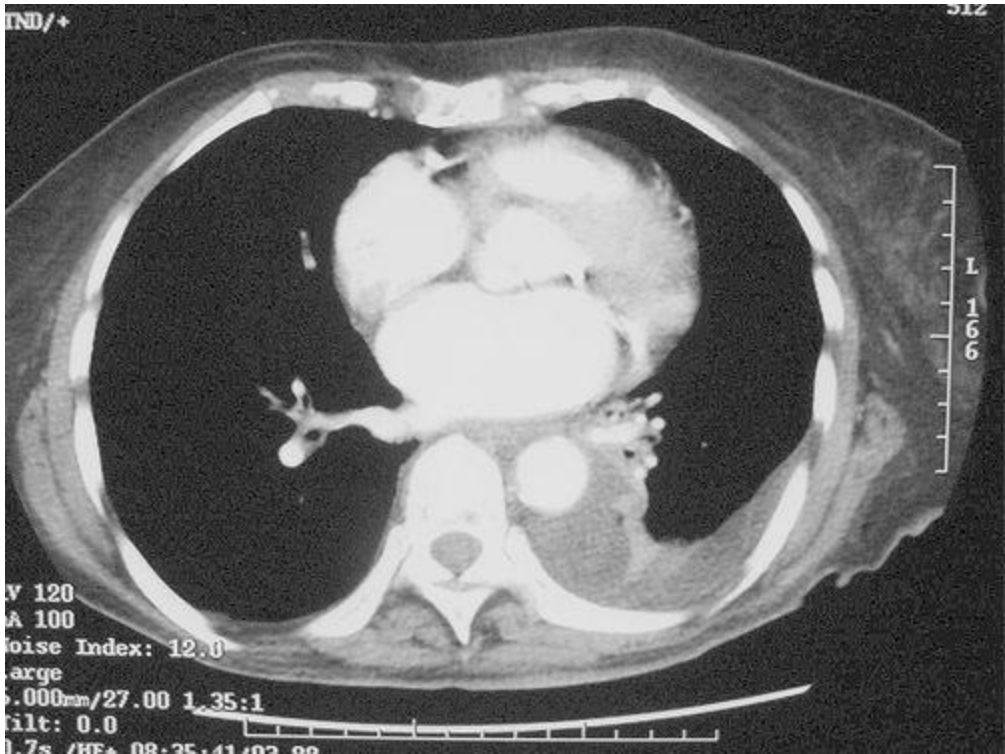
Obstructed lymphatics - tumor.

Movement of fluid from extrathoracic site - pancreatitis.

Clinical manifestations

Symptoms:
Asymptomatic pain- "pleuritic" or "dull ache"
cough
dyspnea

Physical examination:
enlarged hemithorax
reduced vocal fremitus
dullness to percussion
decreased breath sounds,
friction-rub



Types

- Hydrothorax
- Hemothorax
- Chylothorax
- Pyothorax or Empyema

Approach to a pleural effusion

Plain chest X-ray

Distribution is determined by gravity..

Obliteration of lateral costophrenic angle

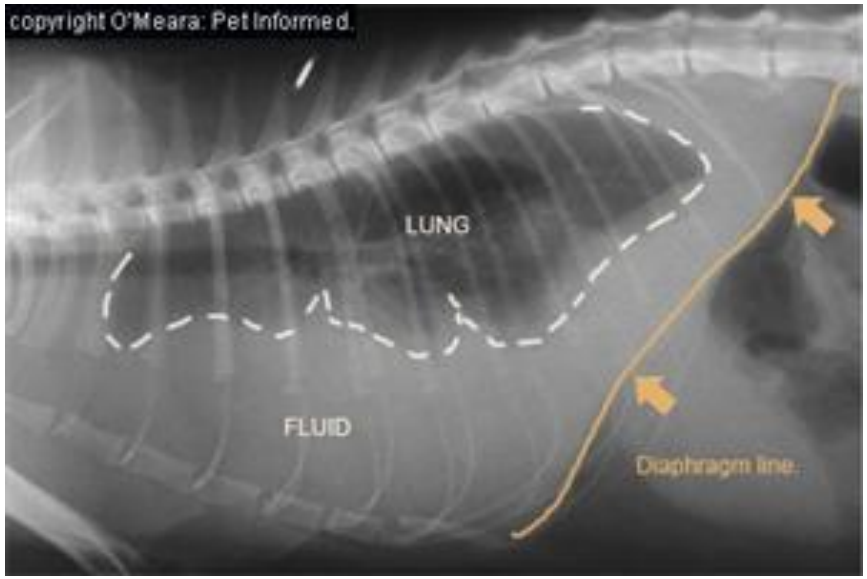
Fluid higher laterally (PA film) and semicircular meniscus on lateral films..

