Fourth Year Respiratory Medicine Lecture Series

INTERSTITIAL LUNG DISEASE

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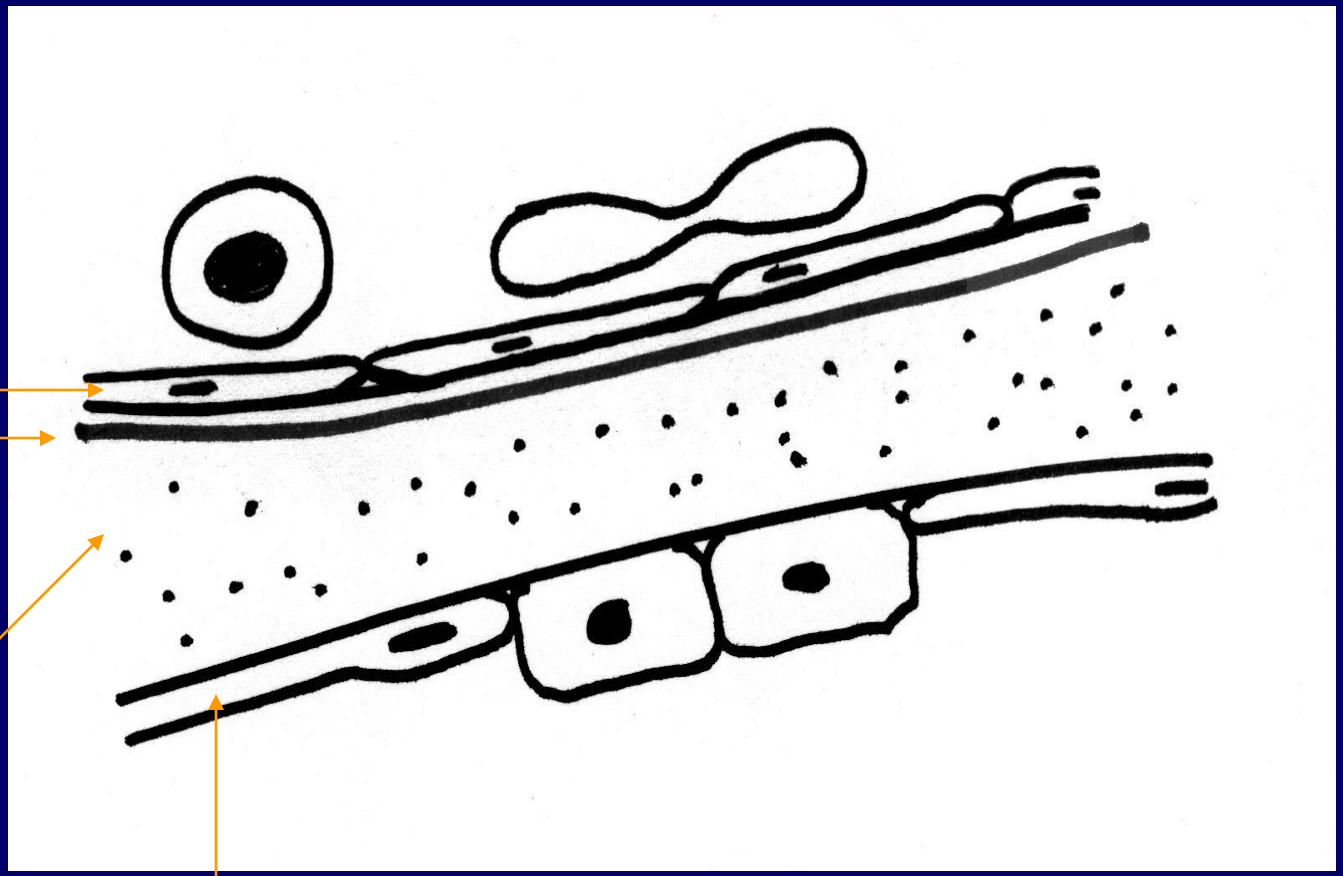
OUTLINE

- Definition
- Disease spectrum
- Pathology
- Epidemiology
- History
- Examination
- Investigation
- Treatment
- Prognosis

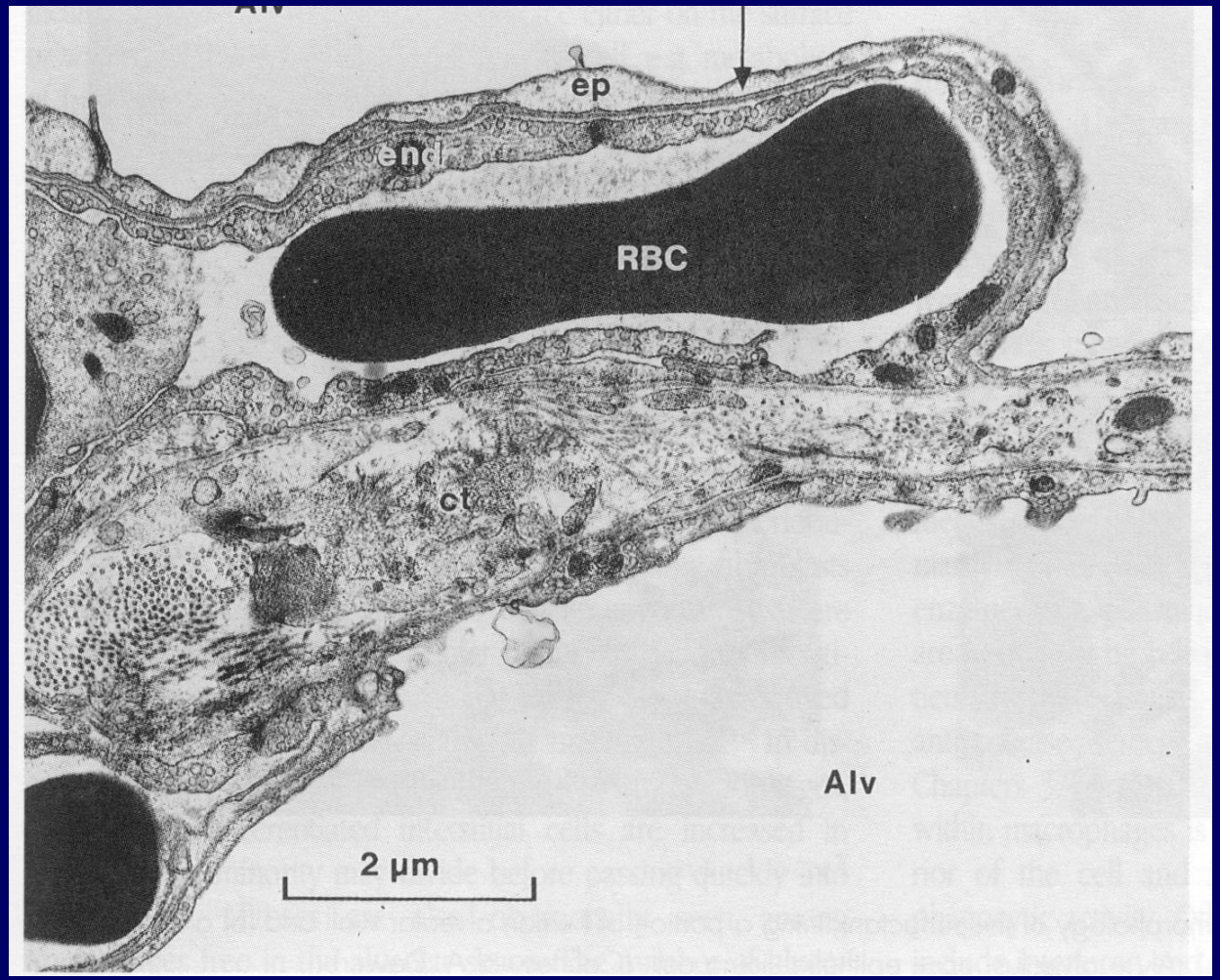
DEFINITION

- Interstitial lung disease (ILD) is also known as diffuse parenchymal lung disease (DPLD)
- Lung parenchyma = alveolar epithelium, capillary endothelium & the space in between (the interstitum)
- The major pathology is seen the interstitum

