دکتر هادی اسحقی ثانی
متخصص طب کار
دانشیار دانشگاه علوم پزشکی هرمزگان

S I L I C O S I S

- Silicon dioxide, or silica, is the earth's most mineral.

- Silicosis :exposed to silica particles of respirable size (0.5–5.0 μm in diameter)


Image courtesy of Markus Schweiss

- OSHA permissible exposure limit (PEL) is 100 µg/m3 for an 8-hour work exposure.
- Bronchitis, a well-recognized effect of chronic dust inhalation, can occur with silica dust inhalation.
- Silica exposure can be associated with:

1. Autoimmune diseases :
   - Scleroderma
   - SLE
   - RA
2. Nephropathy
3. Tuberculosis
4. lung cancer

SILICA
(silicon dioxide)

FREE : 1.quartz (including granite)
2.flint
3.opal
4.diatomite.

Combined (silicates) :1.asbestos
2.talc
3.kaolin

Asbestos

$Mg_3Si_2O_5(OH)_4$

Kaolin : $Al_2Si_2O_5(OH)_4$


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Classification of silicosis

SILICOSIS
- classic
  - Simple
  - PMF
- accelerated
- acute

Miner's lung with silicosis

CLASSIC SILICOSIS

- **simple silicosis** (presenting as nodular pulmonary fibrosis with or without symptoms) to **progressive massive fibrosis** (severely disabling restrictive lung disease).

Diagnosis

There are three requirements for the diagnosis of silicosis:

1. History of silica exposure sufficient to cause illness.
2. Chest radiograph features consistent with silicosis.
3. Absence of other illnesses that mimic silicosis.

❖Other chest illnesses : rheumatoid nodules, tumor, infection, other pneumoconiosis, or sarcoidosis

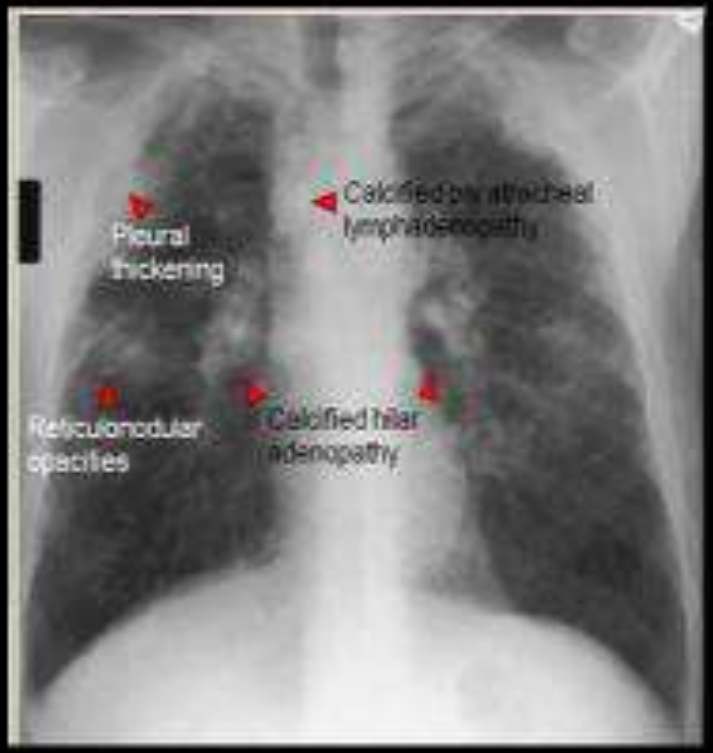
Simple silicosis

- **chronic productive cough**,

- Physical examination :coarse sounds are the result of oexisting bronchitis.

