

Asbestosis: diagnosis and attribution criteria

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FUNDACENTRO

Asbestosis

- A declining disease in developed countries
- Most cases of asbestosis are due to occupational exposure
- The diagnosis takes into account the clinical and occupational history, latency time and imaging

Exposure-Response Estimate for Lung Cancer and Asbestosis in a Predominantly Chrysotile-Exposed Chinese Factory Cohort

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D. Wayne Berman, PhD,⁴ and Eiji Yano, MD, MPH, DMSc⁵

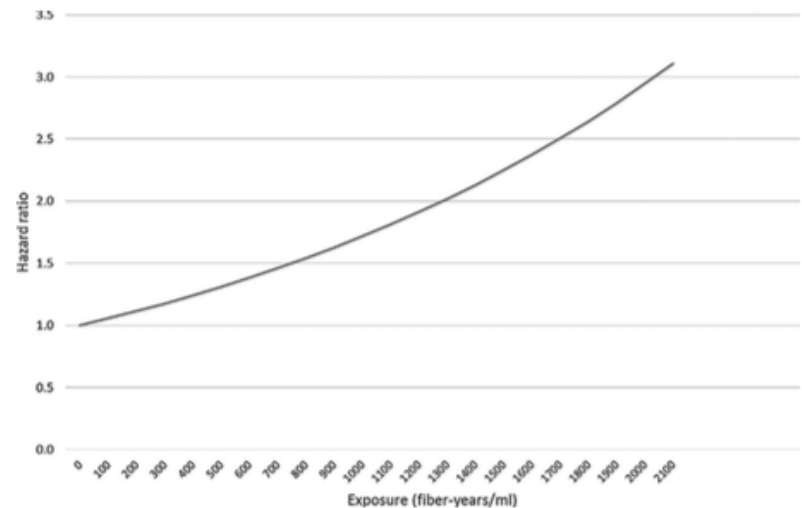


FIGURE 2. Asbestosis hazard ratios by cumulative asbestos exposure in fiber-years per milliliter.

Am J Ind Med 2016;59:369–378

Occupational/Environmental history

Occupational history

- ✓ *Structured questionnaires*
- ✓ *JEMs*

In the absence of a history suggestive of exposure think of:

- ✓ *Talc, vermiculite and soapstone (may contain asbestos)*
- ✓ *Bystander, inadvertent exposures (at work, home or environmental)*



Symptoms and signs

- They are not required for asbestosis recognition
- ✓ *Shortness of breath (11,8% prevalence in the A/C cohort and 24,3% in cohort members with asbestosis)*
 - ✓ *Basal crackles (54% of cohort members with asbestosis)*
 - ✓ *Finger clubbing*

PFTs

Physiological defects associated with asbestosis are neither characteristic nor necessary for the diagnosis of the disease and are shared by other diffuse interstitial diseases: restriction and reduction of CO diffusion. However, we frequently find exposed patients presenting with obstruction, alone or in combination with restriction.

“An analysis of lung function in 24 asbestos-exposed workers found an increased elastic recoil, smaller vital capacity, ventilation inhomogeneity, and larger mid-expiratory flows with decreased peak flows at any transpulmonary pressure level in heavily exposed workers. This suggests that the primary lesion has a predominant peribronchiolar location”

Jodoin G et al. Am Rev Respir Dis 1971

“...long term exposure to mineral dust as an asbestos miner produces severe diffuse pathological changes in the small airways; these findings may relate to the physiological observation of unusual degrees of airflow obstruction in this group of workers”.

Wright J, Churg A. Br J Ind med 1985

Lung function decline

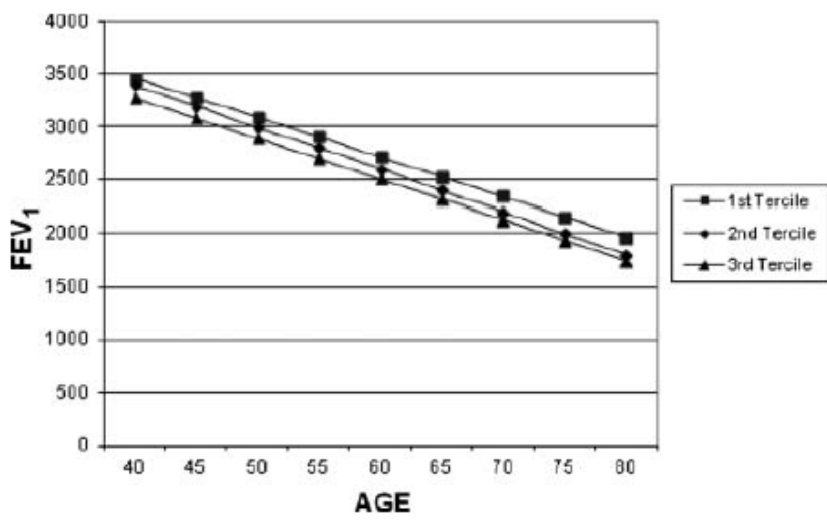


Figure 1 Estimated mean forced expiratory volume in 1 s (FEV₁) decline by the tertiles of cumulative exposure for ages 40–80. At age 40, subjects in the second tertile of cumulative exposure compared with subjects in the first tertile have 70 ml less FEV₁ and subjects in the third tertile have 183 ml less. Former asbestos-cement workers, Brazil. *ANOVA: $F=236.13$, $p<0.0001$ for differences among slopes.

Algranti et al, OEM, 2013

Cohort

	ID	Sex	Race	Height	Age	FEV1	FVC	TestDate
▶1	953	Male	White	173	45	3476	4447	26/01/1996
2	953	Male	White	173	47,2	3139	4016	13/04/1998

953 Regr. Slope=-22 mL/y Group Slope=-39 mL/y

Cohort members with asbestosis

	ID	Sex	Race	Height	Age	FEV1	FVC	TestDate
▶1	1023	Male	White	156	60	2530	3090	08/05/1996
2	1023	Male	White	156	63,3	2710	3260	13/09/1999