THE INTERSTITUM



THE INTERSTITUM:
ELECTRON MICROGRAPH

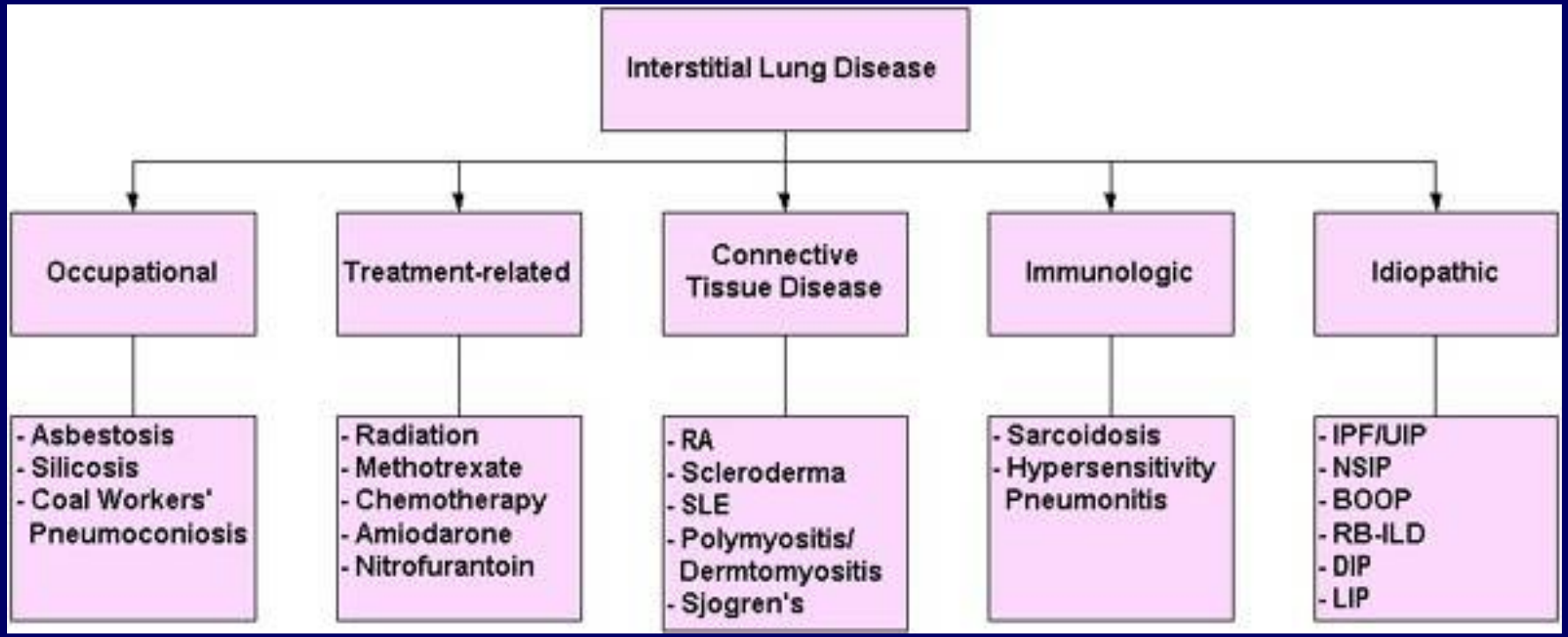


DISEASE SPECTRUM

- Over 200 disease pathologies are associated with ILD
- Many have unknown aetiologies
- Many are rare diseases

- All affect the peripheral gas exchanging areas of the lung and are characterized by a restrictive ventilatory defect

Classification



SOME EXAMPLES OF ILD'S

Known Aetiology

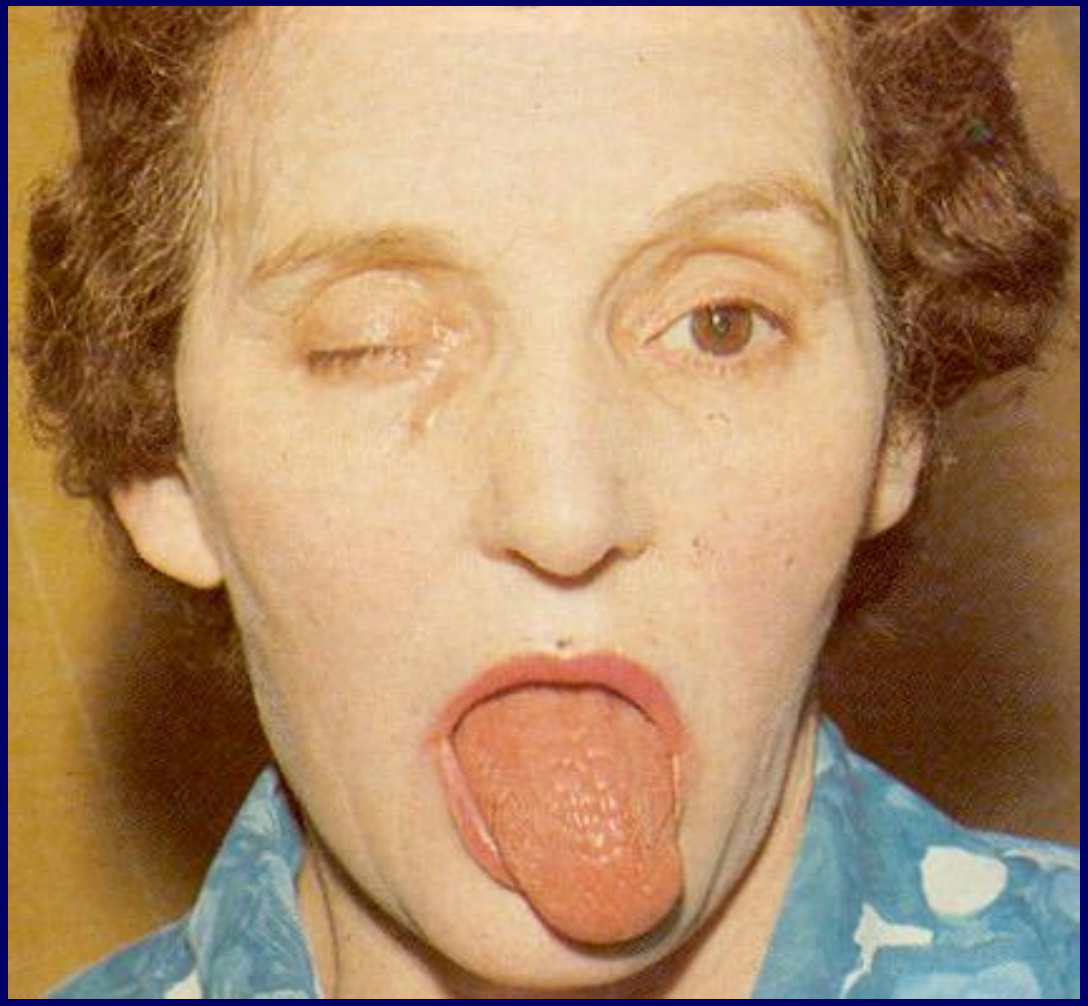
- Organic dusts
  - chronic extrinsic allergic alveolitis
  - sugar cane, paprika
- Inorganic dusts
  - coal, silica, asbestos
- Drugs
  - Amiodarone, nitrofurantoin, paraquat, cytotoxics

Unknown Aetiology

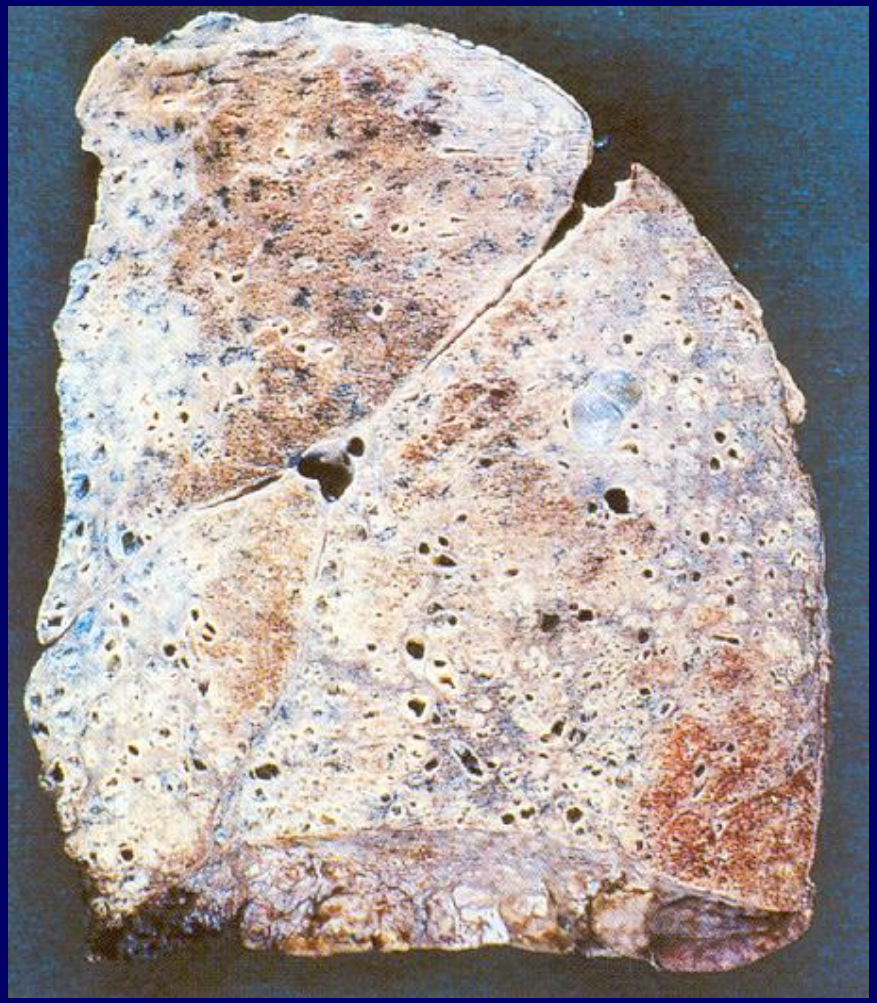
- Collagen disease
  - RA, systemic sclerosis
- Inherited diseases
  - Neurofibromatosis, TS
- Sarcoidoisis
- Veno-occlusive disease
- Eosinophilic pneumonia
- Cryptogenic fibrosing alveolitis