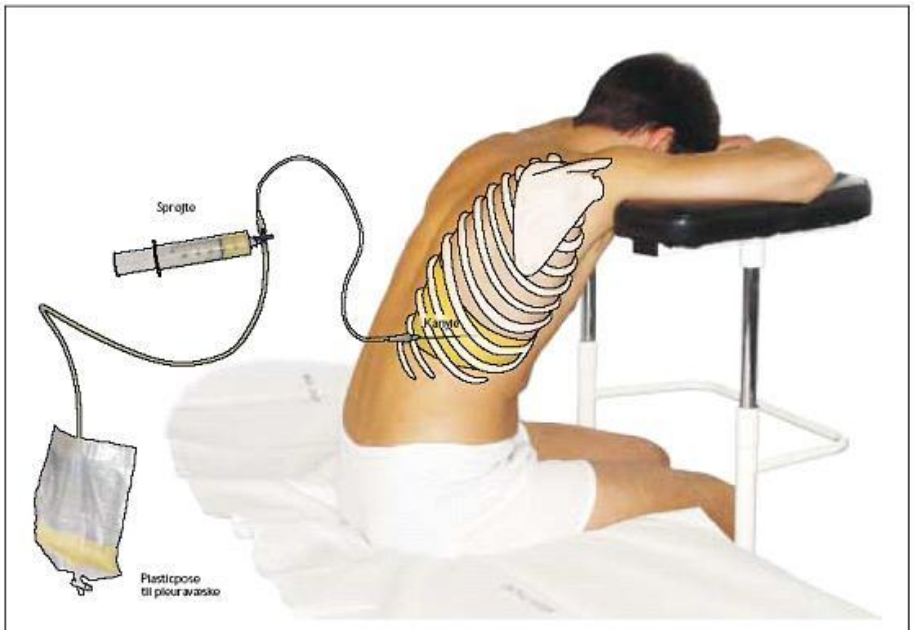
Detects > 175ml off fluid

May be subpulmonic, loculated or "pseudotumor"

Clinical approach- cont..

- Horizontal x-rays
- Ultrasound
- CT Scan, MRI
- Pleuracentesis!!!!
- Pleural biopsy
- Thoracoscopy
- Open pleural biopsy





Narrowing the Differential of Pleural Effusions

- Exudative
  - Etiology
    - Local factors influencing accumulation of pleural fluid affected
- Transudative
  - Etiology
    - Imbalance between hydrostatic//oncotic force

Classification

- Transudate
  - Ultrafiltrate of plasma
  - Small group of etiologies
- Exudate
  - Produced by host of inflammatory conditions
  - Large group of etiologies

Modified Light's Criteria

Pleural fluid protein > 2.9 g/dL

Pleural cholesterol > 45 mg/dL

Pleural LDH > 60 % ULN (upper limit of normal)

Any ONE off the following defines an exudate.

(Traditional Light's criteria:

Protein P/S > 0.5

LDH P/S > 0.6

LDH > 2/3 ULN)

Workup: Laboratory

- LDH > 1000 IU/L
  - Empyema, Malignancy, Rheumatoid
- Glucose < 30 mg/dL
  - Empyema, Rheumatoid
- Glucose between 30 – 50 mg/dL
  - Lupus, Malignancy, TB

Albumin Gradient

- Light's criteria tend to overcall exudates
- Especially in transudative effusions after diuresis
- if difference between albumin in serum minus pleural fluid is > 1.2 than more likely a true transudate
- May misidentify 13%

Exudative or Transudative

- **Sensitivity of Tests to Distinguish Exudative from Transudative Effusions**

TABLE 3. SENSITIVITY OF TESTS TO DISTINGUISH EXUDATIVE FROM TRANSUDATIVE EFFUSIONS.*

TEST	SENSITIVITY FOR EXUDATE	SPECIFICITY FOR EXUDATE
	%	
Light's criteria (one or more of the following three)	98	83
Ratio of pleural-fluid protein level to serum protein level >0.5	86	84
Ratio of pleural-fluid LDH level to serum LDH level >0.6	90	82
Pleural-fluid LDH level >two thirds the upper limit of normal for serum LDH level	82	89
Pleural-fluid cholesterol level >60 mg/dl (1.55 mmol/liter)	54	92
Pleural-fluid cholesterol level >43 mg/dl (1.10 mmol/liter)	75	80
Ratio of pleural-fluid cholesterol level to serum cholesterol level >0.3	89	81
Serum albumin level − pleural-fluid albumin level ≤1.2 g/dl	87	92

*LDH denotes lactate dehydrogenase.

