Approach to lung opacities

- This is hard!
- You will not be an expert today
- Approach
- Practice
- Think like a pathologist
Categories of lung opacities

• 1. Consolidation

• 2. Interstitial

• 3. Airways

• 4. Other
Airways

Not applicable
Consolidation

- Confluent opacity
- Fluffy around periphery
- Air bronchograms
- Lack of volume loss

Confluent opacity, no volume loss
Air bronchograms

Consolidation

- Acute vs. chronic symptoms
- Distribution
- Acuity of changes
- Differential diagnosis in acute setting
  - Edema
  - Acute lung injury
  - Infection
Invasive mucinous adenocarcinoma
Comparison

Signs of atelectasis: volume loss

- Fissure displacement
- Deviation of mediastinal structures
- Elevated diaphragm
Interstitial opacities

Nodules

Lines
Nodules: diff dx

- Hematogenous spread
  - Miliary tuberculosis
  - Miliary fungal infection (e.g. cocci)
  - Metastases
- Lymphatic spread
  - Sarcoidosis
  - Lymphangitic spread of tumor
  - Pneumoconioses (e.g. silica)

Histoplasmosis
Miliary tuberculosis

Interstitial: lines
Causes of interstitial lines

- Edema
  Kerley-b lines may be present

- Malignancy

- Fibrotic lung diseases (this is a long list)
  These lines are typically thick, wavy and irregular

Linear opacities
Pulmonary edema (kerley-b lines)

Edema: alveolar + interstitial
Reticular opacities (distribution)

- Mid-lower lobe predominant
  - Idiopathic pulmonary fibrosis
  - Connective tissue disease
  - Drugs
  - Asbestosis
  - Hypersensitivity pneumonitis
- Upper lobe predominant
  - Sarcoidosis
  - Prior TB/fungus
  - Pneumoconioses
Idiopathic pulmonary fibrosis

Hypersensitivity pneumonitis
Airways disease

- Circular
- Tubular
Differential diagnosis of airways disease

• Mild:
  – Asthma
  – Viral infection
  – Chronic bronchitis
  – Etc.

• Severe:
  – Bronchiolitis obliterans
  – Immunodeficiency
  – Ciliary dyskinesia
  – Cystic fibrosis
  – ABPA
  – Tuberculosis
  – Cartilage diseases

Cystic fibrosis
Which compartment of lung is affected?

Solitary pulmonary nodule: differential diagnosis

- Granuloma
- Hamartoma
- Primary bronchogenic carcinoma
- Metastasis
- Lots of others
### Nodules: benign vs. malignant

<table>
<thead>
<tr>
<th></th>
<th>Benign</th>
<th>Malignant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Small size</td>
<td>Large size</td>
</tr>
<tr>
<td>Border</td>
<td>Smooth border</td>
<td>Spiculated border</td>
</tr>
<tr>
<td>Calcification</td>
<td>Diffuse calcification</td>
<td>No or irregular calcification</td>
</tr>
<tr>
<td>Stability over time</td>
<td>Stability over time</td>
<td>Growth over time</td>
</tr>
</tbody>
</table>
So you see a nodule on CXR…

- 1. Is it actually a nodule?
Shallow obliques

? nodule
So you see a nodule on CXR…

- 1. Is it actually a nodule?
- 2. Look for prior films?
- 3. Is diffuse calcification present?
So you see a nodule on CXR…

• 1. Is it actually a nodule?

• 2. Look for prior films?

• 3. Is diffuse calcification present?

• 4. Get a CT scan or a follow-up CXR
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>CXR features</th>
<th>Common causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alveolar</td>
<td></td>
<td>• Confluent opacities • Air bronchograms • Fluffy edges</td>
<td>• Edema • Acute lung injury • Infection</td>
</tr>
<tr>
<td>Interstitial</td>
<td>Nodules</td>
<td>• Small, well-defined nodules • Opacities not confluent • Normal lung between nodules</td>
<td>• Tuberculosis • Fungal infection • Metastases • Sarcoidosis</td>
</tr>
<tr>
<td>Interstitial</td>
<td>Lines (kerley-b)</td>
<td>• Thin, fine, delicate lines • Lines at periphery of lung (kerley-b)</td>
<td>• Pulmonary edema • Cancer</td>
</tr>
<tr>
<td>Interstitial</td>
<td>Lines (reticular)</td>
<td>• Thick, wavy, irregular lines</td>
<td>• Fibrotic lung disease</td>
</tr>
<tr>
<td>Airways</td>
<td></td>
<td>• Circular or tubular • Thin or thick walled</td>
<td>• Numerous causes</td>
</tr>
<tr>
<td>Not in a single compartment</td>
<td></td>
<td>• One or a few nodules (≤3 cm) or masses (&gt;3 cm)</td>
<td>• Lung cancer • Metastasis • Granuloma • Hamartoma</td>
</tr>
</tbody>
</table>

Not all cases are straightforward
Well-defined: interstitial

Ill-defined: alveolar

Extensive nodules: interstitial
Peribronchial cuffing: interstitial

Airways: circles and tubes
Algorithmic Approach to Lung Opacities

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