SARCOIDOSIS:
ERYTHEMA NODOSUM

SJOGRENS FACIES



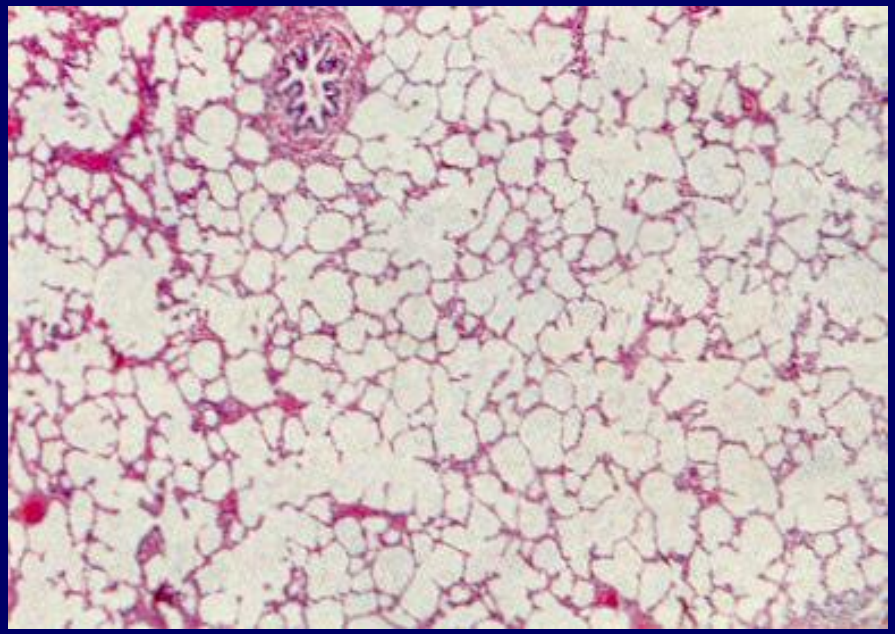
PATHOLOGY:
MACROSCOPIC

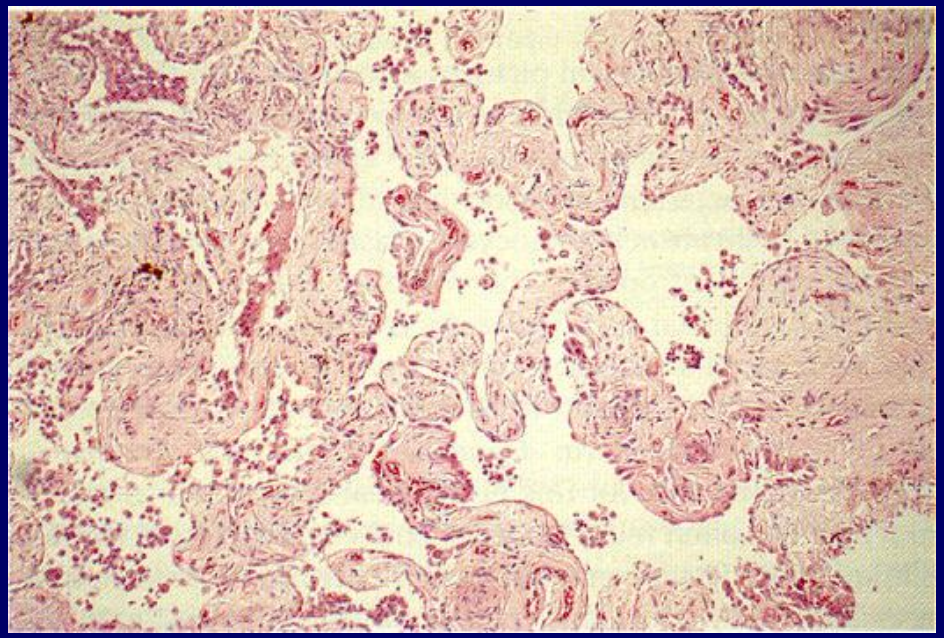


Cryptogenic fibrosing alveolitis

PATHOLOGY:
MICROSCOPIC

Normal parenchyma





Severe fibrosing alveolitis

DIAGNOSIS

- History, examination & special investigation
- Many causes have very specific features
  - so it is important to have a list of possible causes in your head
- Accurate diagnosis is usually not clinical
  - Requires special investigation, especially histology

HISTORY:
LENGTH OF HISTORY

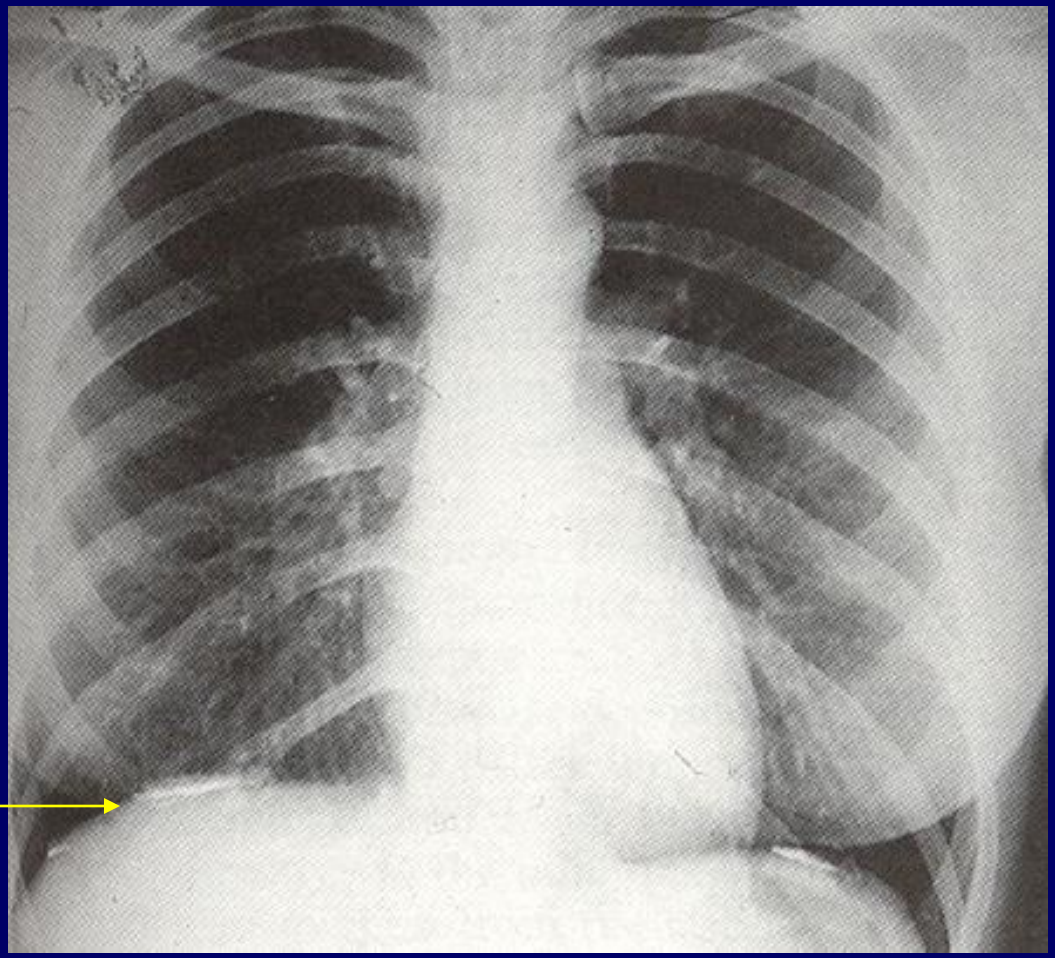
- Cardinal symptom: progressive exertional dyspnoea
- Also note pleuritic chest pain, wheezing & haemoptysis

