Anatomy & Common Diseases of the Thorax
Topics

1. Basics of CT (density, windows, etc.)

2. Thoracic CT anatomy

3. Evaluation of lung cancer

4. Emergent findings on CT
CT is all about density

<table>
<thead>
<tr>
<th>Substance</th>
<th>Density (HU)</th>
<th>Appearance</th>
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</thead>
<tbody>
<tr>
<td>Air</td>
<td>-1000</td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td>-50</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Soft tissue</td>
<td>+30 to +60</td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>More to follow</td>
<td></td>
</tr>
<tr>
<td>Bone</td>
<td>+1000</td>
<td></td>
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</tbody>
</table>
CT density of blood over time
Rib fracture with hematoma
Basics of chest CT

- Spiral scanning (lower neck through adrenals)
- Parameters
  - 120 kVp
  - Pitch 1.0-1.5
  - Automatic mA adjustment
- Intravenous contrast
  - 3 cc/sec, 120 cc
  - 350 mg/ml Omnipaque
- Reconstruct images @ any thickness
  - Standard: 5.0/2.5 mm
  - Can obtain < 1 mm reconstructions
Indications for contrast

- Evaluation of hilar structures
- Evaluation of mediastinal structures
- Pleural disease
- Lobar collapse
- Pulmonary embolism
- Aortic dissection
- Coronary CT angiography
Pleural metastases
## Window level and width

<table>
<thead>
<tr>
<th></th>
<th>Level</th>
<th>Width</th>
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<tbody>
<tr>
<td>Lung</td>
<td>-600</td>
<td>1500</td>
</tr>
<tr>
<td>Mediastinum</td>
<td>0</td>
<td>300</td>
</tr>
<tr>
<td>Bone</td>
<td>500</td>
<td>2000</td>
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</tbody>
</table>
Windows

Mediastinum  Lung  Bone
Thoracic Compartments
Lungs
Mediastinal Anatomy
Diagnosis?
Tips for identifying anatomy

Dense contrast in SVC + right atrium

Pulmonary artery: inverted Y

Axis of heart: right chambers anterior, left chambers posterior

Right chambers

Left chambers

Thick muscle: left ventricle
Pulmonary Embolism
Aortic Dissection
Lung Anatomy
Bronchogenic carcinoma
CT Lobar Anatomy

Lingula

LUL

LLL

Left Lung
Lobar Anatomy

Right Lung

- RUL
- RML
- RLL

Right Lung
CT Lobar Anatomy

RUL

RML

RLL
CT Lobar Anatomy

RUL

RML

RLL
CT Lobar Anatomy
Trachea
Segments (right)

- RUL-apical
- RUL-posterior
- RUL-anterior
- RML-lateral
- RML-medial
- RLL-posterior
- RLL-lateral
- RLL-superior
- RLL-medial
Segments (left)

- LUL-apicoposterior
- LUL-lateral
- LUL-lingular
- LUL-main
- LLL-posterior
- LLL-lateral
- LLL-main
- LLL-superior
- LLL-anteromedial
Evaluation of lung cancer
Lung cancer evaluation

1. Primary tumor
   - Location
   - Invasion of adjacent structures

2. Lymph nodes

3. Distant metastases (e.g. adrenals)
Lung CA: paratracheal, subcarinal, supraclavicular LAD
Lung CA with mediastinal invasion
Adenocarcinoma with malignant pleural effusion
Lung cancer with subclavian artery invasion
Emergent findings
Pneumothorax

- Air between visceral and parietal pleura
- Causes
  - High airway pressures (e.g. intubation, asthma)
  - Trauma
  - Iatrogenic (s/p thoracentesis)
  - Cavitary cancers/infections
- +/- tension --> shift to opposite side
- Treatment
  - Observation
  - Chest tube placement
Pulmonary Embolism

- Commonly unrecognized (5% cancer PTs)
- May be asymptomatic
- Harbinger of more serious emboli
- CT diagnosis
  - Filling defect in pulmonary artery
  - Contrast surrounds defect
Aortic dissection

- Blood dissects into aortic wall
- Usually due to hypertension
- CT: line projects into middle of aorta
- Treatment
  - Surgery (involves ascending aorta)
  - Observation