Asbestos-Related Disorders
Pneumoconiosis

- Pulmonary Diseases
- Pneumoconioses (dusty lung)
- Non-neoplastic **reaction** of the **lungs** to inhaled mineral or organic **dust** …
Fibers
Asbestos Spray on Beams
Spraying Asbestos on Ceilings
Occupational Title Can be Uninformative

- Pipe Coverer, Insulation worker
- Millwright, boiler maker
- Fireman (may be furnace worker)
- Mixer, front end loader, welder
- Laborer – construction trades
- Bystanders
- Carry-home
Asbestosis

- One of group of “asbestos-related disorders”
- ↓ FVC; ↓ DLCO
- Can see mixed restrictive/obstructive
- Interstitial fibrosis
- Pleural scarring
- Pleural plaques
- Calcifications
- Progressive

- Asbestosis refers to interstitial fibrosis, not to pleural fibrosis with or w/o pleural thickening

- Diagnosis
  - Evidence of structural pathology consistent with asbestos-related disease (either imaging or histology)
  - Evidence of causation – history, plaques
  - Exclusion of alternative plausible causes
  - See PM E-500 §§ 17 & 18 – if not asbestosis, may still be considered an “asbestos-related disorder” p. 6, “lung fibrosis” p. 7 or “pneumoconiosis” p. 8
Chest X-ray: Asbestosis
Plate 7–2a. Parenchymal asbestosis (grade 2) fairly evenly distributed.
Plate 7–2b. Parenchymal asbestosis (grade 3), extensive distribution, shaggy heart thickened interlobar fissure, no calcification seen with Bucky, obliteration of the R costophrenic angle.
Asbestosis

Extensive fibrosis with emphysematous changes predominantly in lower lobe; great thickening of visceral, parietal, and diaphragmatic pleura.

Calcified pleural plaques and irregular densities, chiefly in lower lobes, shown on oblique roentgenogram.

Pleural plaques in pulmonary asbestosis.

Moderately advanced asbestosis with extensive fibrosis and distorted alveoli. Asbestos bodies (some fragmented) and a few asbestos fibres in airspaces and interstitium.

Asbestos bodies in sputum.
Progressive asbestosis
Pleural Plaque

Figure 9-4  A. Large, noncalcified plaques (arrowed) in a shipyard worker exposed to asbestos. In addition, scant parenchymal asbestotic lesions are present. (Courtesy of Dr. J. Lyons.) B. Close-up view of the right lower zone of chest film of another subject. A well delineated calcified pleural plaque is present on the right diaphragm.
Pleural Plaques

- Marker of Asbestos Exposure
- Marker of risk – cancer and mesothelioma
- May be associated with ↓ in PFT
Figure 9-3  The final stages of asbestosis in a shipyard worker. Both lungs show diffuse fibrotic change, obscuring the cardiac border. The heart is dilated, and clinically this patient was in cardiac failure. (Courtesy of Dr. J. Lyons.)
American Thoracic Society (ATS) on Smoking

- Smokers w/o dust exposure can have irregular opacities, but rarely as high as 1/0
- Latency – usually 20 or more years
- Duration – as little as 1 month of high level
- High intensity exposure can decrease latency
- PM E-500, Exhibit 2
Clinical Picture

- Dyspnea
- Bi-basilar rales
- Restrictive or mixed PFT
- Decreased DLCO
- Abnormal Chest x-ray
Bronchogenic Carcinoma: Adenocarcinoma

Different histologic types of bronchogenic carcinoma cannot be distinguished by gross specimen or roentgenogram alone. However, a peripherally located tumor <4 cm in diameter is most likely to be adenocarcinoma.

Small, peripherally placed tumor

Varied histology of adenocarcinoma

Tumor cells form glandlike structures with or without mucin secretion

Tumor cells may also form papillary structures
Lung Cancer

Plate 13
Bronchogenic Carcinoma: Squamous Cell Type

Low-power section (H and E stain) showing nests of tumor cells separated by fibrous bands. Keratin (horn) pearls present

High-power section showing nuclear pleomorphism and individual cell keratinization (pink)

Tumor usually located near hilus, projecting into bronchus

Bronchoscopic view

Cytologic smear from sputum or bronchoscopic scraping showing cells with dark nuclei and cytoplasm strongly pink because of keratin
X-ray w/possible lung cancer
Serosal Membranes

- **Pleura**
  - single layer of mesothelial cells
  - resting on connective tissue

- **Visceral Pleura** – covers lung
- **Parietal Pleura** – lines chest wall
Tumors of Serosa

- Diffuse Malignant Mesothelioma
  - Pleura
  - Also peritonium, pericardium & Tunica vaginalis testis

- Usually aggressive, multifocal
- Survival from Dx 8-18 months
Mesothelioma – Pleural

- Pain, SOB, Cough, Insidious
- 4-6 mo later – pleural effusion, weight loss, increasing pain,
- Misdiagnosed as
  - Cardiac, GB
  - Shoulder pain
  - Meso can be confused with metastatic lung, prostate, pancreatic, breast ca.
- Pleural tumors can be metastatic from lung, prostate, kidney, pancreas, breast (females)
Mesothelioma in the Pleura

Plate 14

Mesothelioma of Pleura
Neoplastic growth associated with asbestosis encasing right lung, infiltrating interlobar fissure, and invading parietal pleura and pericardium. Hemorrhagic fluid in remainder of pleural cavity.

Fibrosarcomatous type of tumor
Epithelial cell type of tumor
Mottled shadow over right lung, with effusion. In advanced cases, lung may be totally obscured.
Asbestosis to Mesothelioma

Plate 10-1d. Asbestosis alone, June 1964; mesothelioma, August 1965; died 1966. Asbestos worker for 31 years, started work 38 years before death.
The Lining of pleura/perit
Peritoneal Meso

- Ascites
- Localized Masses – outside bowel
- Often does not obstruction bowel
- Diagnosed late stage
- Survival usually shorter than pleural
Navy Pilot w/abd Meso
Gross Specimen of Pleural Thickening
Gross Specimen
Wide Spectrum

- Localized plaques
- Limited pleural thickening
- Extensive pleural thickening
- Case example:
  - Question to DMC – Asbestosis?
  - Opinion: No, only pleural disease.
  - Disposition? Hint – PM E-500 § 17 b. (3) (a)
Lung Cancer
Multifocal Spread
### Table 8

Comparison of Age-Standardized Death Rates* for Lung Cancer in Asbestos Workers and in Males not Occupationally Exposed, Tabulated according to smoking habits.

<table>
<thead>
<tr>
<th>Smoking Habits</th>
<th>Asbestos Workers</th>
<th>Unexposed Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never smoked regularly</td>
<td>58.4</td>
<td>11.3</td>
</tr>
<tr>
<td>Regular cigarette smokers</td>
<td>601.6</td>
<td>122.6</td>
</tr>
</tbody>
</table>

*Per 100,000 man-years
What we covered

- What key conditions are called pneumoconioses
- The benign and malignant asbestos related disorders
- The significance of pleural plaques and pleural thickening
- That mesotheliomas can occur in the chest or abdomen
- The concepts of latency and synergy
Questions