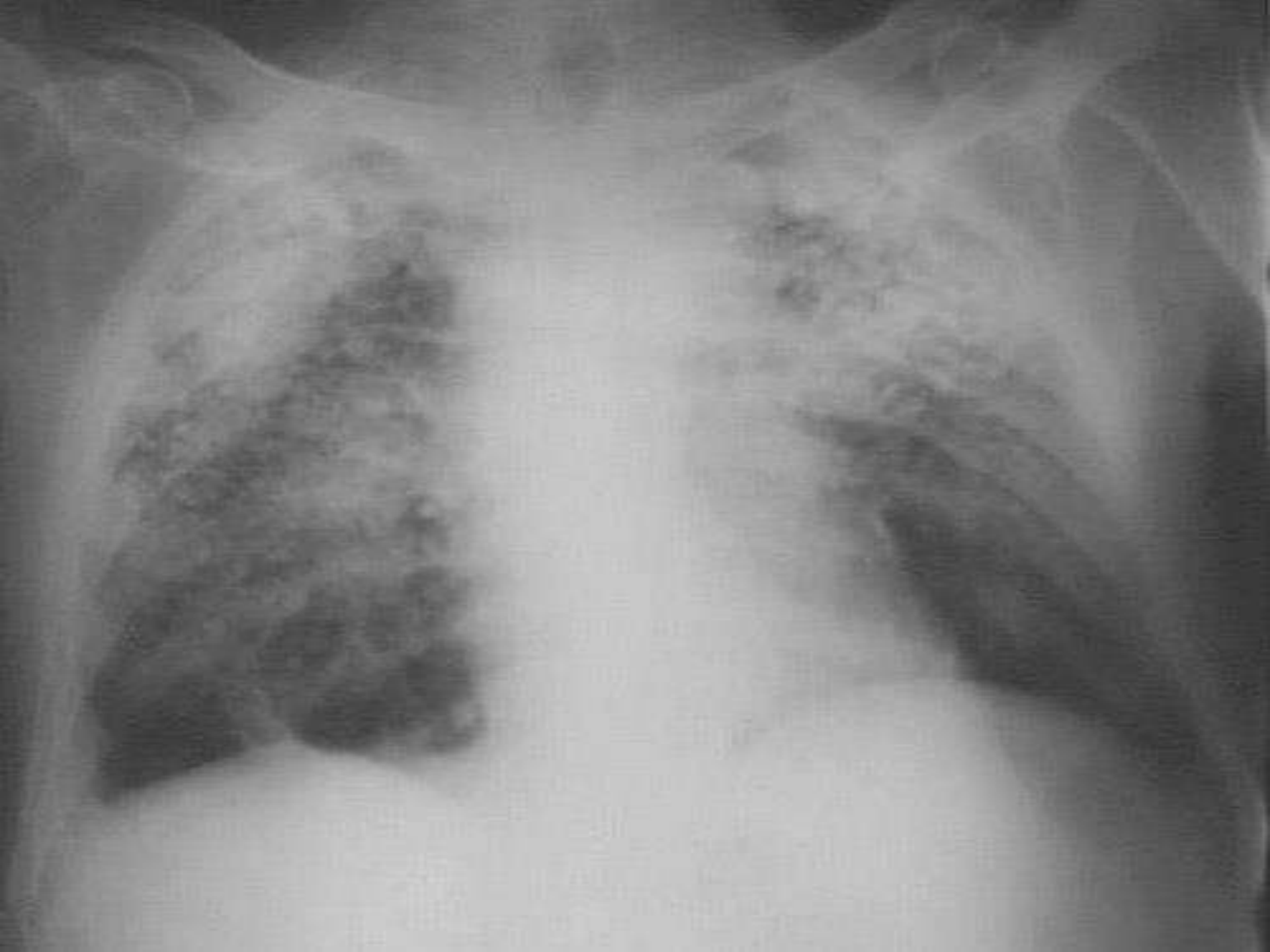
- simple silicosis typically appears as an upper zone distribution of rounded opacities less than 1 cm in diameter.