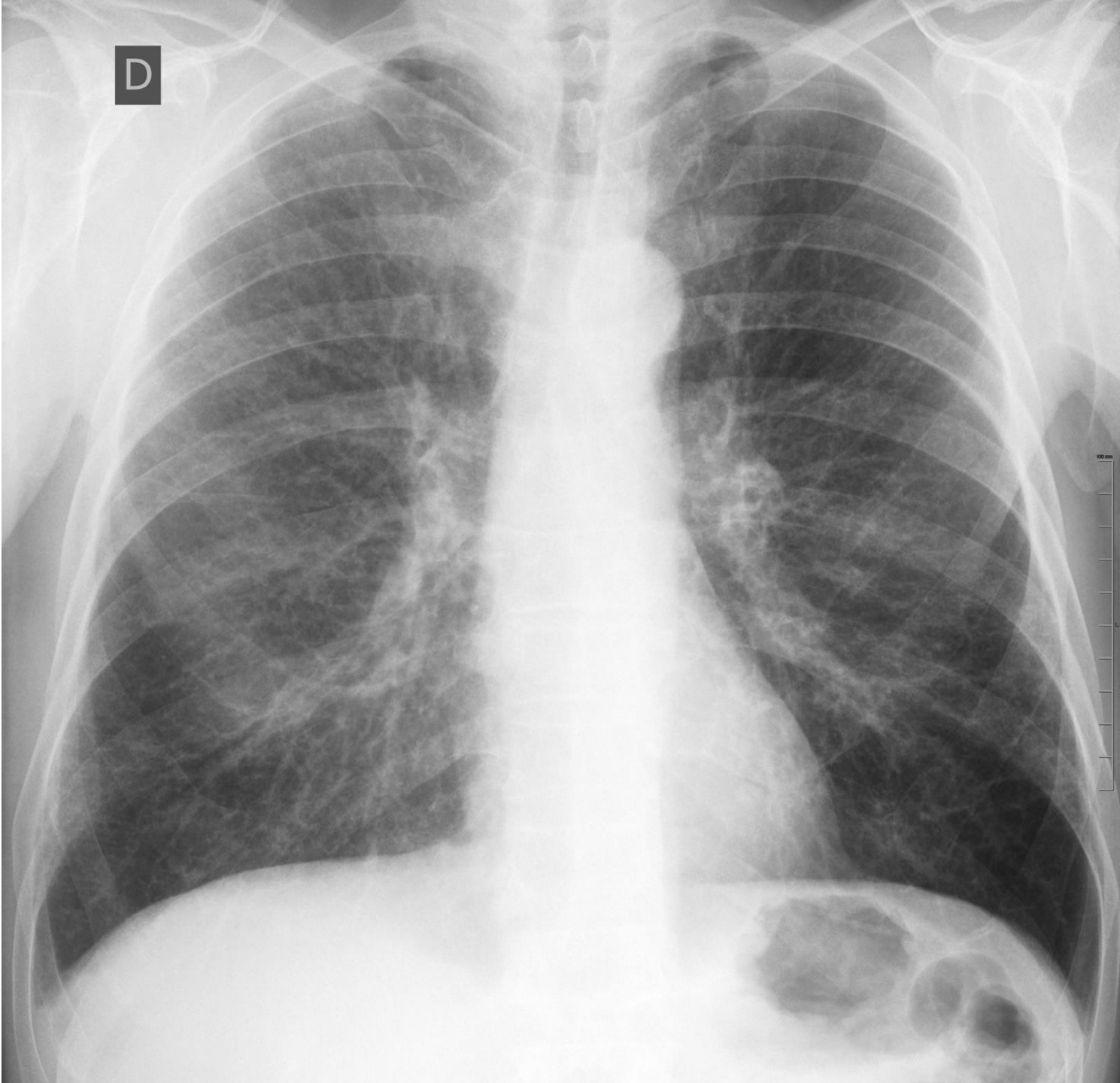
1023 Regr. Slope=-25 mL/y Group Slope=-43 mL/y

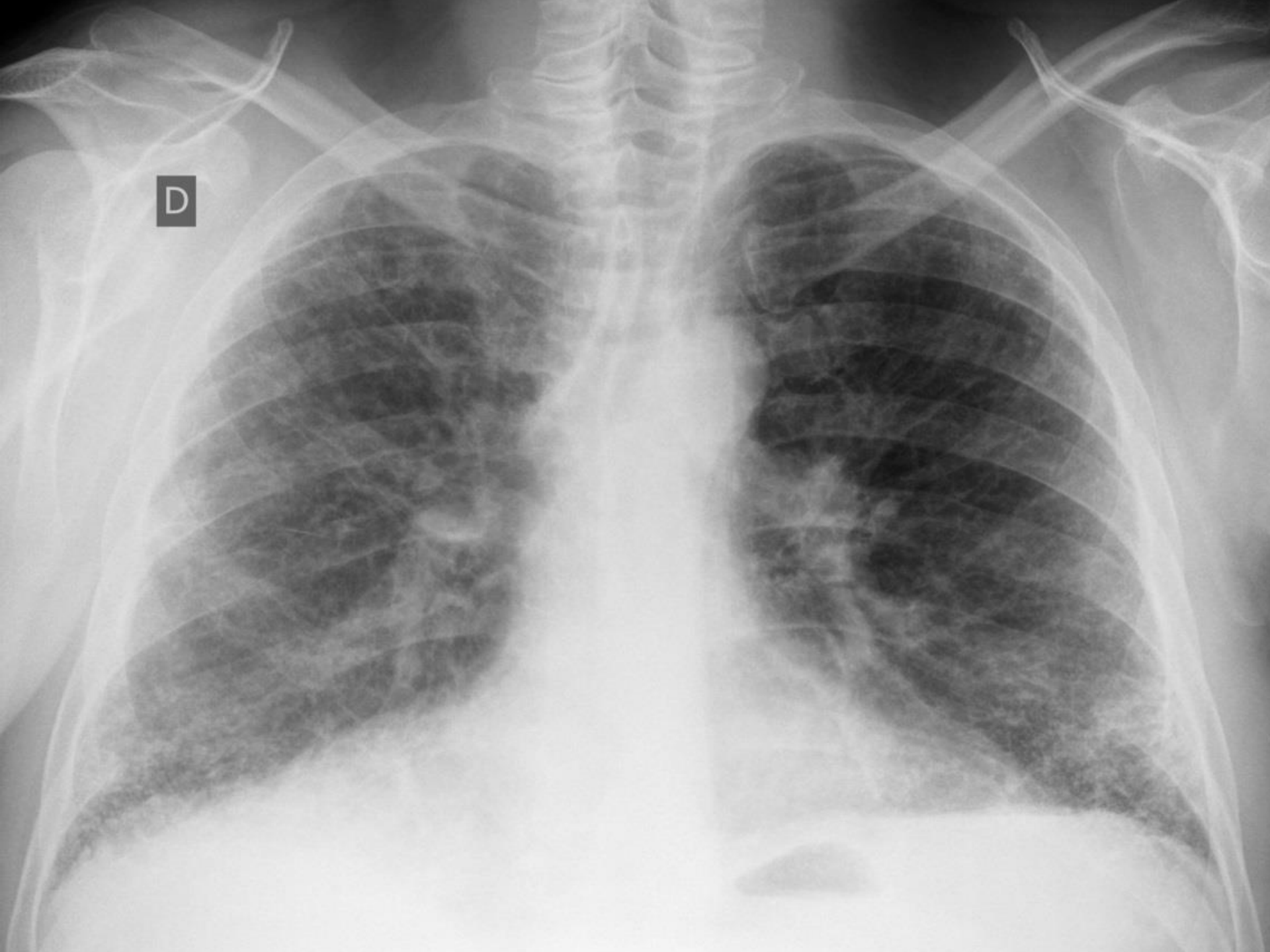
Asbestosis – X-Ray Imaging criteria

- Chest X-Ray showing linear (irregular) small opacities at the lower half of the thorax $\geq 1/0$
- Pleural plaques common (over 70%)



D





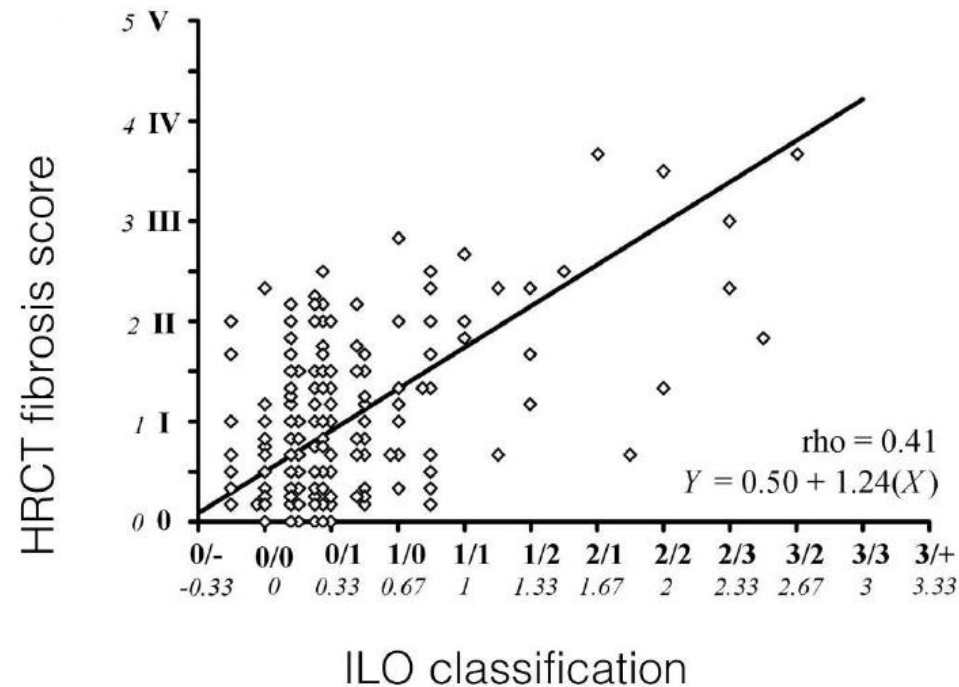
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Assuming HRCT as the "gold standard" the chest X-ray showed:

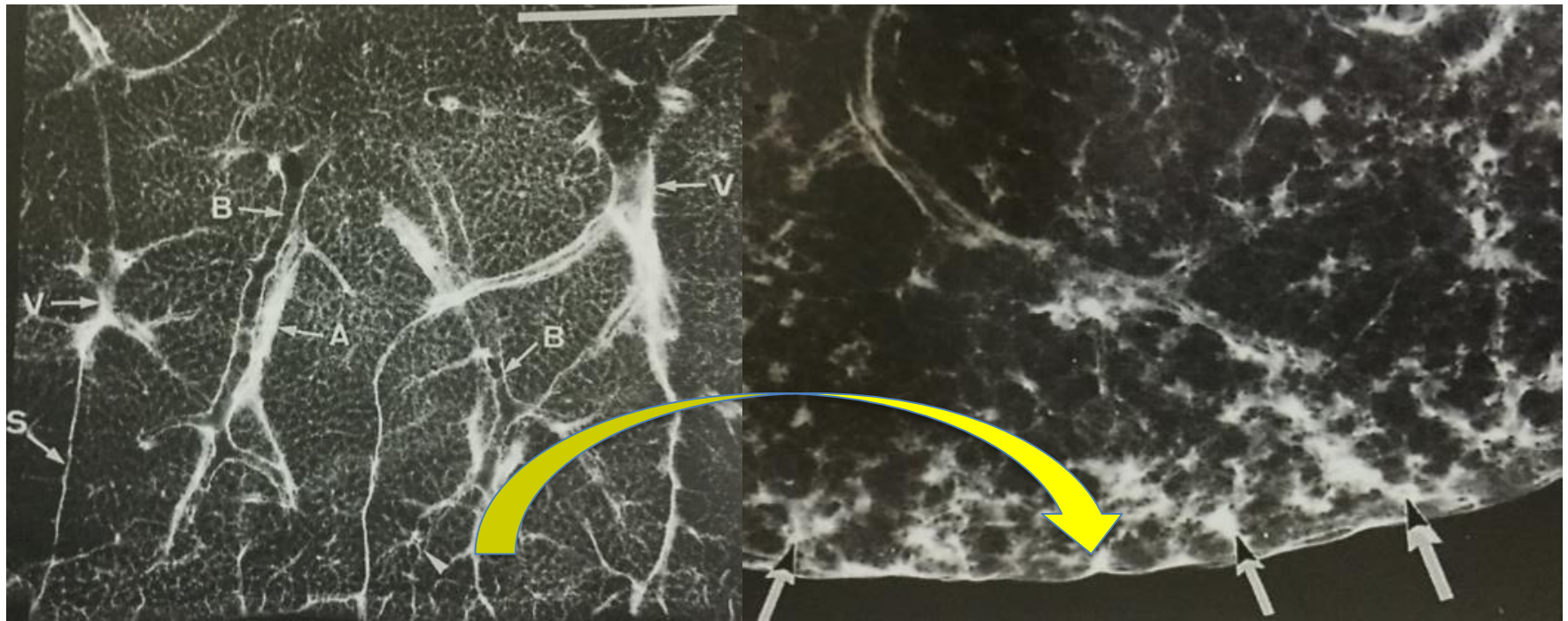
- ✓ 21,6% false negatives
- ✓ 4,2% false positives (asbestosis)

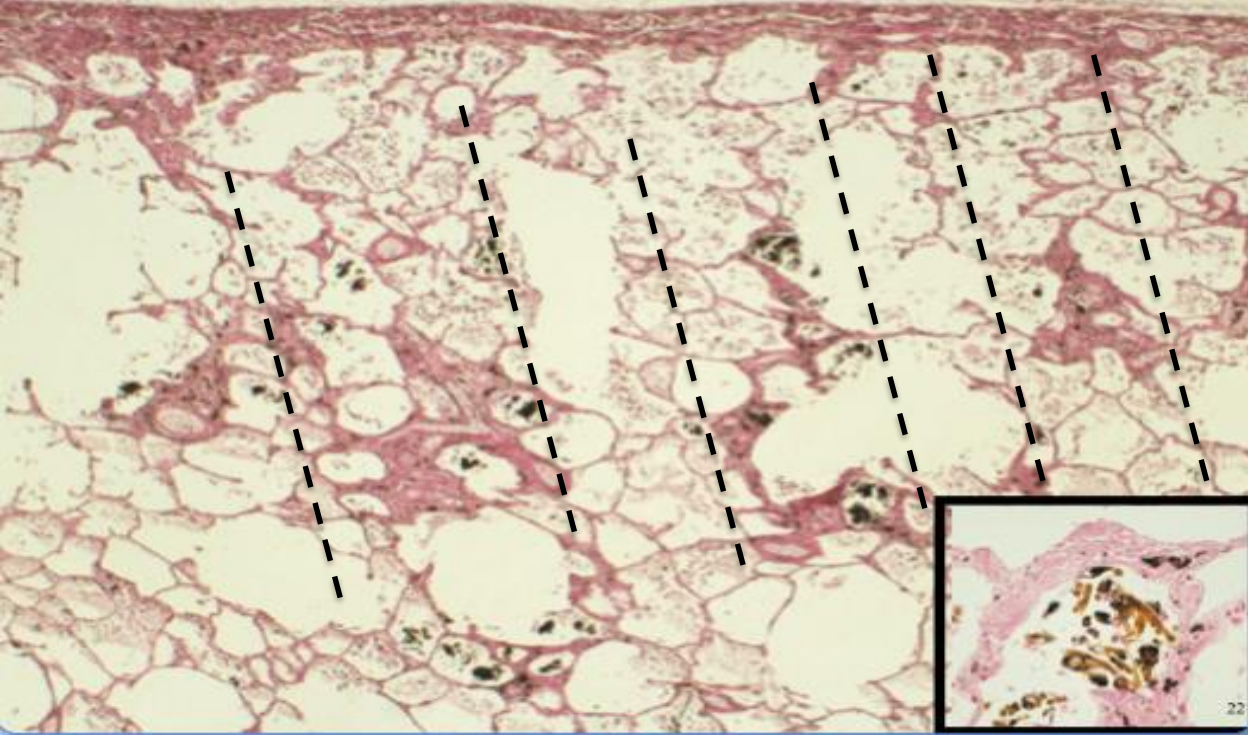
- ✓ 26% false negatives
- ✓ 14,4% false positives (pleural plaques)