- Presentation may be acute, episodic or chronic
  - Alters the differential diagnosis
- Search out and review all old CXR's

HISTORY:
ENVIRONMENTAL FACTORS

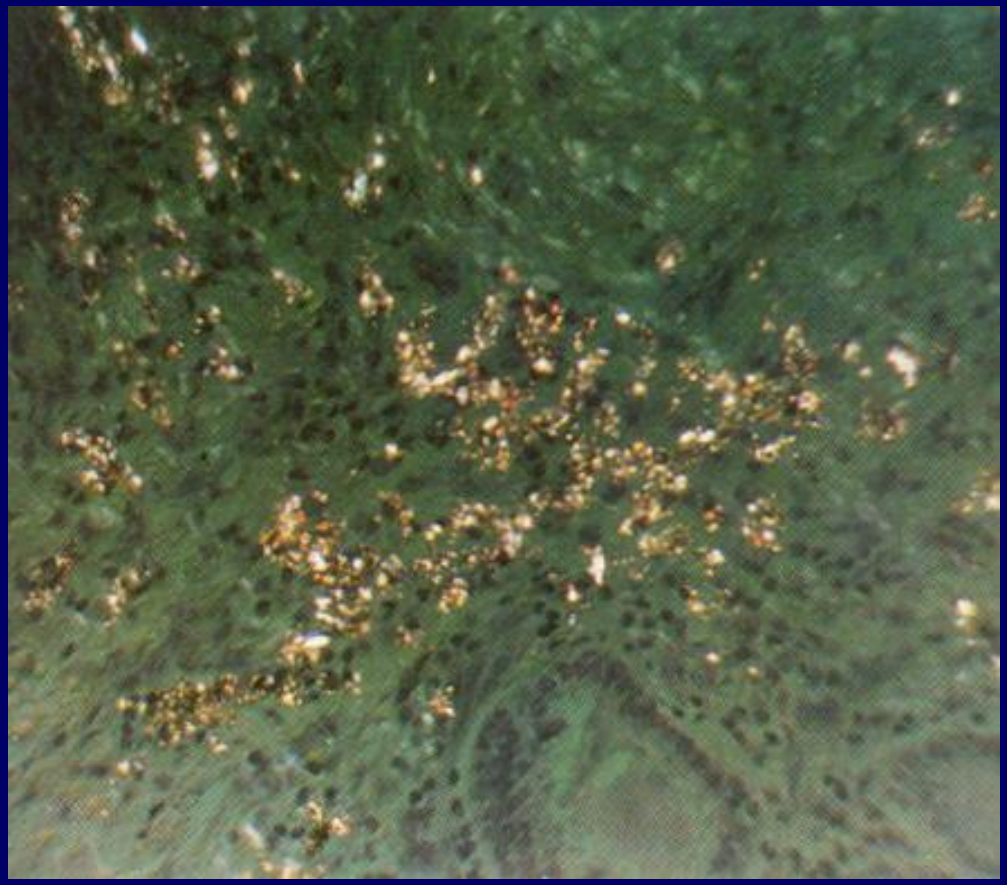
- Occupational exposure
  - e.g. asbestos, silica, animal proteins,
  - a job title in not enough
  - details of respiratory protection
- Hobbies and pastimes
  - e.g keeping birds especially pigeons & budgerigars
- Travel history
  - Parasitic disease can cause pulmonary eosinophilia

ASBESTOS RELATED LUNG DISEASE



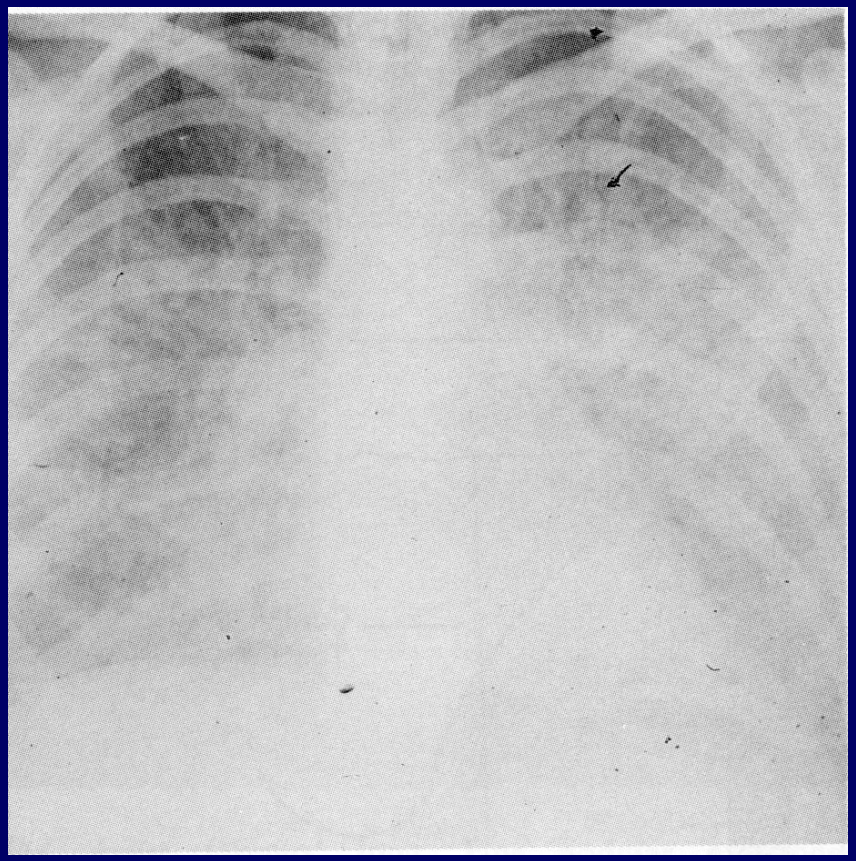
Diaphragmatic calcification

HARD METAL DUST

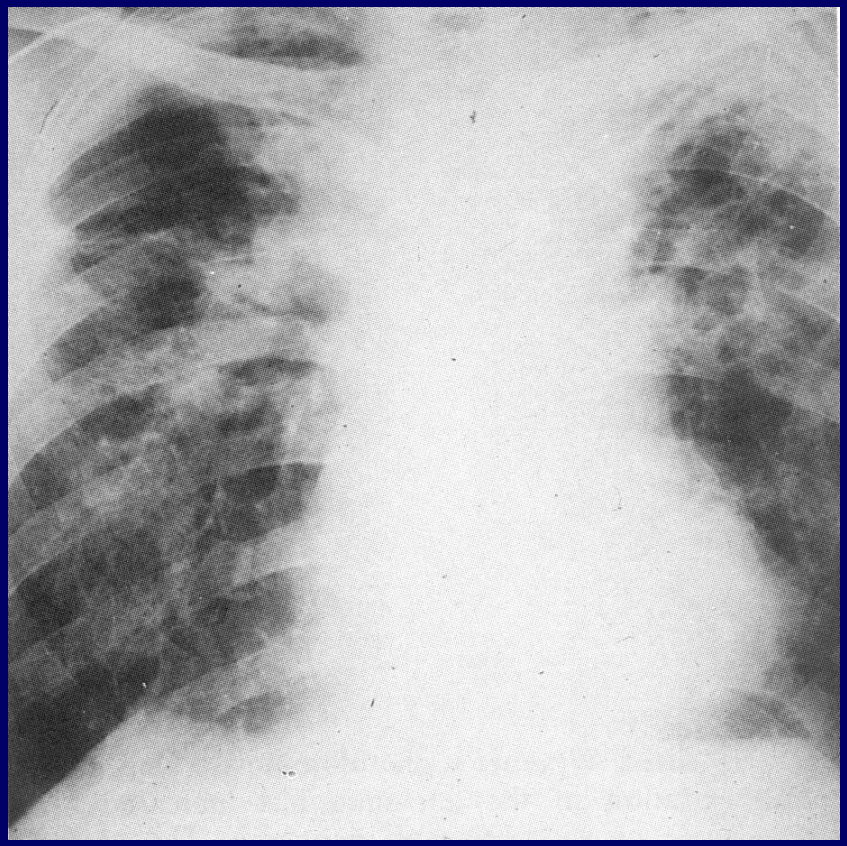


Open lung biopsy

EXTRINSIC ALLERGIC ALVEOLITIS



Acute stage



Chronic Stage

HISTORY:
OTHER FEATURES

- Pulmonary radiotherapy for cancer
- Immunodeficiency states e.g. HIV and opportunistic infection/malignancy
- Careful drug history
- Family history