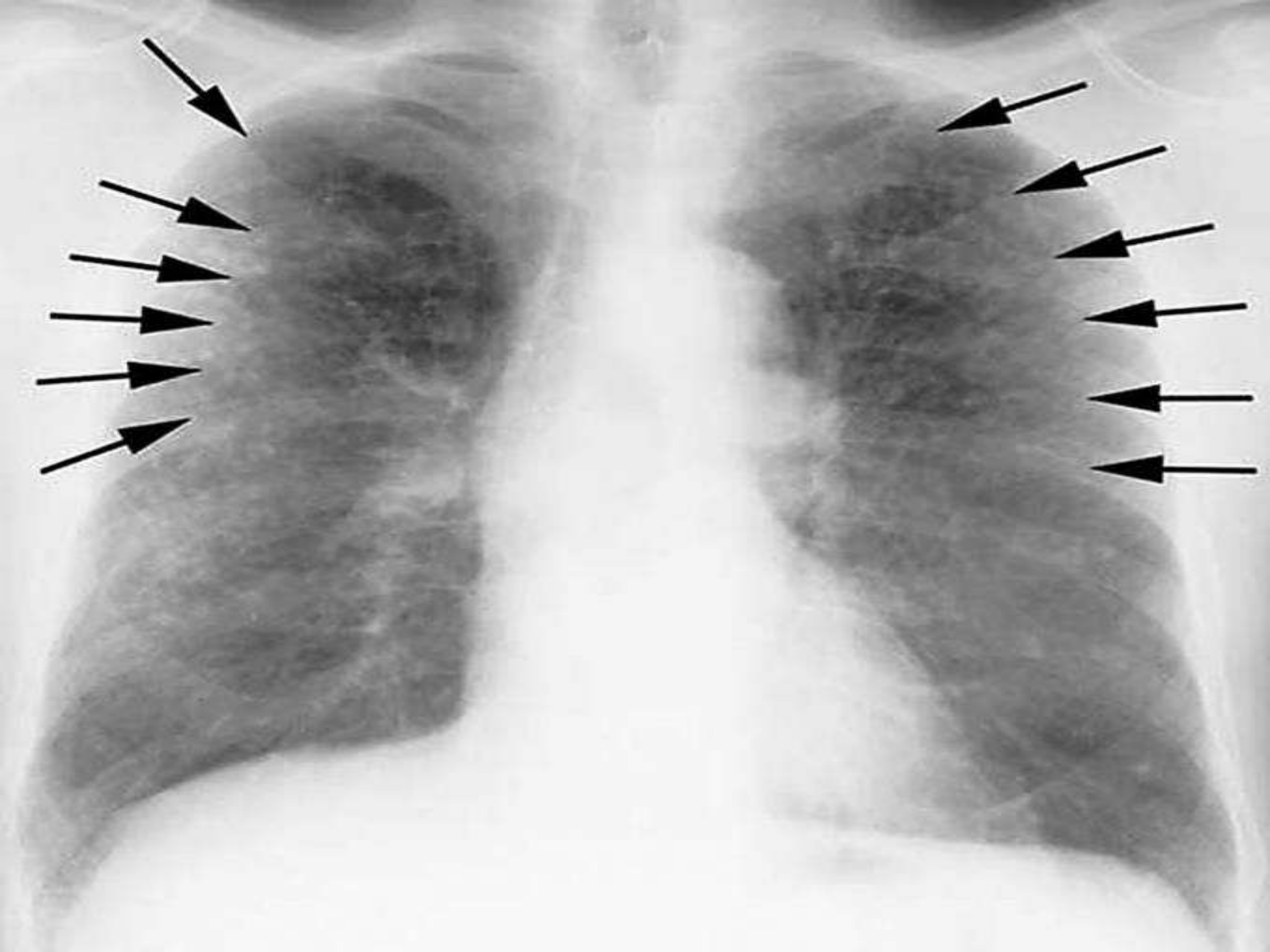

Egg shell calcification in lymph nodes

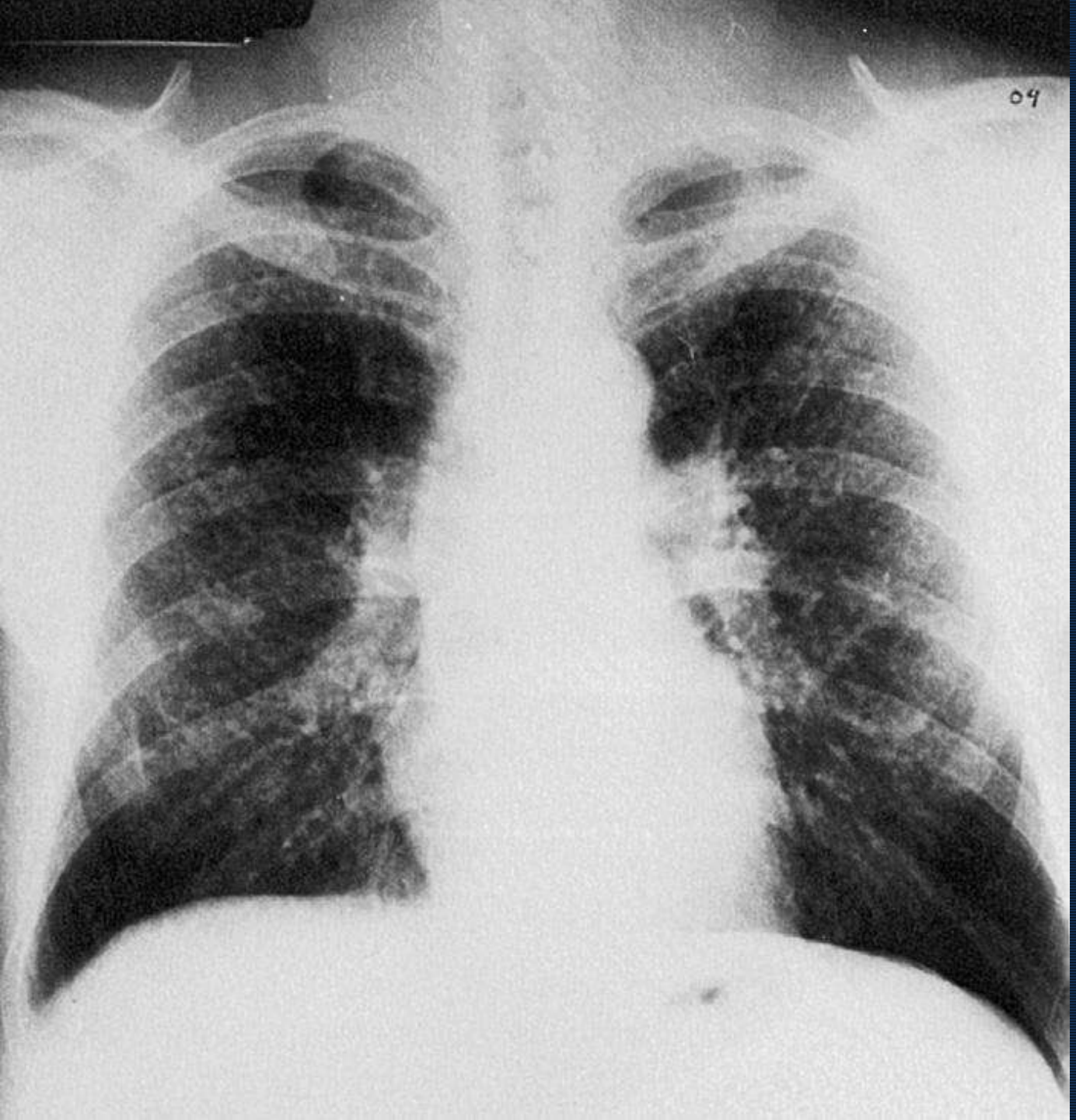

Pleural thickening
Calcified tracheal lymphadenopathy
Reticulonodular opacities
Calcified hilar adenopathy


Hilar calcification
Bilateral conglomerate masses of progressive massive fibrosis