Algranti E. et al. Am J Ind Med 2001



Huuskonen O. Scand J Work Environ Health 2001



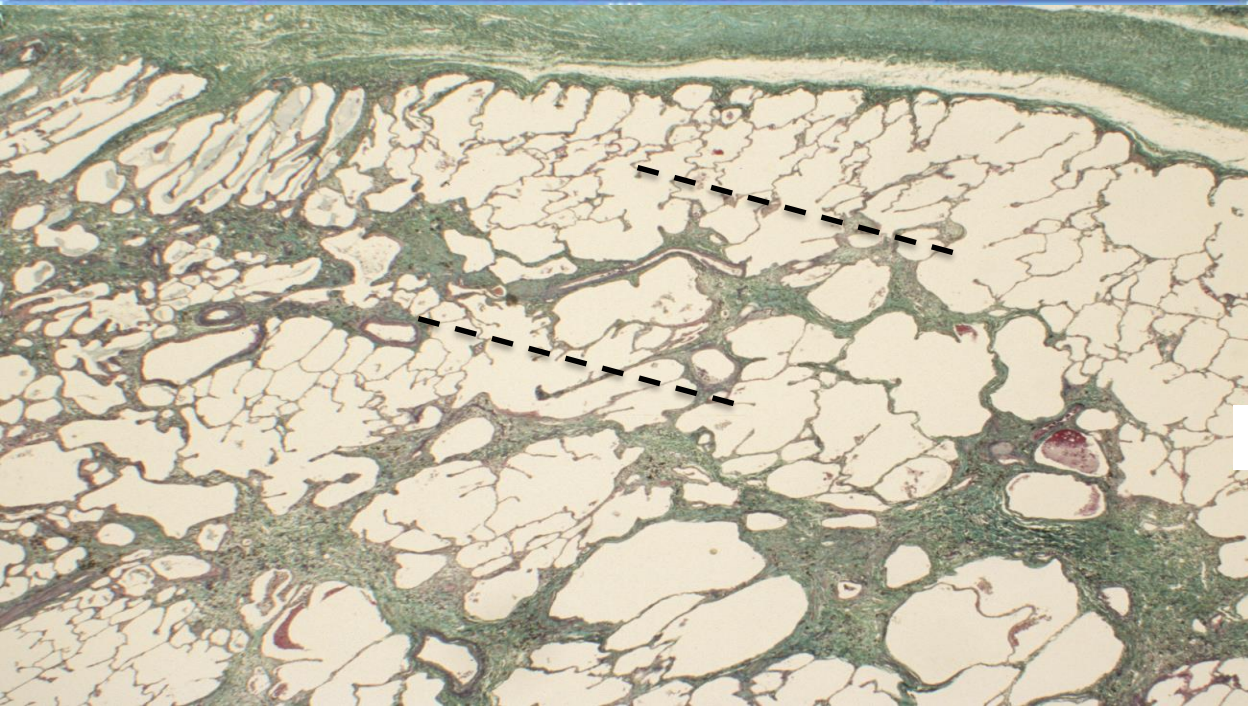


DOTLIKE
(mm from pleura)

I – Merging of
centrilobular fibrosis

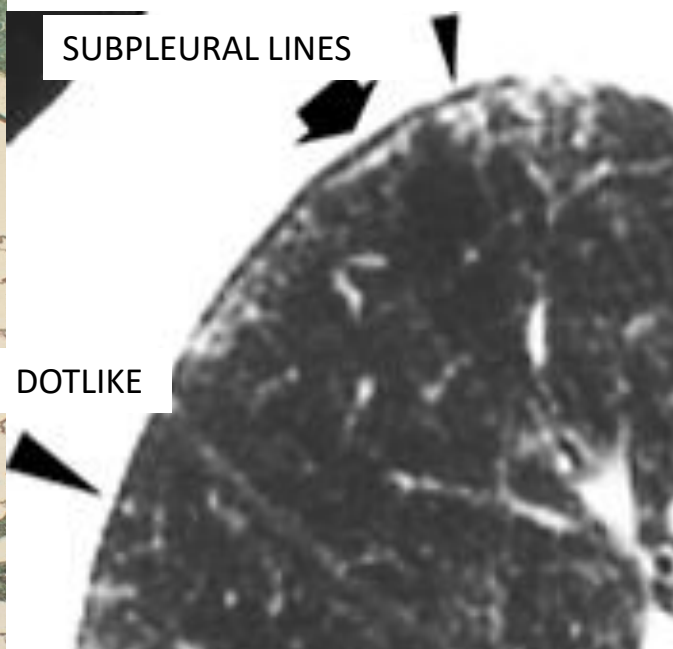
II – Alveolar collapse,
bronchiolar
obstruction