NEUROFIBROMATOSIS

Café au lait spot

Neurofibroma

EXAMINATION:
RESPIRATORY SYSTEM

- Finger clubbing e.g fibrosing alveolitis
- Added breath sounds: crackles
  - Rare in sarcoid & EAA, fine bilateral end-inspiratory in CFA
- Signs of pulmonary hypertension and cor pulmonale

FINGER CLUBBING

EXAMINATION:
SYSTEMIC FEATURES

- Rash: connective tissue disease
- Uveitis/iritis: sarcoid
- Raynaud's: systemic sclerosis
- Pericarditis : SLE
- Arthritis:
- Haematuria
- Oral candida: HIV disease

SCLERODERMA FACIES

SARCOID IRITIS

ORAL CANDIDA IN HIV

INVESTIGATIONS:
BLOOD TESTS

- Many are possible given the large number of underlying diagnoses

  - FBC & eosinophil count, urine sediment, U&E's, LFT's, ANF, RF
  - ANCA, anti-GBM, SACE, Ca^{2+}, serum precipitins

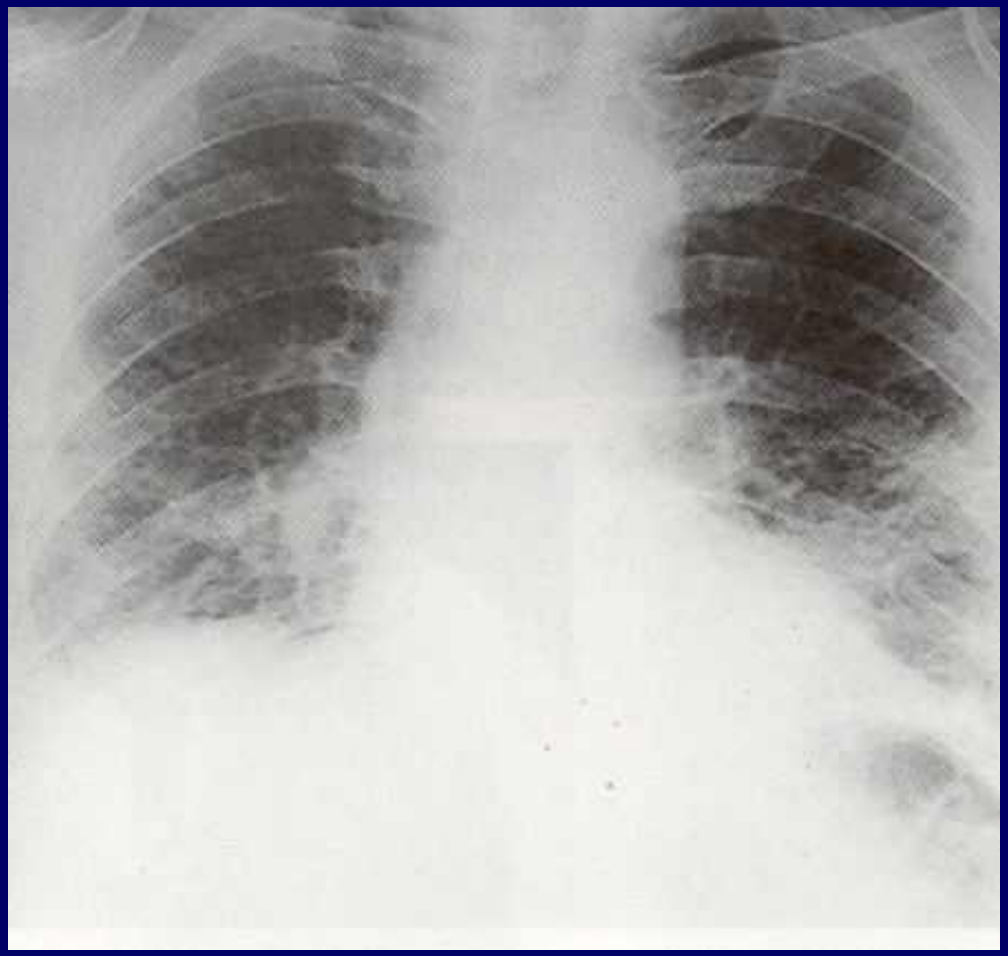
INVESTIGATIONS:
THE CHEST RADIOGRAPH

- Usually abnormal but non-specific
- Occasionally diagnostic (in context) e.g. sarcoid and pulmonary eosinophilia

Typical findings

- Small lung volumes
- In CFA, bilateral lower zone peripheral interstitial shadows

CRYPTOGENIC FIBROSIS ALVEOLITIS

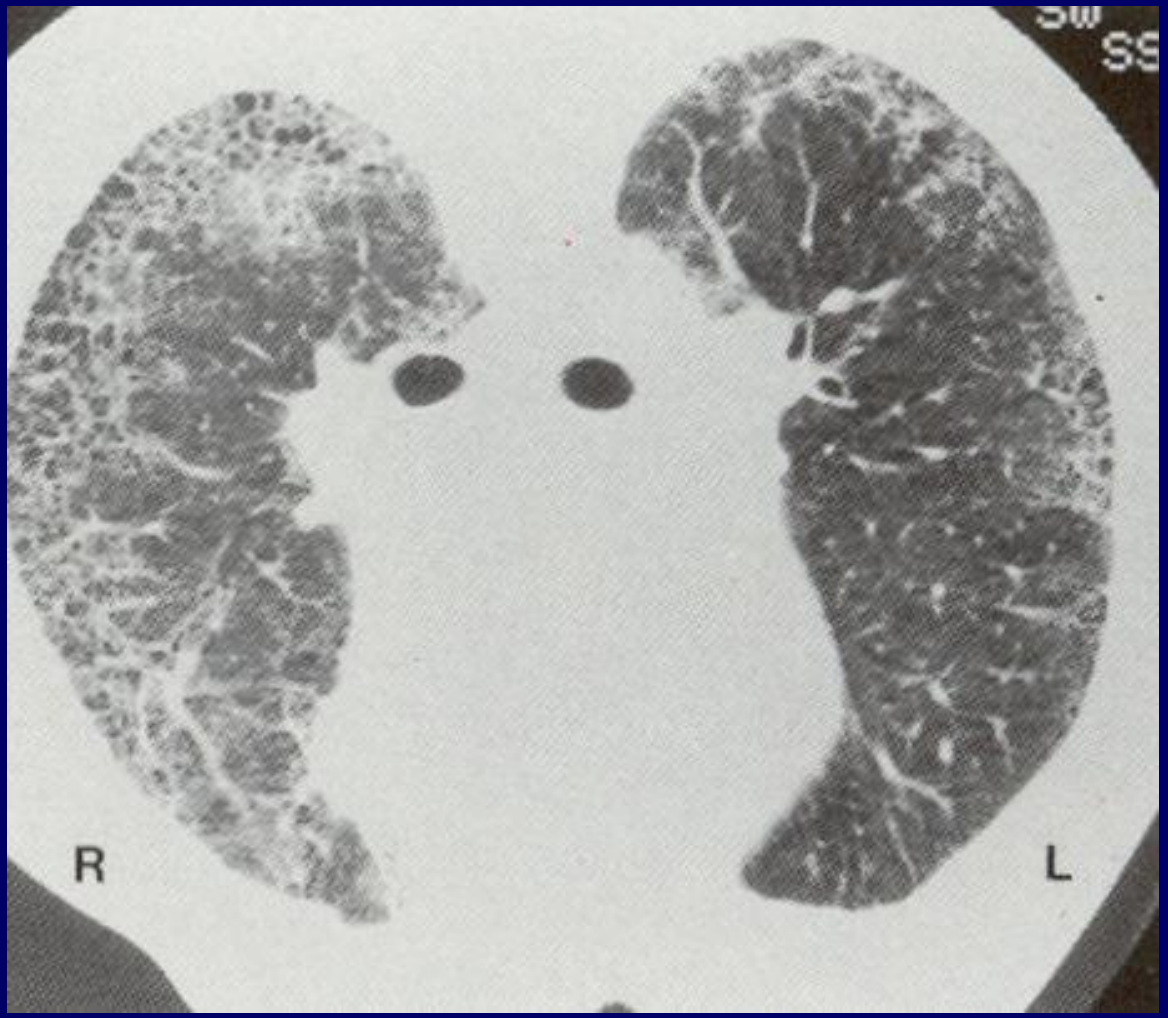


INVESTIGATIONS:
WHAT DOES CT SCANNING ADD?