Transudates = ultra filtrate off serum

- CARDOSIS (CHF) – due to increased pulmonary venous pressures, usually bilateral (R > L), usually resolves in 48 hours after diuresis
- NEPHROSIS – low oncotic pressures
- CIRRHOSIS – can preferentially form in pleural space, hepatic-hydrothorax

Other Transudates

- Atelectasis – increased negative pleural pressure Congestive cardiac failure
- Peritoneal dialysis
- Glomerulonephritis
- Urinothorax
- Myxedema
- Pulmonary embolism
- Sarcoidosis.

Differential diagnosis- exudate

- Parapneumonic effusion
- Malignancy - lung, breast, lymphoma,
- mesothelioma
- Tuberculosis
- Pulmonary emboli
- Abdominal disease
- Esophageal perforation
- Collagen vascular disease

Differential diagnosis- exudates

- Drugs- nitrofurantoin, bromocryptine, amiodarone, methotrexate.
- Asbestos
- Dressler's syndrome
- Meig's syndrome,´Yellow-nail syndrome,
- Sarcoidosis,, Uremia,, Myxedema

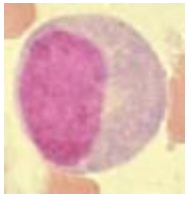
Total and Differential Cell Counts

- **Neutrophil predominance (>50%)–**
- **– Implies acute process***
- – 21 of 26 parapneumonic effusions (81 percent)
- – 4 of 5 effusions secondary to pulmonary embolus (80 percent)
- – 4 of 5 effusions secondary to pancreatitis (80 percent)
- – But only 7 of 43 malignant effusions (16 percent) and none of 14 tuberculous effusions contained more than 50 percent neutrophils.

Light RW, Erozan YS, Ball WC Jr. Cells in pleural fluid: their value in differential diagnosis. *Arch Intern Med 1973;132:854-860.*

Total and Differential Cell Counts

- **Lymphocyte predominance (>50%)**
- **Implies chronic process**
- Cancer, TB, or post CABG

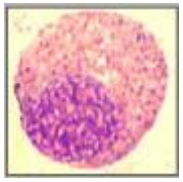


- The combined data from two series*show that:
- – 90 of 96 exudative pleural effusions consisting of more than 50 percent lymphocytes (94 percent) were due to cancer or tuberculosis..
- – In these series, 90 of 116 tuberculous pleural effusions (78 percent) contained more than 50 percent lymphocyttes..

*Yam LT. Diagnostic significance of lymphocytes in pleural effusions. *Ann Intern*

Total and Differential Cell Counts

- **Eosinophilia predominance**
- – 2/3 blood or air in pleural space (repeated thoracentesis)
- – Drug reactions
  - – Dantrolene
  - – Bromocriptine
  - – **Nitrofurantoin**



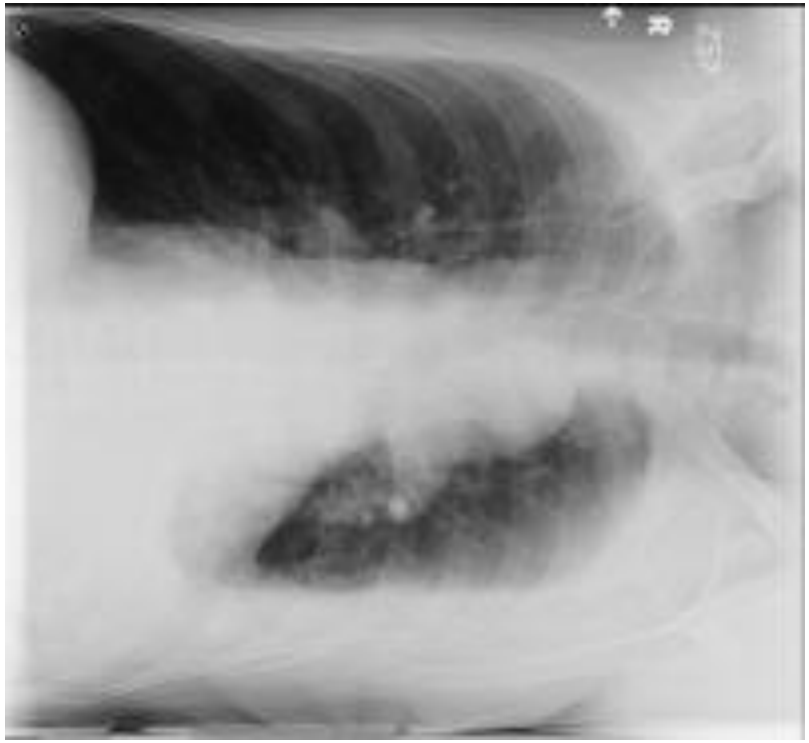
- – Exposure to asbestos, paragoniimiiasiis,,
- – Churg–Sttrauss syndrome..