SUBPLEURAL LINES



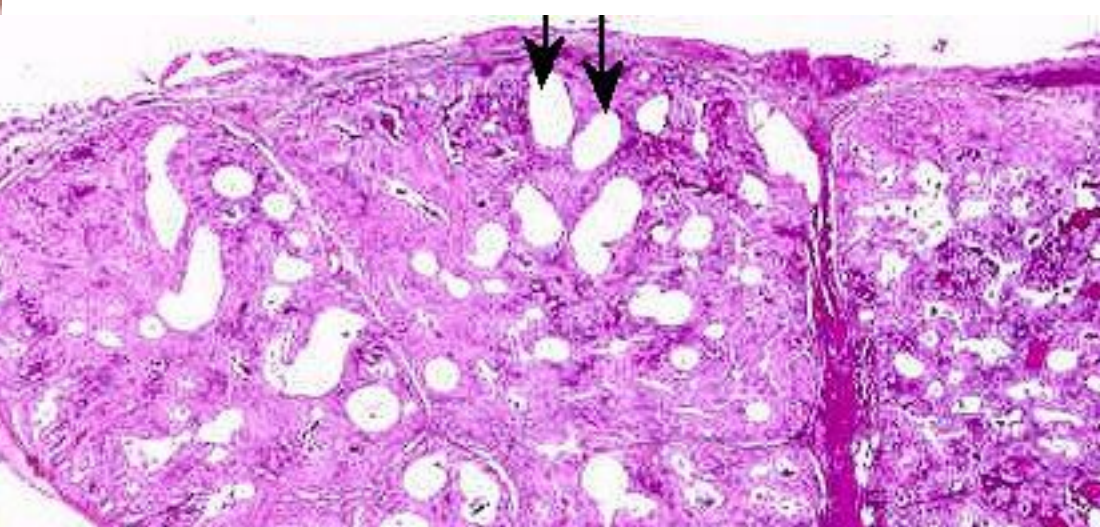
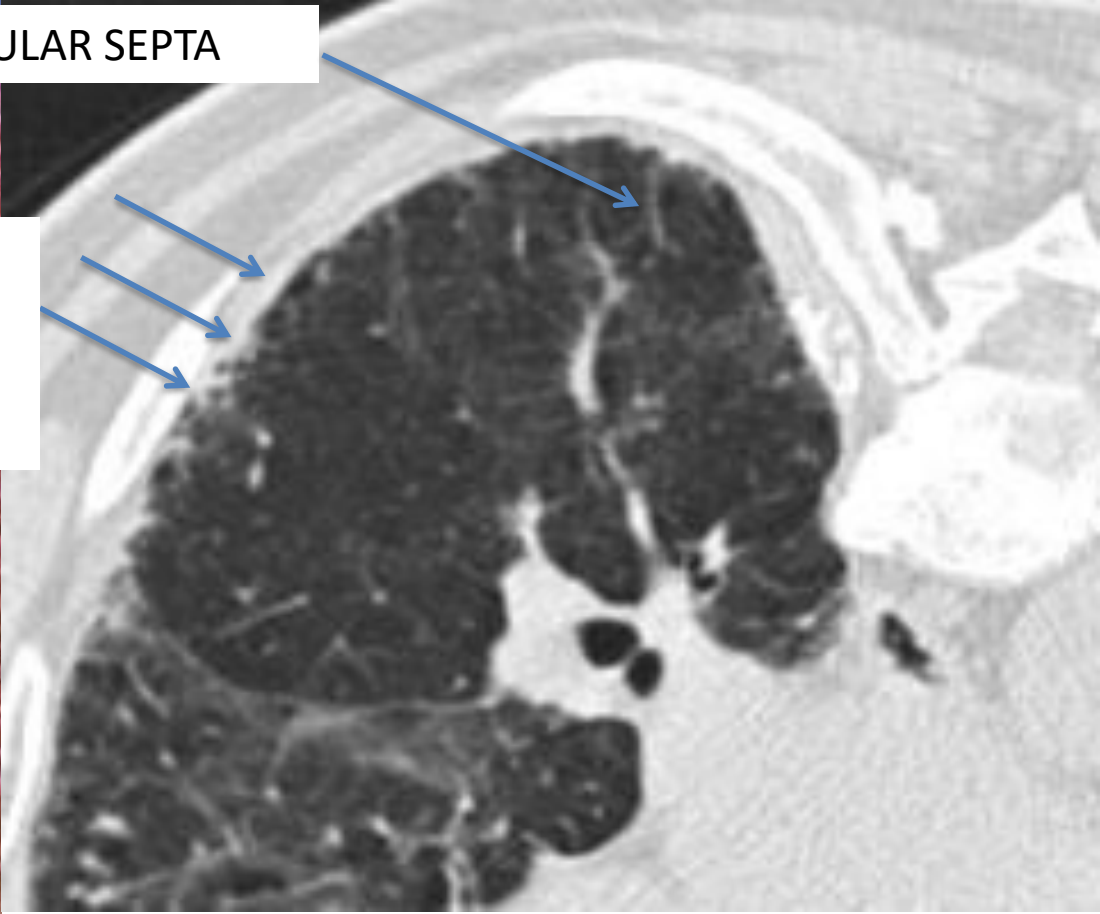
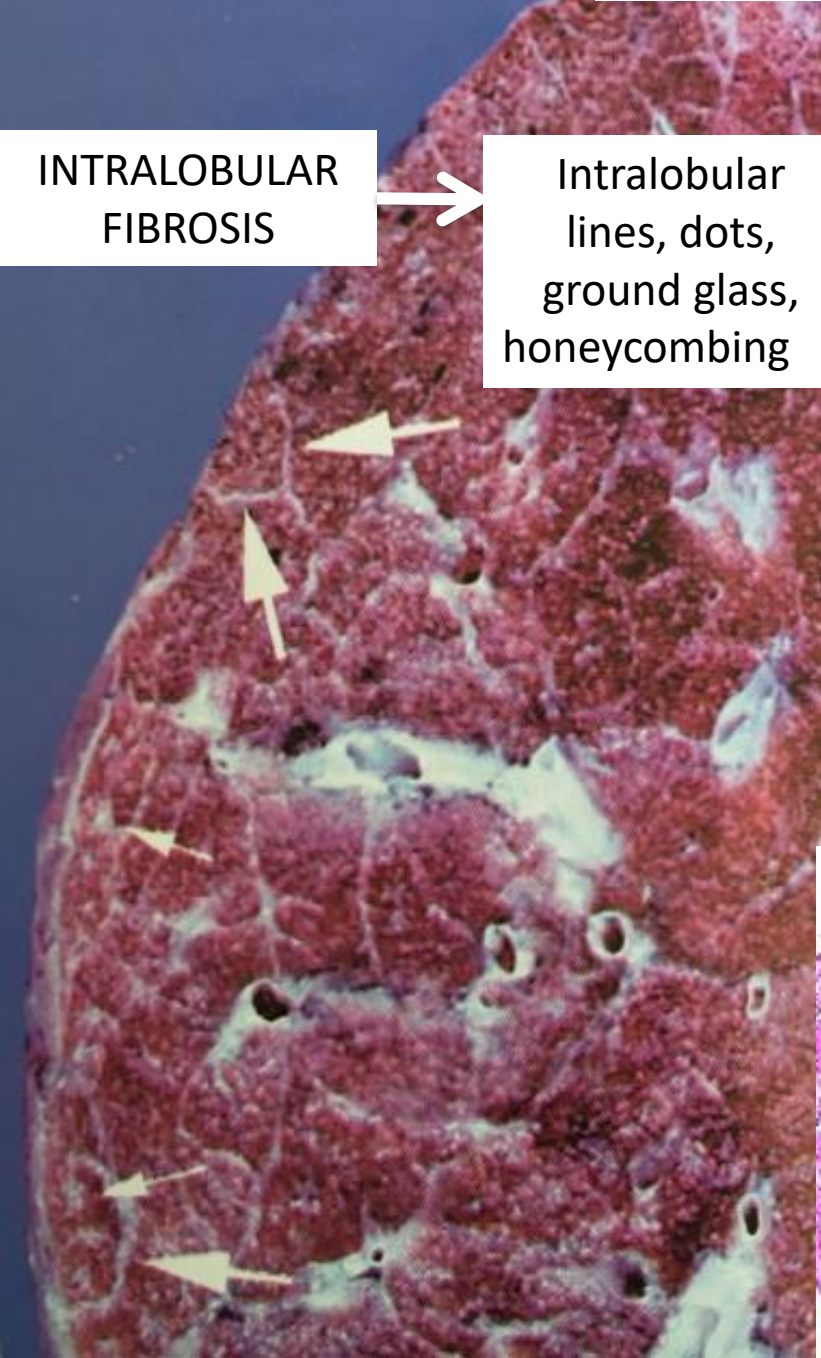
SUBPLEURAL LINES