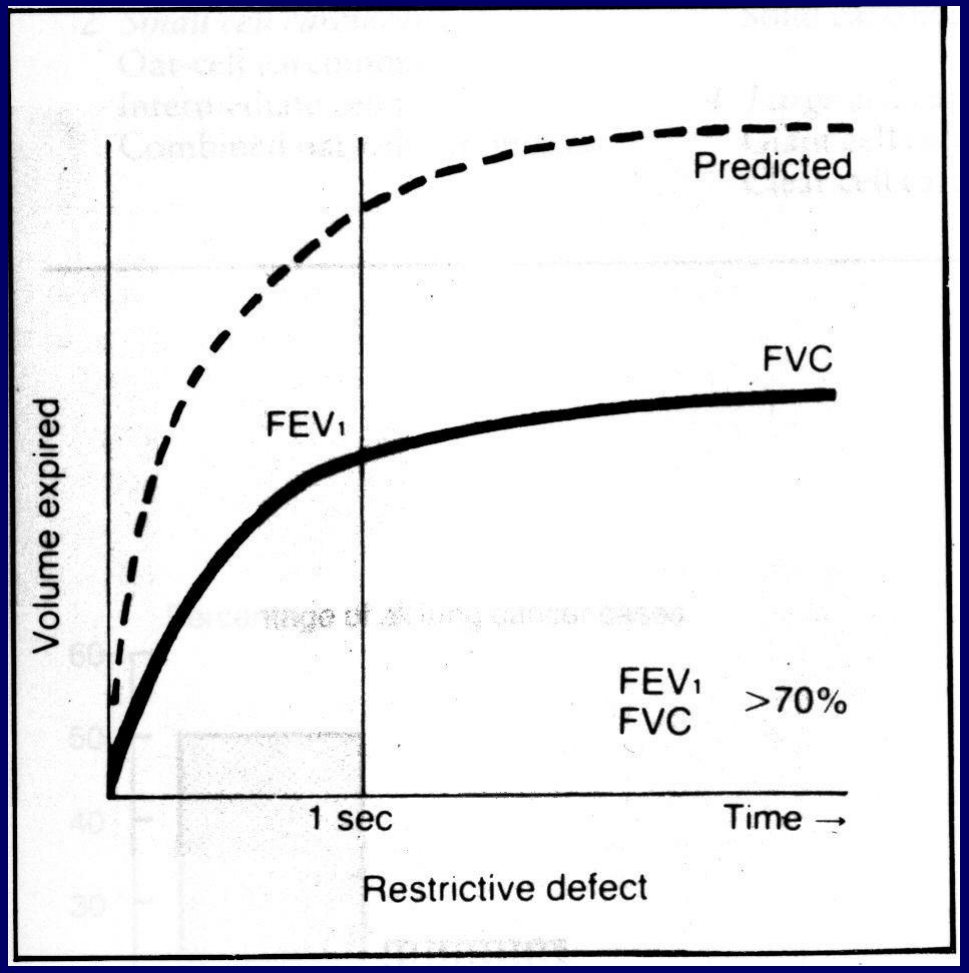
High resolution ('thin cut') CT gives better spatial resolution

- Higher detection rate of ILD
- Better characterization of disease and extent of disease
  - In some conditions e.g. CFA, typical clinical features + appropriate HRCT avoids need for histology

CRYPTOGENIC FIBROSIS ALVEOLITIS

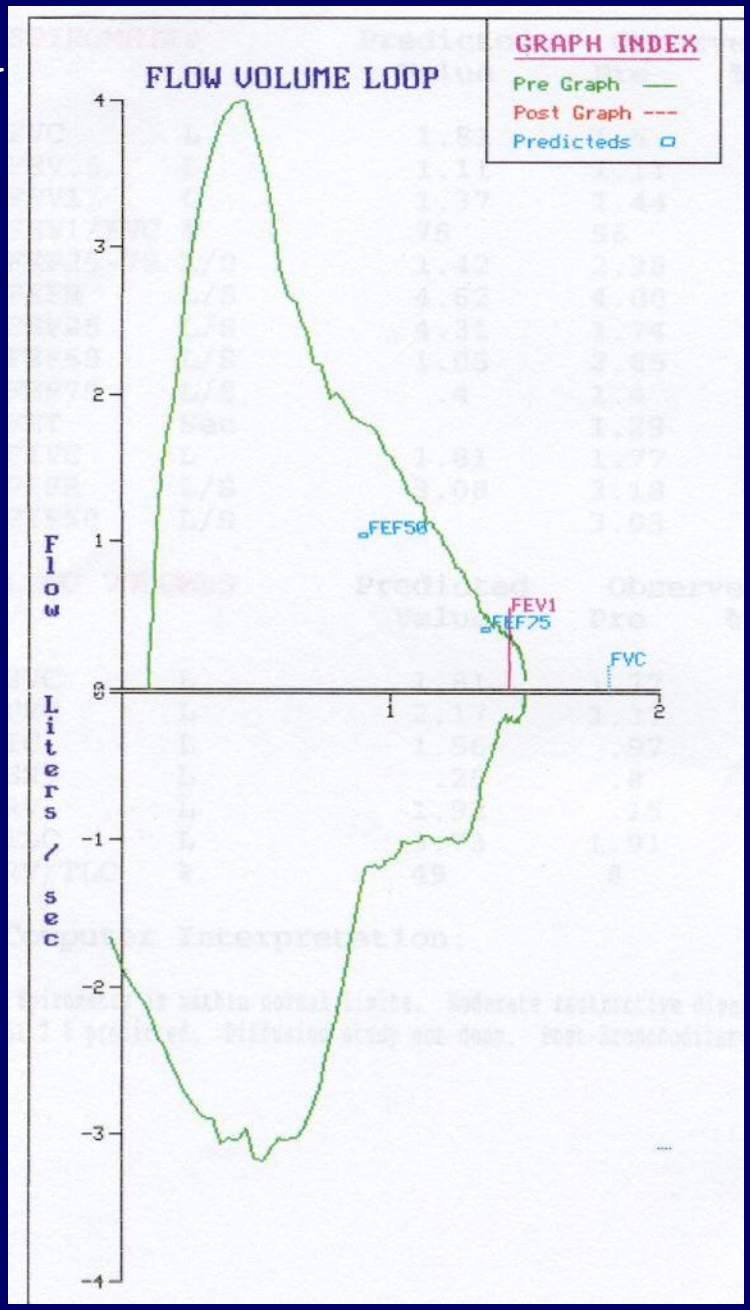


INVESTIGATIONS:
SPIROMETRY



RESTRICTIVE FLOW VOLUME LOOP

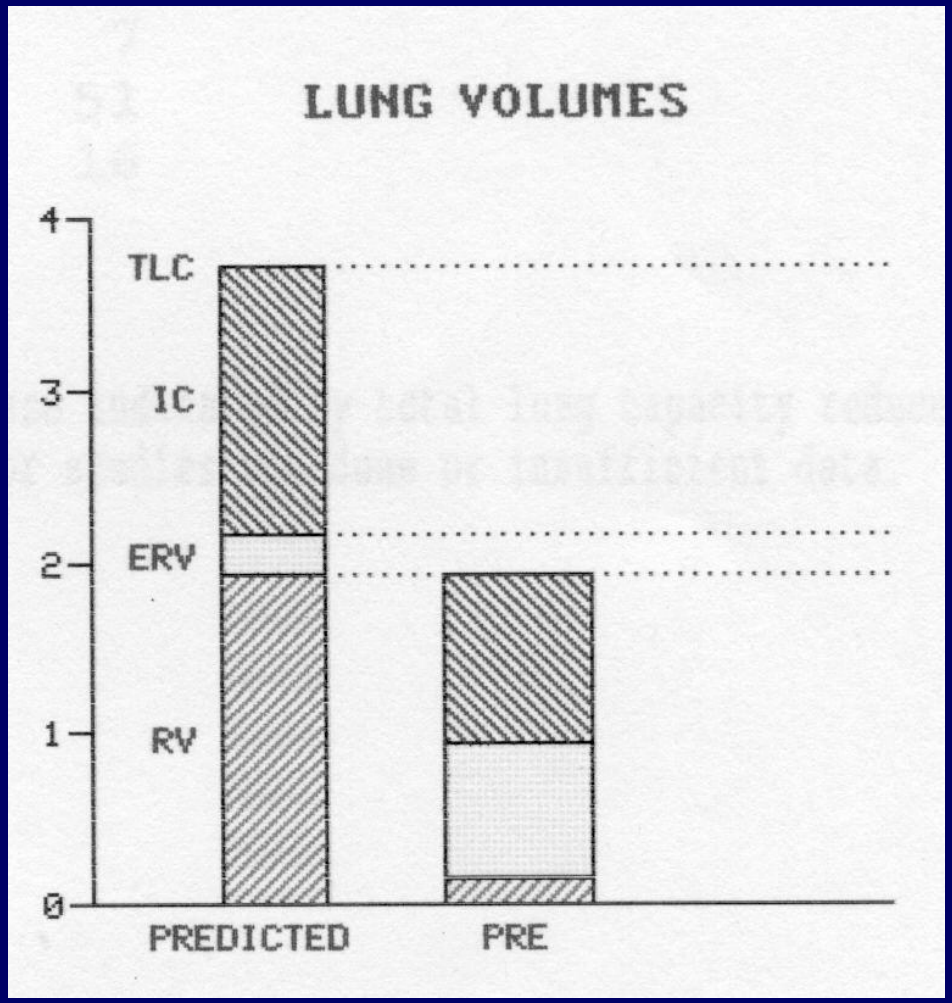
SPIROMETRY		Predicted Value	Observed Pre	%Pred
FVC	L	1.81	1.5	82
FEV.5	L	1.11	1.11	100
FEV1	L	1.37	1.44	105
FEV1/FVC	%	75	96	128
FEF25-75	L/S	1.42	2.38	167
PEFR	L/S	4.62	4.00	86
FEF25	L/S	4.31	1.74	40
FEF50	L/S	1.05	2.85	271
FEF75	L/S	.4	1.4	350
FET	Sec		1.29	
FIVC	L	1.81	1.77	97
PIFR	L/S	3.08	3.18	103
FIF50	L/S		3.03	