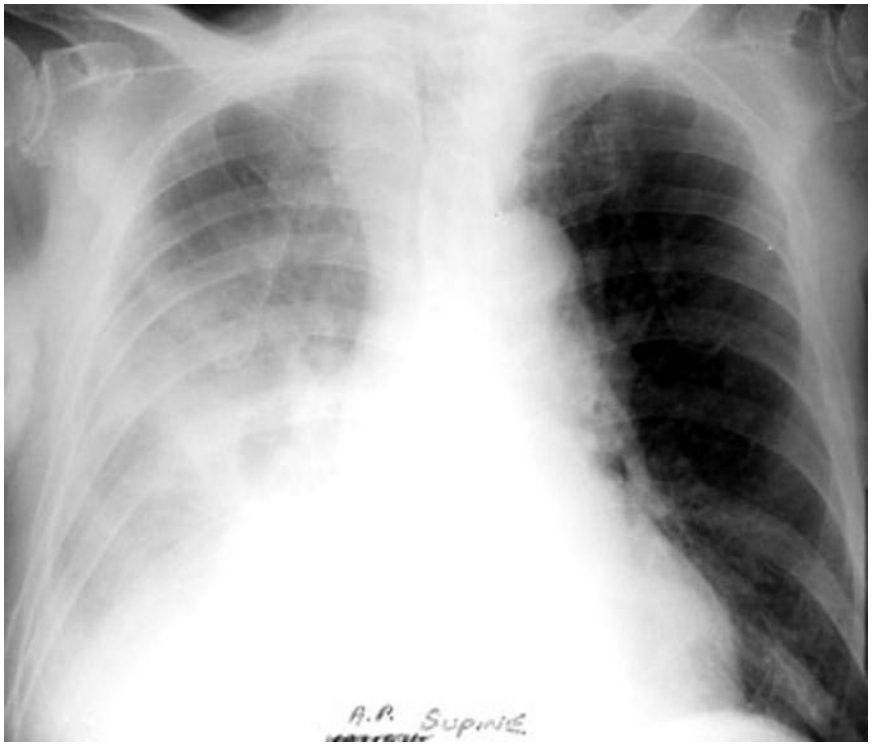
Pleural Fluid Glucos Pleural Glucose < 60 mg/dl

- Rheumatoid pleural effusions – can be < 10mg/dl. May have Increased cholesterol from cell debris.
- Empyema/ Complicated Parapneumonic Effusions
- Esophageal rupture – high level of salivary amylase & very low pH
- Malignancy
- Rarely:: Chourg–Strauss syndrome, Paragonimiasis
- (lung fluke),Lupus pleuritis..

Workup: Imaging

Workup: Imaging





Workup: Imaging

- Ultrasound
  - Aids in identification of loculated effusions
  - Aids in differentiation of fluid from fibrosis
  - Aids in identification of thoracentesis site
  - Available at bedside

Workup: Imaging

- CT Scan
  - Aids in differentiation of
    - Lung consolidation vs. Pleural effusion
    - Cystic vs. Solid lesions
    - Peripheral lung abscess vs. Loculated emypema
  - Aids in identification of
    - Necrotic areas
    - Pleural thickening, nodules, masses
    - Extent of tumor

Treatment

- Treat underlying etiology
- Therapeutic thoracentesis

Figure 1. Chest radiograph of left empyema demonstrating a D- shaped, lentiform pleural opacity.

erytema nodosum