Bilateral progressive massive fibrosis

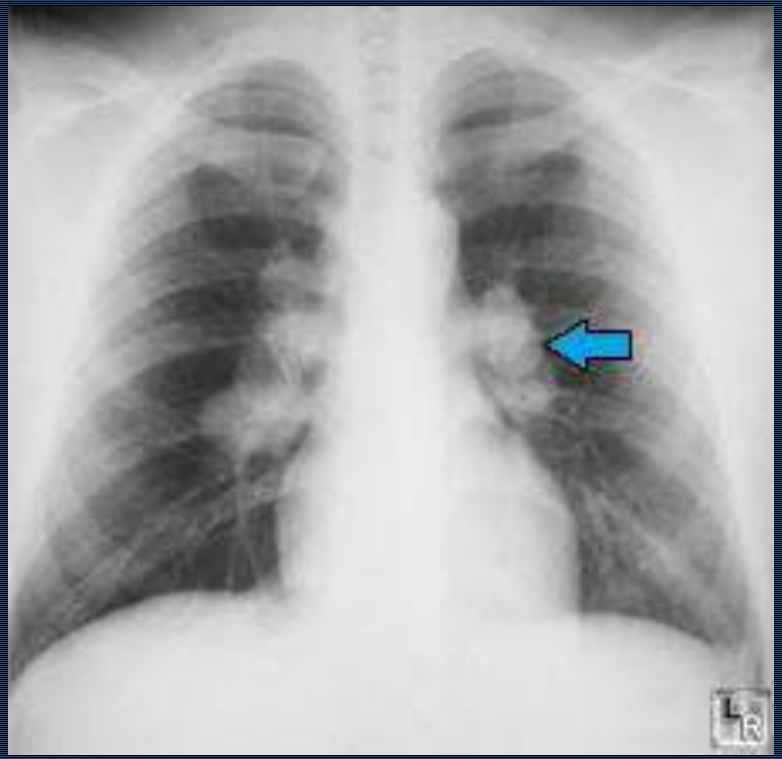


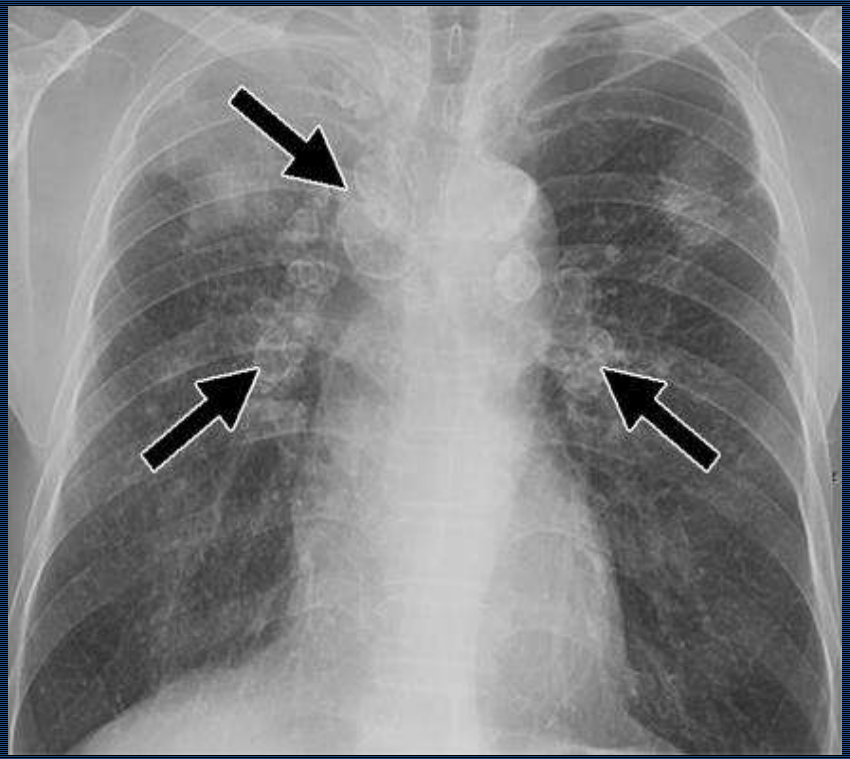


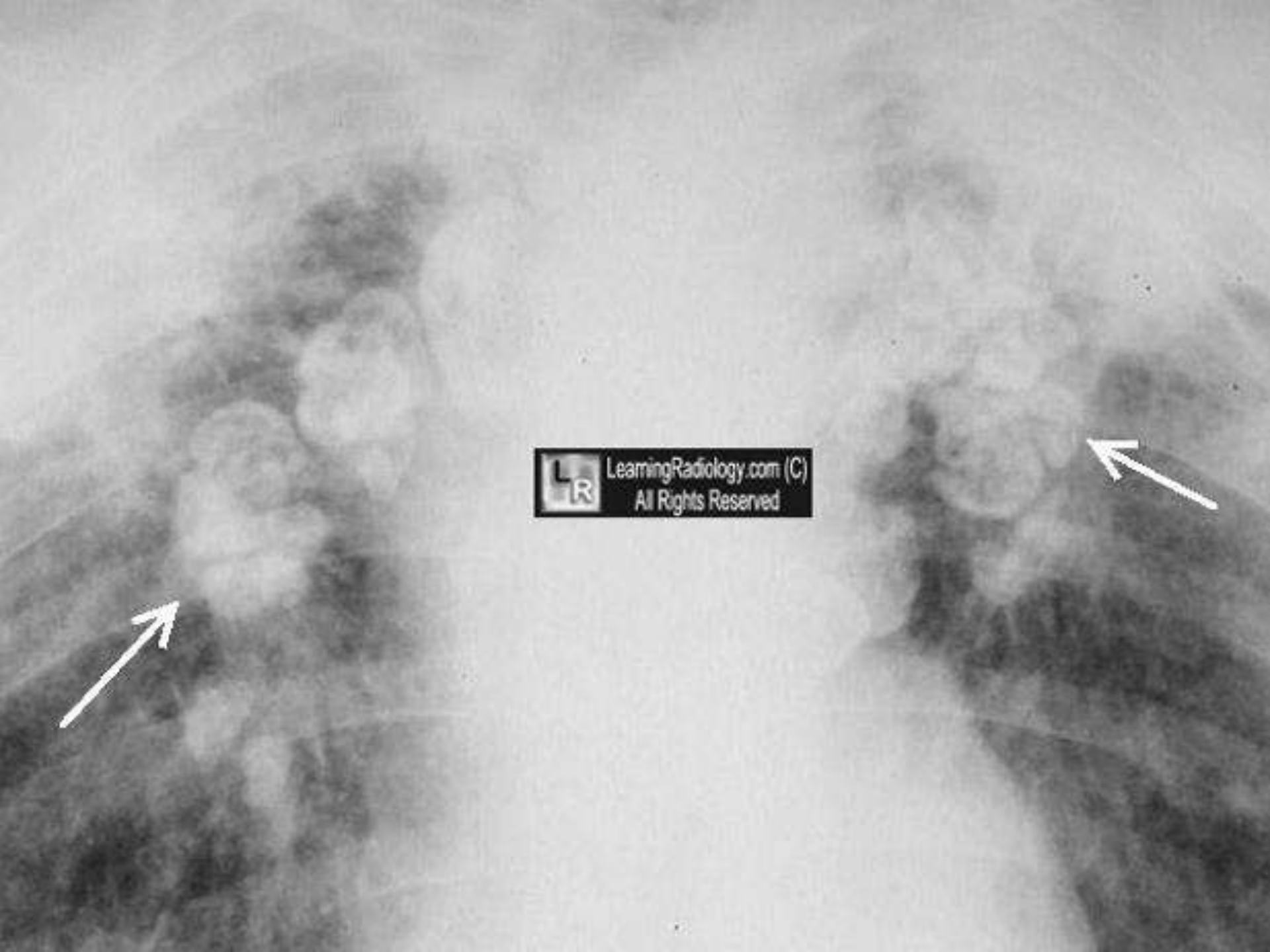


This PA chest radiograph is taken from a 24-year-old worker employed for 5 years as a bagger in the production of silica flour.
Small rounded opacities (ILO 2/2) are diffusely present in both mid- and upper zones, consistent with simple silicosis.

Hilar lymph nodes are often enlarged with a distinctive peripheral calcification, described as **eggshell calcification**.



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Progressive massive fibrosis

- Is the result of the conglomeration of small rounded opacities.
- advanced simple silicosis.

symptoms

- The respiratory symptoms :chronic productive cough

  to exertional dyspnea and, in some persons, ultimately to respiratory failure.

Physical examination

- Physical examination :demonstrates decreased breath sounds,
- the illness is extensive, signs of cor-pulmonale and impending respiratory failure.

- Crackles usually are not audible, and clubbing, if present, is attributable to another cause.