DOTLIKE



PERILOBULAR FIBROSIS → INTERLOBULAR SEPTA

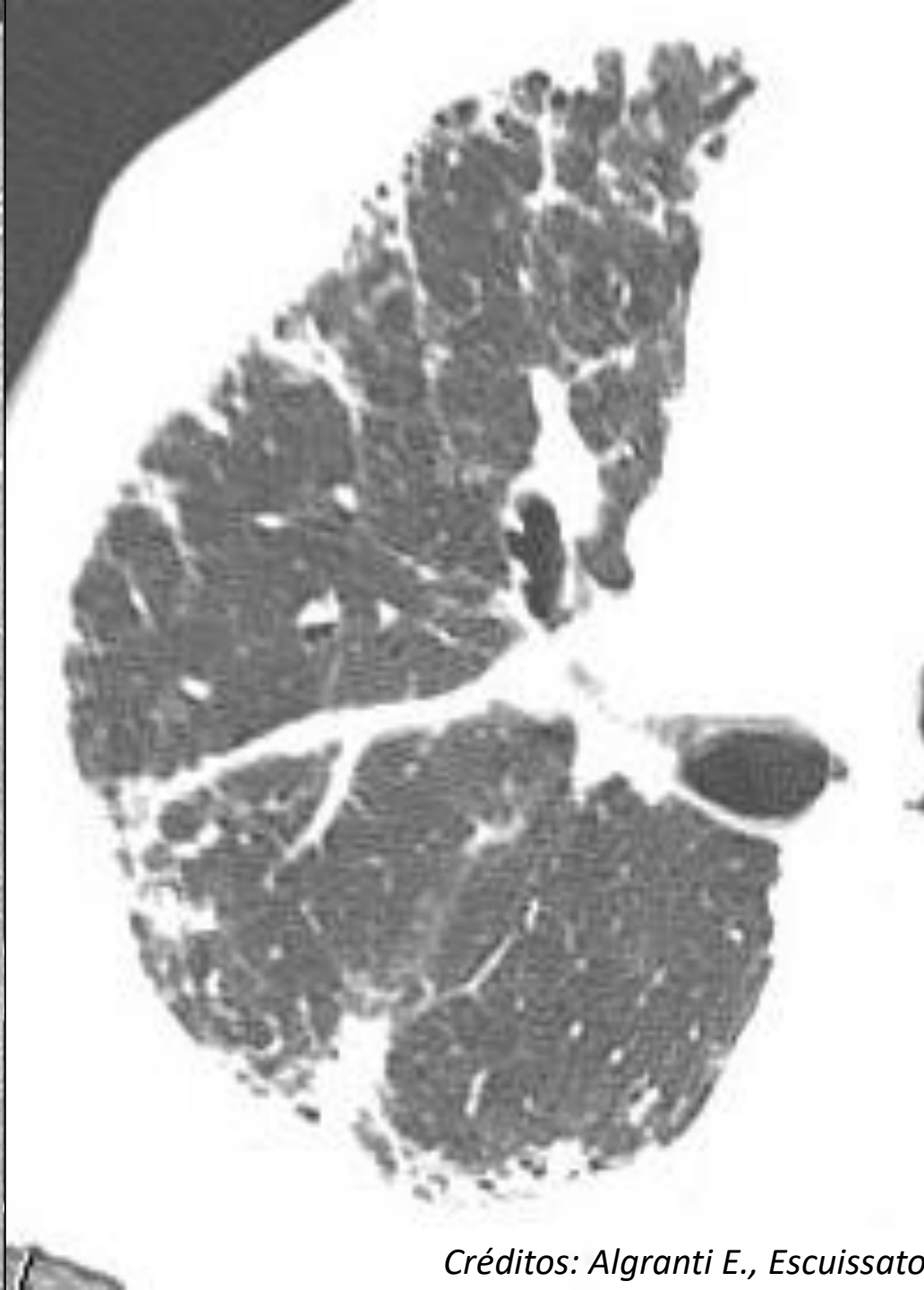
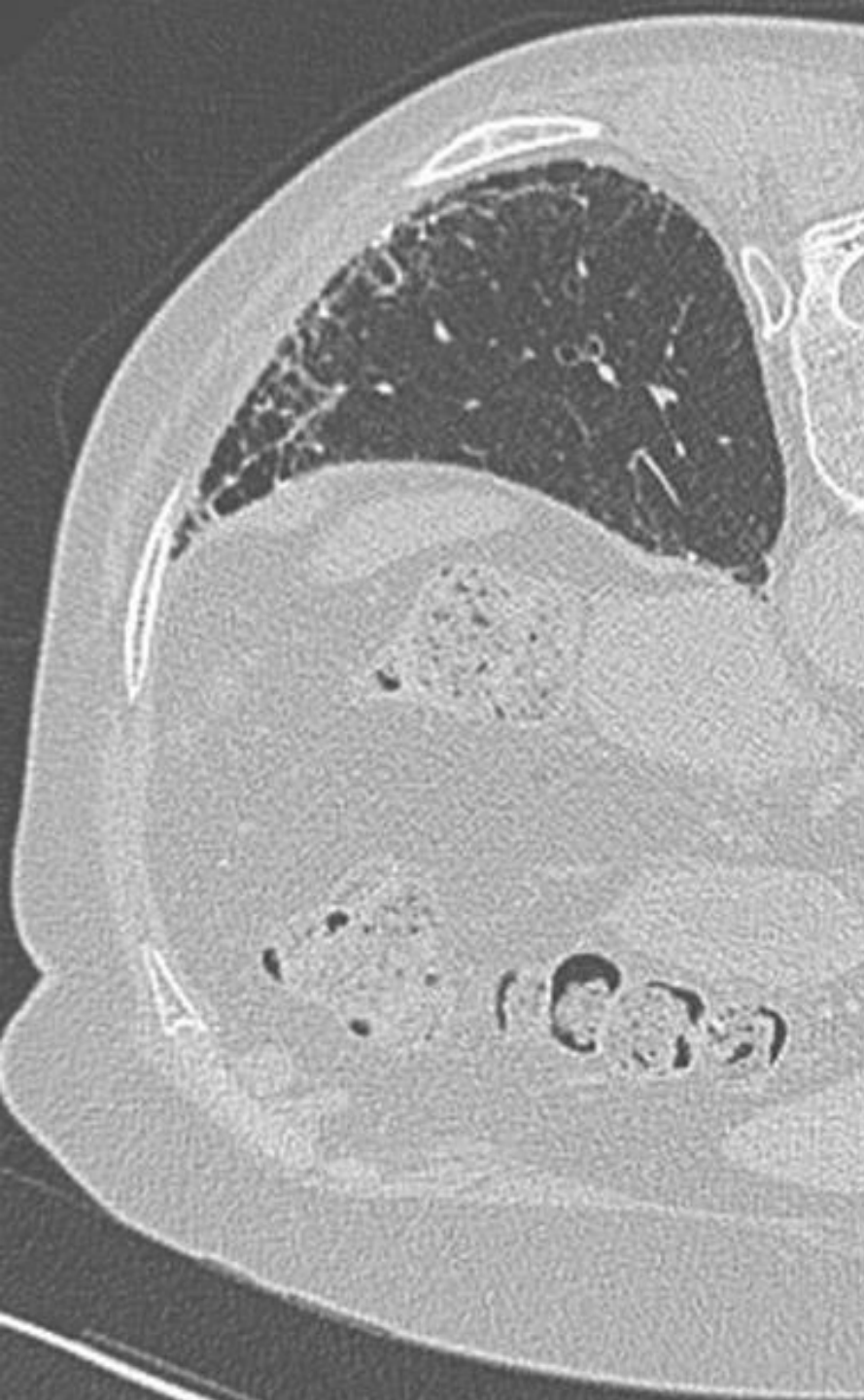
INTRALOBULAR FIBROSIS → Intralobular lines, dots, ground glass, honeycombing



When HRCT is mandatory?

- Borderline X-Ray (0/1-1/0)
- Umbalance between symptoms/PFTs and X-Ray changes
- Diffuse pleural thickening or extense areas of pleural plaques





Asbestosis – HRCT criteria

- Presence of signs of fibrosis (traction bronchiectasis, architectural distortion, honeycombing) and / or 3 or more suggestive signs - subpleural dots, intralobular lines, interlobular septa, subpleural curvilinear lines, subpleural ground glass - at two or more levels and bilateral

Gamsu G. Am J Roentgenol 1995

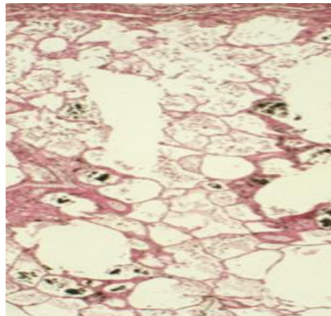
- “...We therefore recommend that the sum grade of ≥ 2 –3 bilateral irregular opacities in lower zones according to the reference film or bilateral honeycombing (sum grade ≥ 2) would be sufficient to represent fibrosis according to the ICOERD system”

Wolff H. Scand J Work Environ Med 2014

When a lung biopsy is needed?