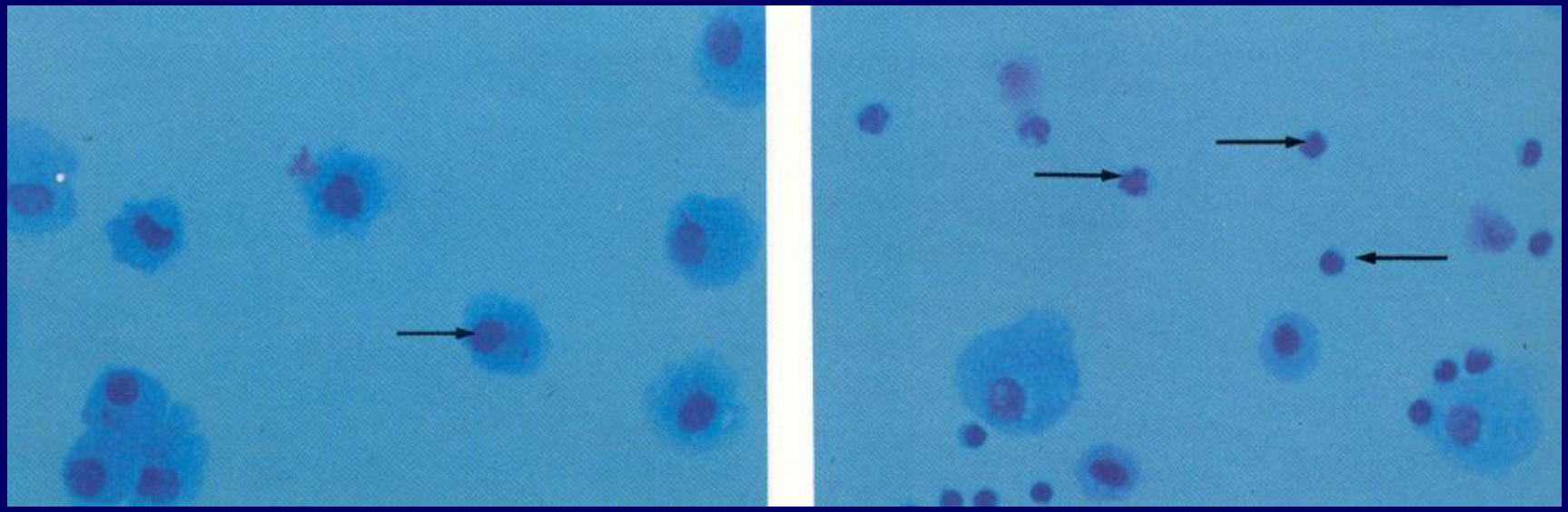
INVESTIGATION:
VOLUMES & GAS TRANSFER

LUNG VOLUMES		Predicted Value	Observed Pre	%Pred
SVC	L	1.81	1.77	97
FRC	L	2.17	1.37	63
IC	L	1.56	.97	62
ERV	L	.25	.8	320
RV	L	1.92	.15	7
TLC	L	3.73	1.91	51
RV/TLC	%	49	8	16

DIFFUSION	Predicted Value	Observed Pre	%Pred
DLCO CORR	20.3	9.93	48
DLCO UNC	20.3	9.39	46
VA @BTPS	6.12	2.39	39
DL/VA	3.93	4.15	105