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PFT

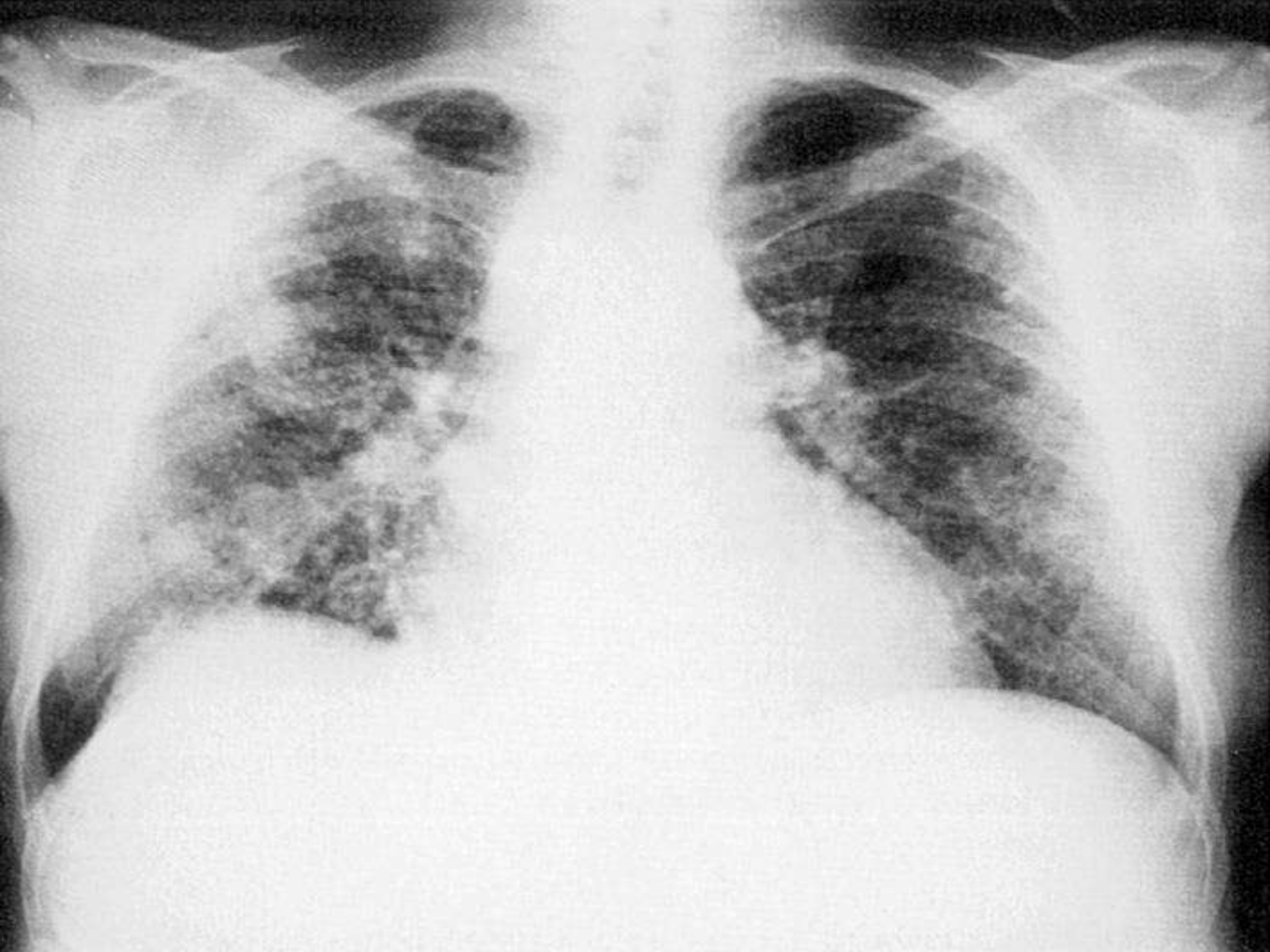
- decreases in lung volumes
- and diffusing capacity.

Case 1

Chest radiograph from a 56 year-old man

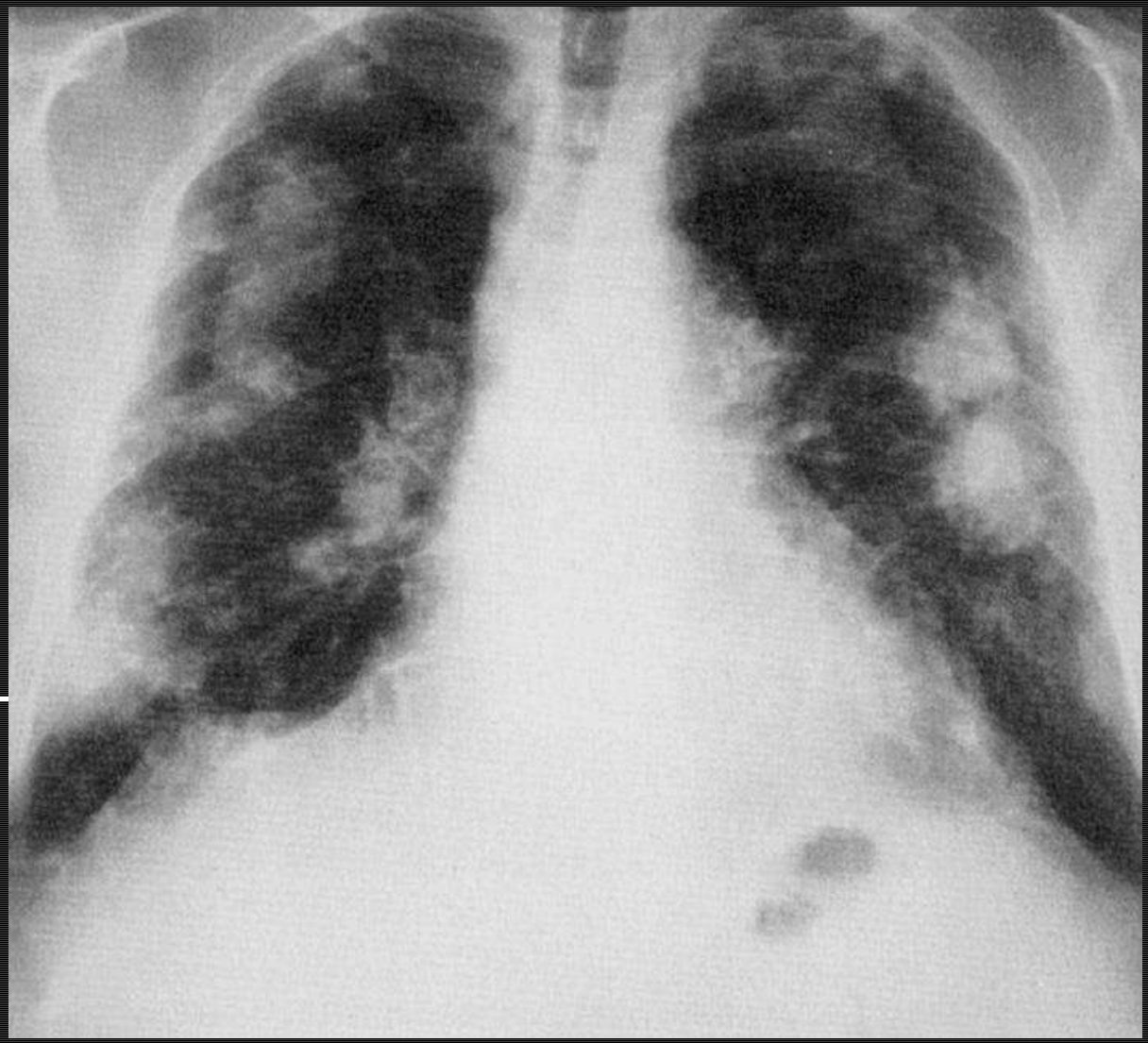
silica flour mill for 6 years.
He complained of symptoms of dyspnea and chronic bronchitis.