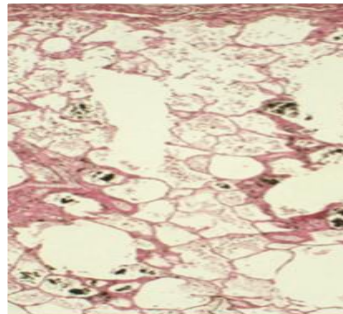
- Dissociation between occupational / environmental history and imaging findings
 - ✓ *Unclear/light exposure*
 - ✓ *Short latency*
 - ✓ *Unexpected clinical course*
- Histological and mineralogical examinations may be complementary in cases of history of non-existent or doubtful exposure

Asbestosis –histologic criteria



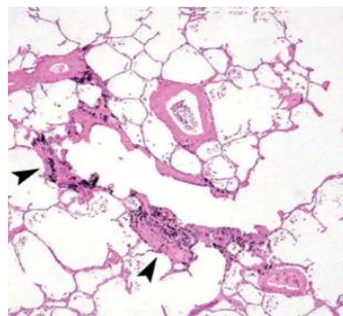
1982 – CAP-NIOSH

- Fibrosis foci in the wall of the bronchioles associated with the presence of asbestos bodies



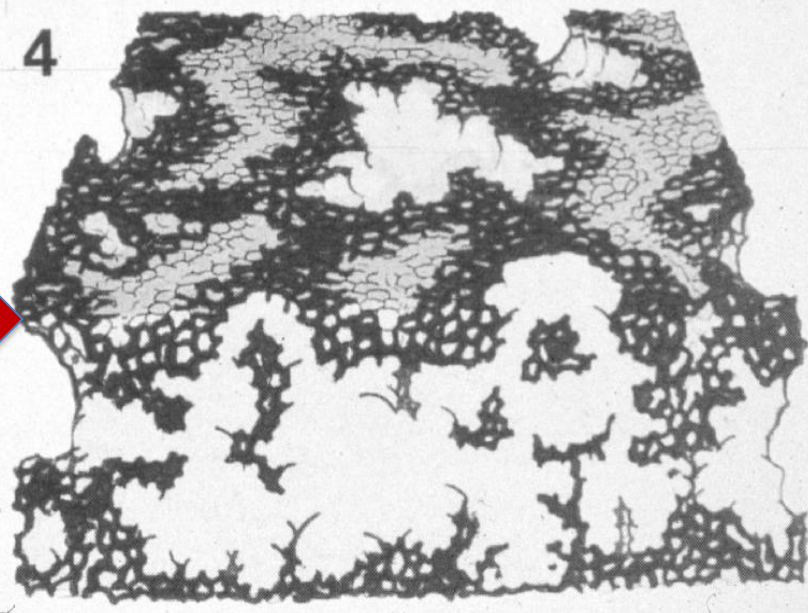
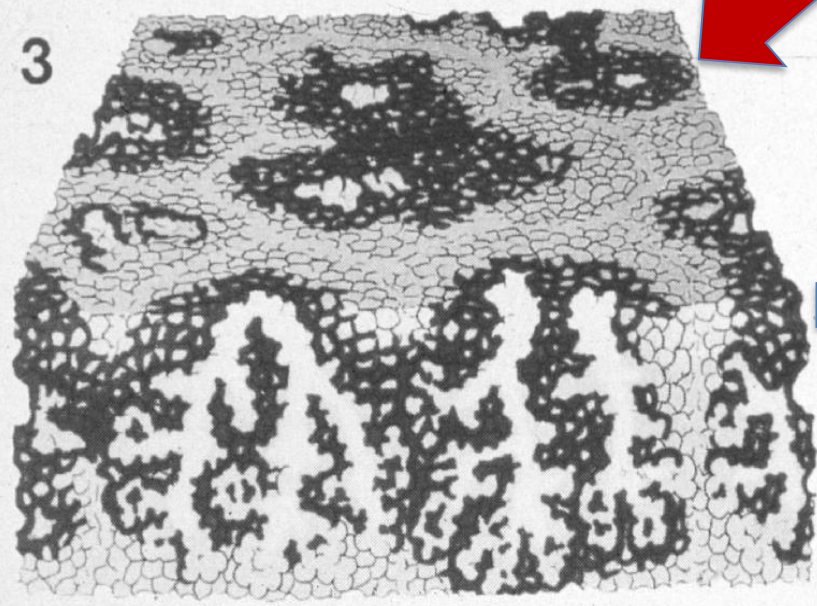
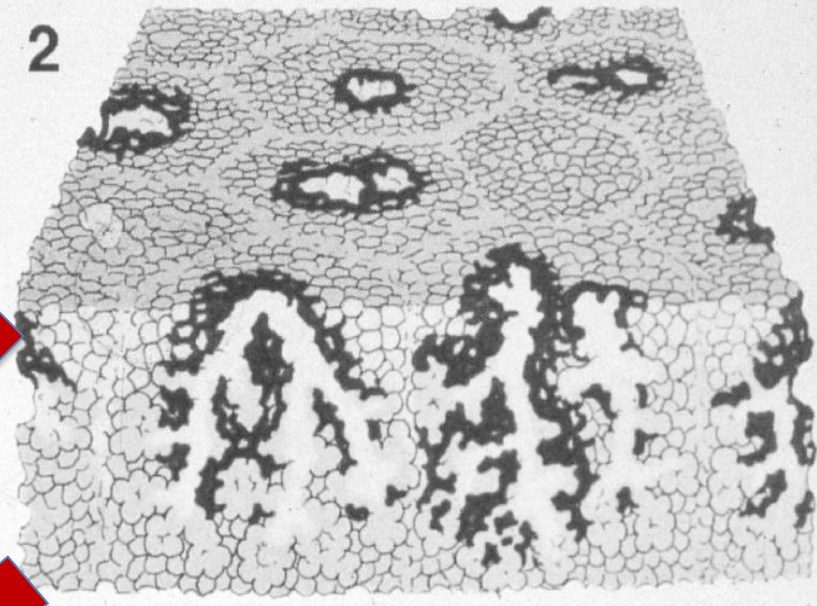
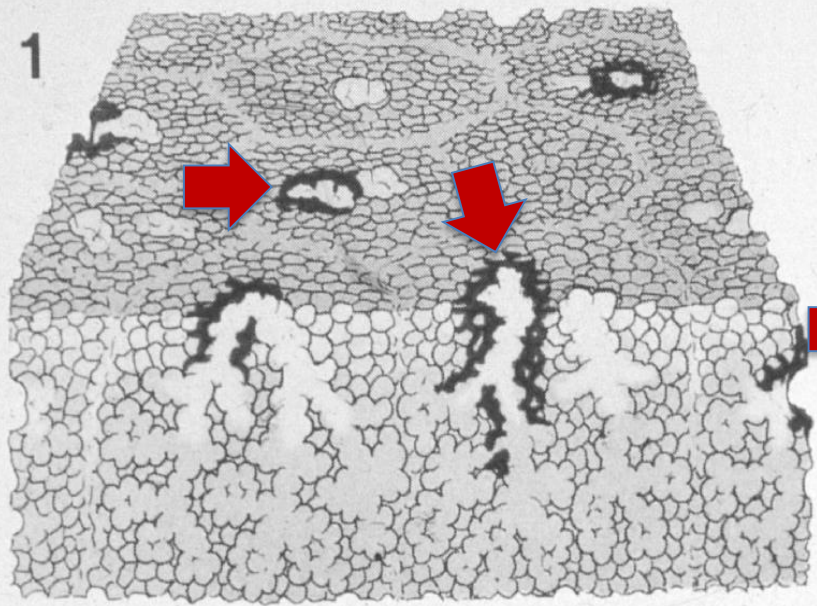
1997 - Helsinki