INVESTIGATION
BRONCHO-AVLEOLAR LAVAGE



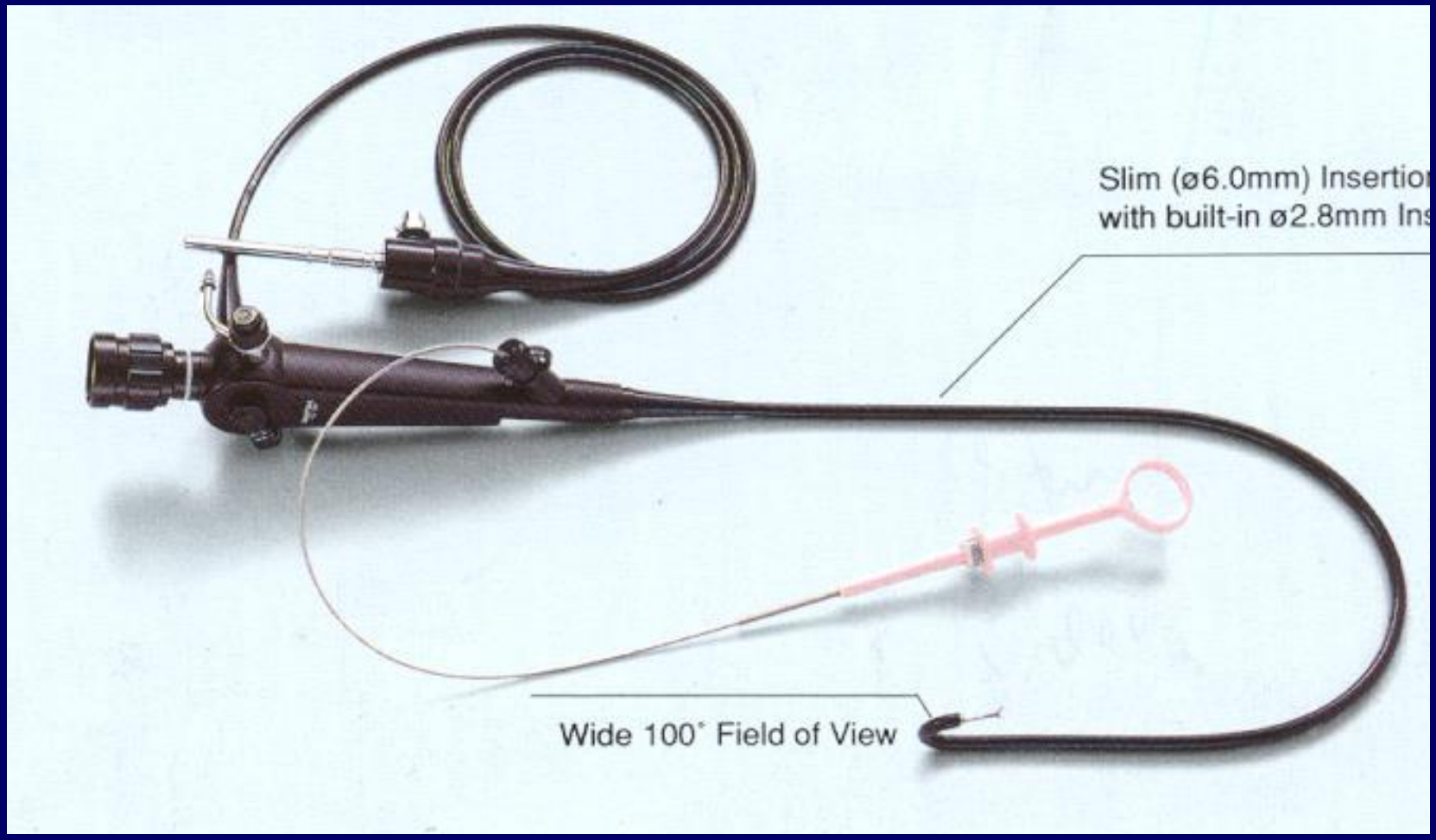
Normal Sarcoidosis

Arrows indicate lymphocytes

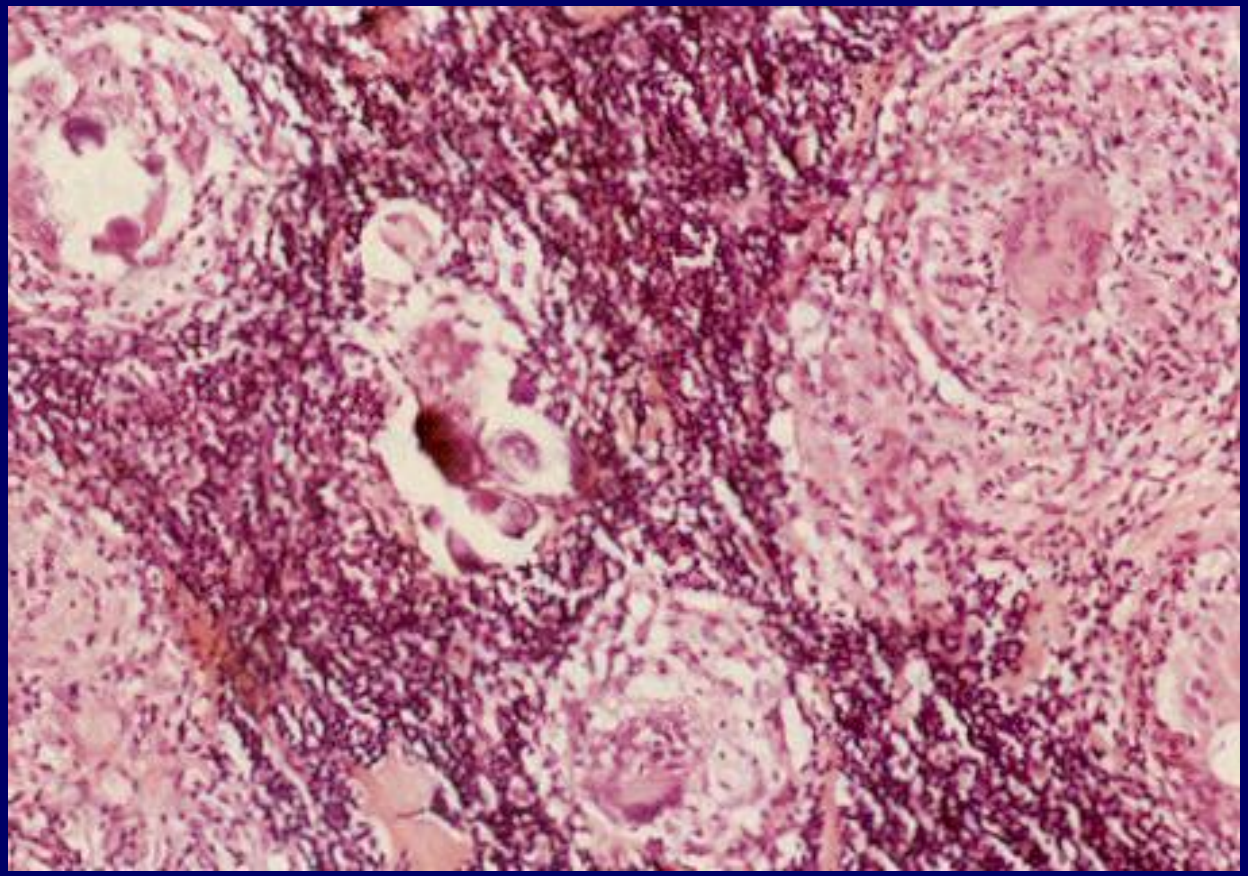
INVESTIGATION:
SAMPLING METHODS

- Endobronchial biopsy: for bronchocentric disease e.g. sarcoidosis.
  - Convenient but small samples
  - No use for peripheral disease
- Open lung biopsy: requires a mini thoracotomy
  - Large pieces but requires GA
- VATS lung biopsy: Video Assisted ThoraScopic
  - New technique

FIBRE-OPTIC BRONCHOSCOPE



INVESTIGATION:
HISTOLOGY



Sarcoid granuloma on lung biopsy

TREATMENT 1

- Treat underlying disease
  - remove precipitating cause: drugs, dusts
  - optimize treatment of systemic disease

- Anti-inflammatory and immunosuppressive regimens
  - usually involve corticosteroids: daily oral doses of prednisolone or pulsed methylprednisolone
  - additionally methotrexate, cyclophosphamide, cyclosporin can be added

TREATMENT 2

- When to start treatment
  - inflammation vs. fibrosis
- Examples
  - sarcoidosis very responsive to prednisolone
  - fibrosing alveolitis very unresponsive
- Lung transplantation
  - last resort

Pathogenesis:
Traditional view

Old Model

Unknown trigger

↓

Damage

↓

Inflammation

↓

Fibrosis

Pathogenesis:
A Change in Thinking

New Model

Unknown trigger

↓

Autostimulating damage

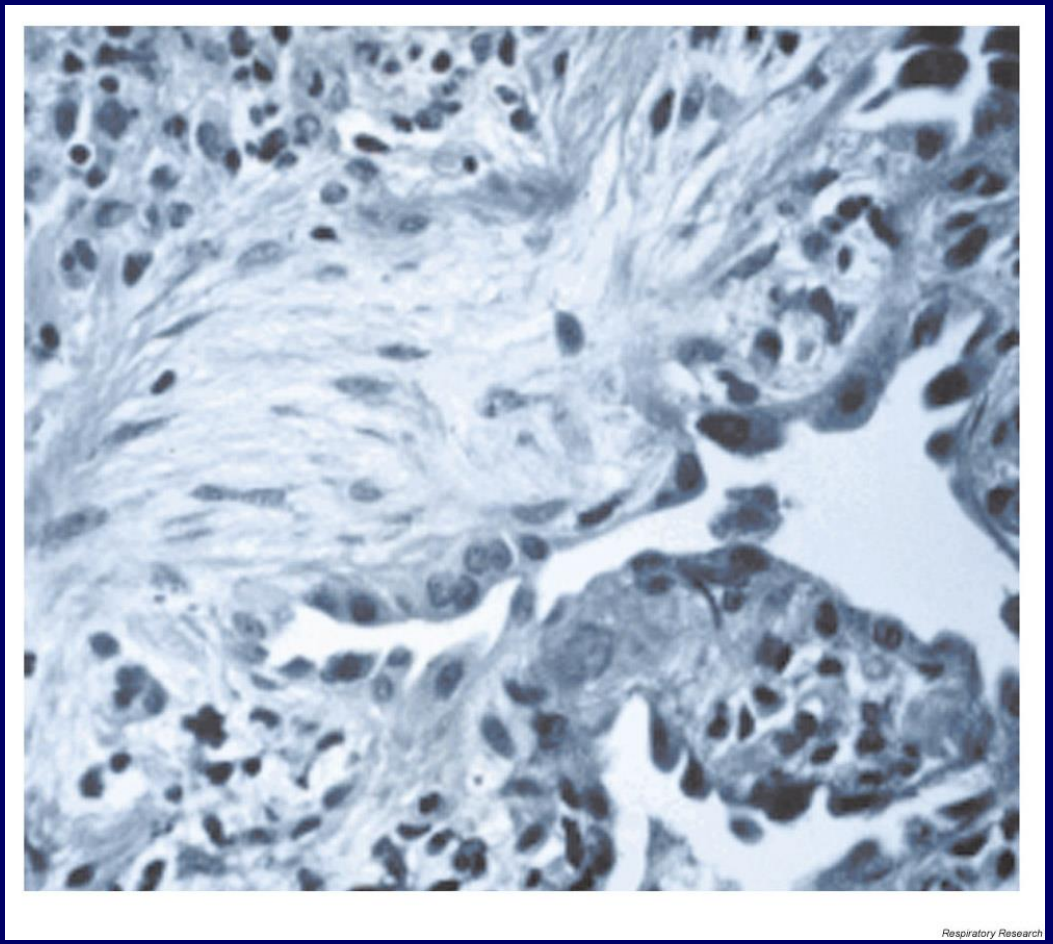
↓

Cytokine dysregulation

↓

Fibroblast proliferation

Pathology of UIP



- Fibrosis with little inflammation
- Distributed in time and space
- Key feature is the fibroblastic focus
- May be primary or secondary

PROGNOSIS

- Monitoring
  - best done clinically and using serial lung function tests.
  - Radiology is insensitive method

- Generally the treatment of ILD's is unsatisfactory and carries a poor prognosis

SUMMARY

- Definition
- Disease spectrum
- Pathology
- Epidemiology
- History
- Examination
- Investigation
- Treatment
- Prognosis