He had an 8-year smoking history. Spirometry showed borderline restriction. The chest radiograph showed profuse small rounded opacities and progressive massive fibrotic lesions in the right upper and mid-zones.



Case 2

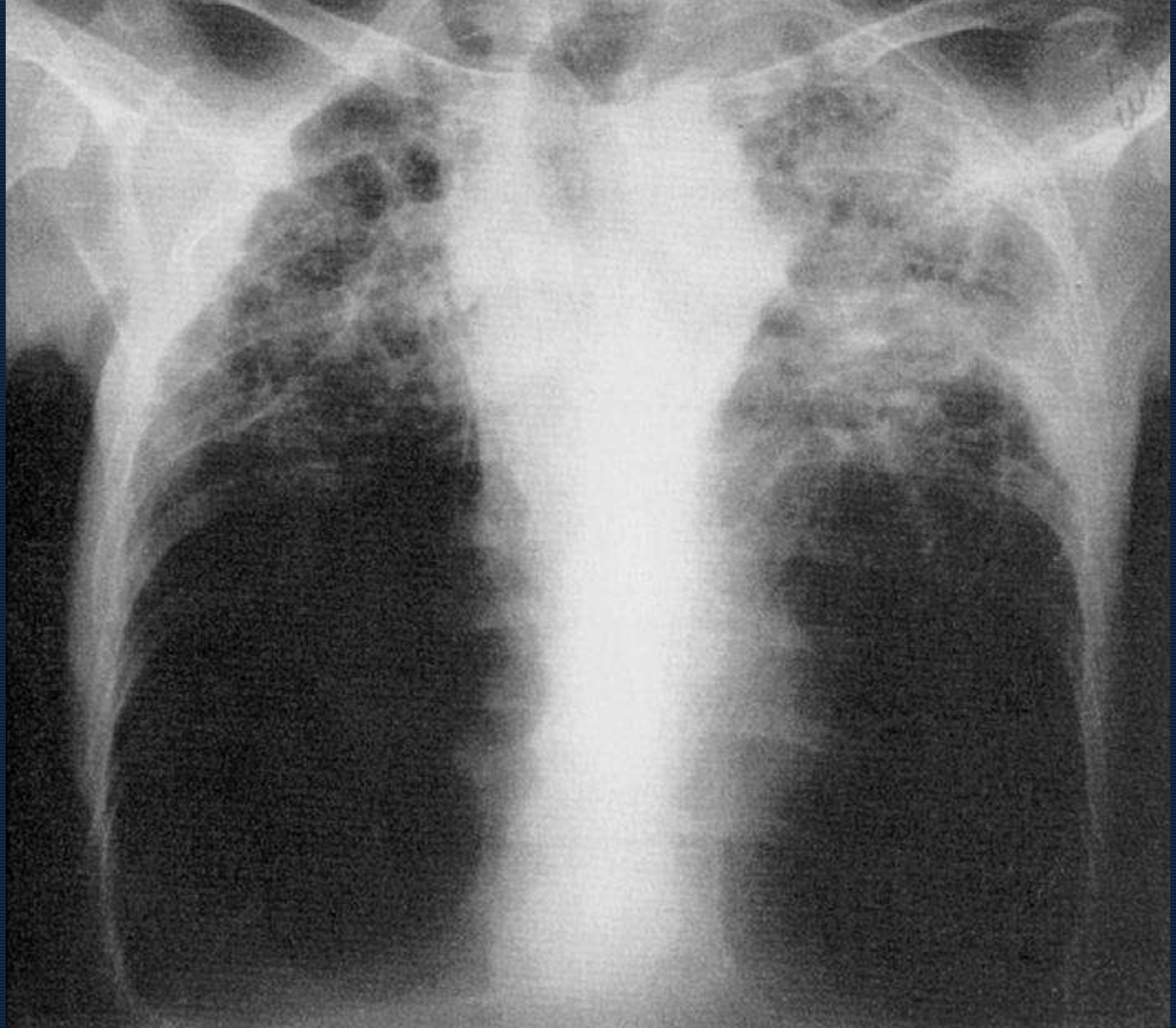
CX-Ray from a surface mine driller. smoked heavily for many years. Asymmetric bilateral upper zone progres - sive massive fibrotic lesions are present. larger and denser left-sided mass lesion raises concern of a pulmonary maligna- ncy.



Case 3

- Chest radiograph from a worker employed for many years in a glass factory with silicosis
- Investigation revealed infection with *M. tuberculosis*.

Although he responded to multiple drug therapy, he still had severe progressive massive fibrosis, extensive emphysema, and impaired function.