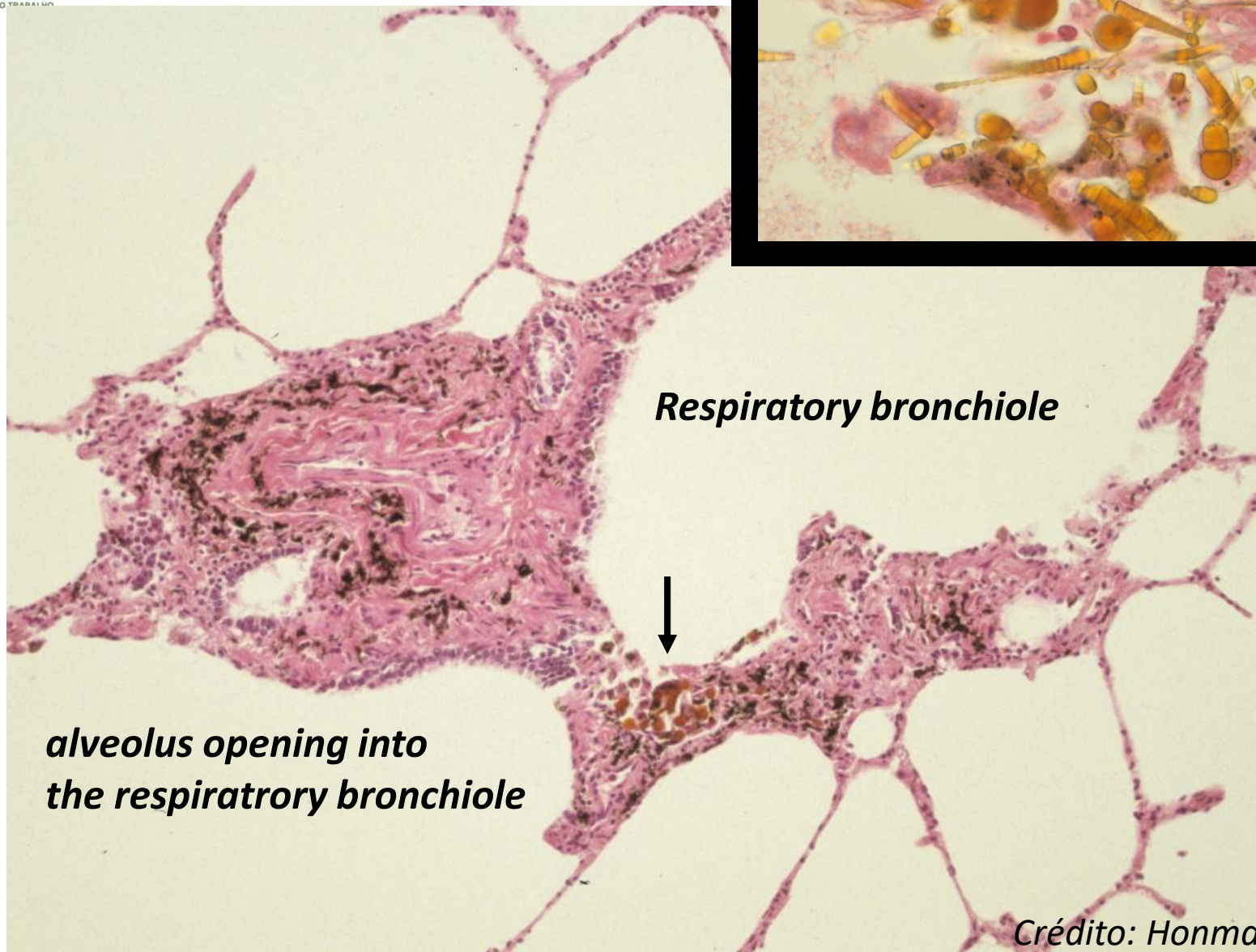
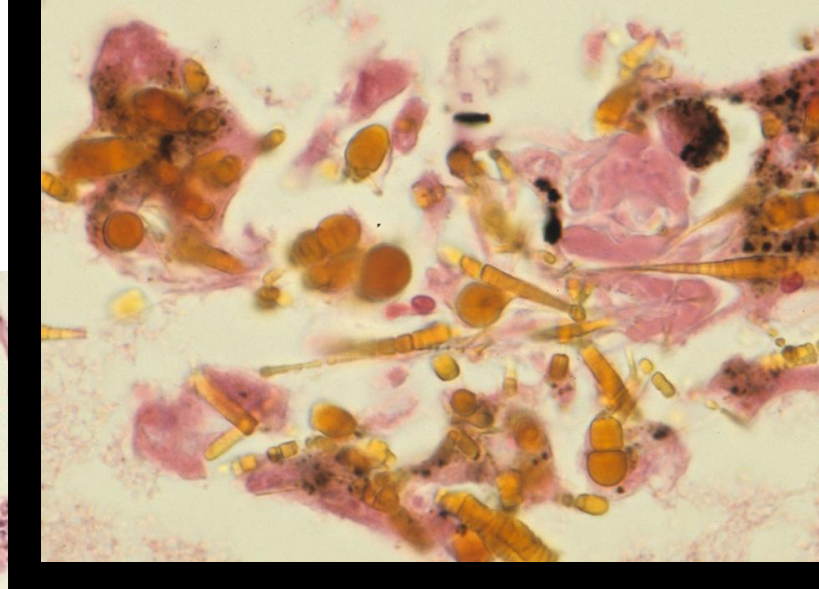
- Fibrous foci in the wall of the bronchioles associated with the presence of 2 or more asbestos bodies per cm²



2010 - CAP

- Asbestosis is defined as the presence of diffuse fibrosis of alveolar septa. When fibrosis is confined to the walls of the bronchioles, it should be interpreted as “asbestos airways disease”





Respiratory bronchiole

*alveolus opening into
the respiratory bronchiole*

- The histological diagnosis of asbestosis requires the presence of diffuse interstitial fibrosis associated with the presence of 2 or more ABs in sections of 1 cm² or a fiber count compatible with cases of asbestosis investigated by the same laboratory
- Additionally it is commented that there may be cases of asbestosis induced by chrysotile that are not accompanied by high fiber count or the presence of ABs. But this is considered speculative.

- New strategies are used by the industry challenging the diagnosis of asbestosis on the grounds of *“questionable asbestos exposure”* or that the industry *“provided respirators to workers”* or that *“differential diagnosis was not addressed”* or that *“the disease was a consequence of other risk factors”*, e. g., smoking. Industry experts try to induce the court to demand objective evidences of exposure, such as fibre counts in bronchial lavage fluids or in lung tissue biopsies

	PIU	ASBESTOSE
Distribuição	Subpleural, basal	Peribronquiolar com acentuação subpleural
Faveolamento	Comum	Apenas em casos avançados
Focos fibroblásticos	Característicos	Raros
Corpos de asbesto	Ausentes	Frequentes
Inflamação	Mínimas, tipicamente nos focos de faveolamento	Mínima
Espessamento pleural	Incomum	Comum

Histologic Feature	UIP	Asbestosis	NSIP
Distribution	Subpleural accentuation, lower lung zone	Peribronchiolar with subpleural accentuation	Diffuse
Honeycomb changes	Common	Uncommon except in advanced cases	Uncommon
Fibroblast foci	Conspicuous	Rare	Inconspicuous
Asbestos bodies	Absent	Frequent*	Absent
Inflammation	Minimal, typically localized to honeycomb foci	Minimal	Variable
Pleural fibrosis ^b	Uncommon	Common	Uncommon

Attribution criteria

- **In most cases** the occupational history revealing exposure*, associated with suggestive imaging findings and compatible latency time are sufficient for the diagnosis of asbestosis
- Differential diagnosis is required when:
 - ✓ *Doubtfull image findings*
 - ✓ *Unexpected clinical, functional and image progression*

**Structured questionnaires, JEMs, cumulative exposure*

MINISTÉRIO
DO TRABALHO



FUNDACENTRO
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Obrigada!

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