Objectives

- Cite the indications for a chest radiograph
- Describe the radiographic views
- Describe the systematic review of a chest radiograph
- Define, list clinical signs, and radiographic evidence of common respiratory problems
- Identify objects implanted in the chest by radiography
Indications for a Chest Radiograph

- Detect lung pathology
  - Atelectasis, pneumothorax, confirm physical examination
- Determine appropriate therapy
  - Hyperinflation, chest tube, PEEP
- Evaluate effectiveness of therapy
- Determine position of invasive tubes
  - Vascular catheters, chest and N-G tube, ETT
- Trends disease progression
Radiographic Views

- Posterior-anterior
- Chest against the film
- Standard
- Correct heart size
Radiographic Views

- Anterior-posterior
- Back against film
- Portable
- Enlarges heart
Radiographic Views

- Lateral Decubitus
- Patient positioned on the side
- Identifies fluid levels

\[ PEI = \frac{A}{B} \times 100 \]
Radiographic Views

- Lateral Upright
- Left side against film
- Sharp view of LLL
- Identifies presence of fluid in the posterior sulcus
- Identifies hyperinflation/increased A-P diameter
- Retrosternal air
Radiographic Views

- Lateral neck
- Evaluates periglottic edema
- Croup
- Epiglottitis
Chest Radiograph Evaluation

- Systematic
- Four densities
- Rotation
- Exposure
- Diaphragms
- Heart shadow
- Costophrenic angles
- Ribs
- Clavicles
- Lung and vascular markings
- Trachea and carina
- Stomach bubble
- Scapulas
Densities

The radiographic density on film depends on both the thickness of a tissue and its atomic weight. Note that most of the soft-tissues are clustered indistinguishably in the middle grays.

Because of its mathematical accuracy and its digital underpinnings, computed tomography permits greater discrimination of individual soft-tissues on an extended gray-scale.
Rotation

- Film should be symmetrical
- Note position of clavicles
- Trachea should be midline
Exposure

- Determine the visibility of the intervertebral discs through the heart shadow
- Lucency of pulmonary blood vessels
- Overexposed = overdarkened
- Underexposed = lack of visualization of vertebral bodies through the heart
  - Lungs whiter than normal
Normal Chest Radiograph

- Right diaphragm higher than left
- Heart shadow < ½ thoracic width
- Air-filled costophrenic angles
Normal Chest Radiograph

- Posterior ribs are most lucent and horizontal
- Clavicles are symmetric
- Lung and vascular markings
Normal Chest Radiograph

- Trachea and carina visible
- Stomach bubble under left diaphragm
- Scapulas produce a vertical line through lung fields
Atelectasis

- **Definition**
  - Loss of air due to compression or absorption

- **Clinical signs**
  - Tachypnea, decreased BS

- **Radiology**
  - Fissure and mediastinal shift, vascular crowding, increased density of lung fields
Hyperinflation

- **Definition**
  - Increased air in the chest

- **Clinical signs**
  - Barrel chest, increased vocal fremitus, hyperresonance

- **Radiology**
  - Increased lucency, depressed diaphragms, narrow heart. Increased retrosternal air
Interstitial Lung Disease

- **Definition**
  - Diffuse, scarring, alveolar injury

- **Clinical signs**
  - Dyspnea, dry cough, increased fremitus, fine crackles

- **Radiography**
  - Alveolar filling, granular
Pulmonary Edema

- **Definition**
  - Fluid in interstitial or alveolar space, diffuse, increased interstitial pressure or permeability

- **Clinical signs**
  - Frothy sputum, dyspnea, crackles

- **Radiology**
  - Fluffy, enlarged heart in CHF, increased hilar markings
Pleural Effusion

- Definition
  - Fluid in the pleural space

- Clinical signs
  - Tachypnea, decreased fremitus, decreased BS

- Radiology
  - Blunted costophrenic angles, air-fluid line
Consolidation

- **Definition**
  - Fluid or pus filled airspaces without alveolar collapse

- **Clinical signs**
  - Tachypnea, fever, decreased fremitus, crackles

- **Radiology**
  - Lobar, homogenous, air bronchograms
Silhouette Sign

- In consolidation, there is a loss of border between two objects of similar density
- Helps determine where the abnormality is
- Dotted lines indicate loss of border
Pneumothorax

- Definition
  - Air in the pleural space

- Clinical signs
  - Acute respiratory distress, asymmetrical chest movement, decreased fremitus, hyperresonance, decreased BS

- Radiology
  - Vertical line, no lung markings outside the line
Endotracheal Tube Placement

- Tip should be 3-5 cm above the carina
- Here, tip is in Right mainstem
- Assure equal BS
- Care in advancing the tube
Pulmonary Artery Catheter

- Catheter proceeds through the VC, RA, RV, and into the PA
- Catheter should reside in zone 3
Chest (Pleural) Tube

- Inserted by the physician
- Evacuation of air and/or fluid
- 32 F
- Radiopaque stripe
- Note the ETT
Laryngotracheobronchitis (Croup)

- **Definition**
  - Viral infection of the larynx and trachea

- **Clinical signs**
  - 6mo-3yoa, brassy hoarse cough, stridor, low fever

- **Radiology**
  - Narrowing and edema of subglottic trachea, ballooning of hypopharynx
Computerized Tomography (CT)

- Radiographs that focus on slices of the organ being scanned
- Computer enhanced to improve resolution
- Able to define small abnormalities and lesions (cancer)