Accelerated silicosis

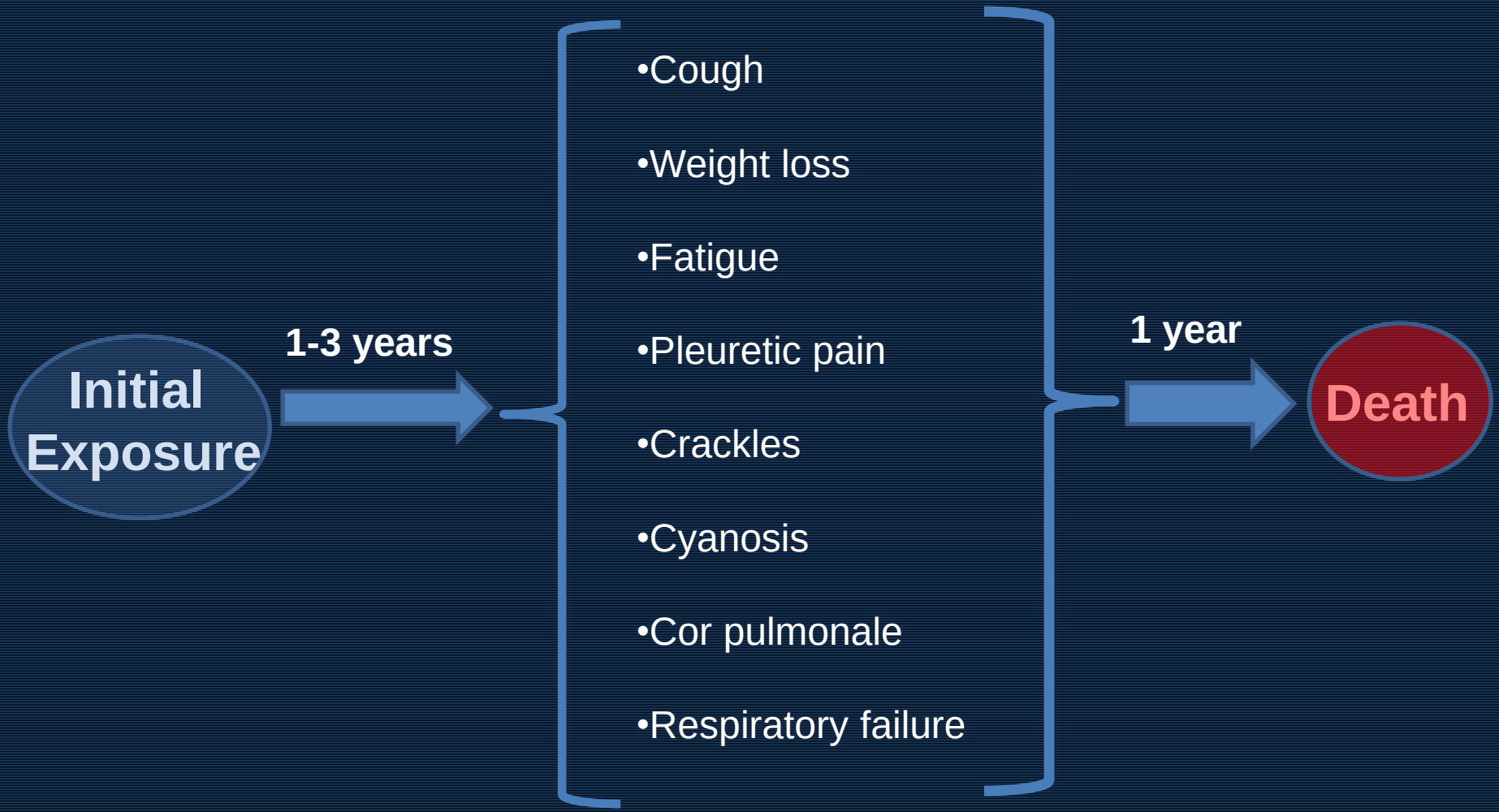
❖The chest radiograph may demonstrate rounded opacities as early as 4 years after initial silica exposure.

❖Result of exposure to grossly excessive levels of dust.

Acute silicosis

- After a short duration of exposure to a high concentrations of respirable free silica.
- The worker has a relatively rapid onset of chest symptoms and progressive respiratory impairment.
- Deaths of a large number of these workers occurred within a year after the onset of symptoms.

Acute silicosis



❖symptoms occurring less than a year after beginning sandblasting have been reported.

ASSOCIATED ILLNESSES

- Mycobacterial infections
- Carcinoma of the lung
- Connective tissue disease
- Renal (GN)

Connective tissue disease

- arthritis
- scleroderma
- rheumatoid arthritis
- musculoskeletal disease
- renal insufficiency
- workers with dust exposure and rheumatoid arthritis upper zone peripheral nodules appeared more frequently in the lungs . This presentation of rheumatoid nodules in workers with silica exposure has been termed Caplan's syndrome.

Renal & extra pulmonary involvement

- Renal disease has been attributed both to a toxic effect or silica or an immunologically mediated process.

- Silicotic lesions have also been described in the liver , spleen, bone marrow, and remote lymph nodes. (the result of lymphatic or hematogenous spread)

Prevention & management

Medical screening of silica-exposed workers is generally recommended, using

questionnaires
chest x-rays
spirometry.
And….PPD