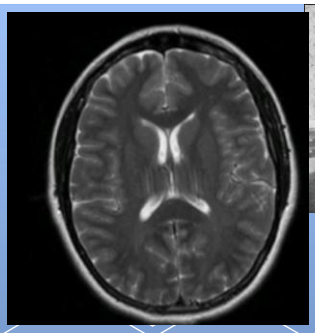
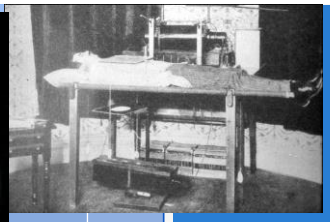
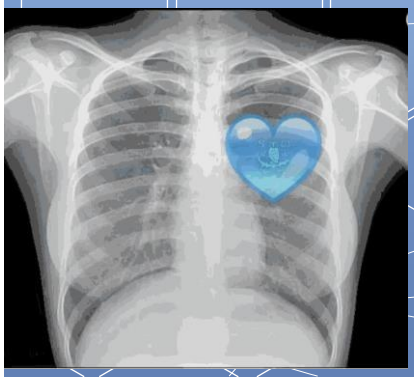






Introduction to Medical Imaging

Lab

Dr. Fatima Abbas

List of diagnostic imaging studies

- Plain x-rays
- CT scan
- MRI
- Nuclear imaging/PET
- Ultrasound
- Mammography
- Angiography
- Fluoroscopy

What are x-rays?

- No mass
- No charge
- Energy

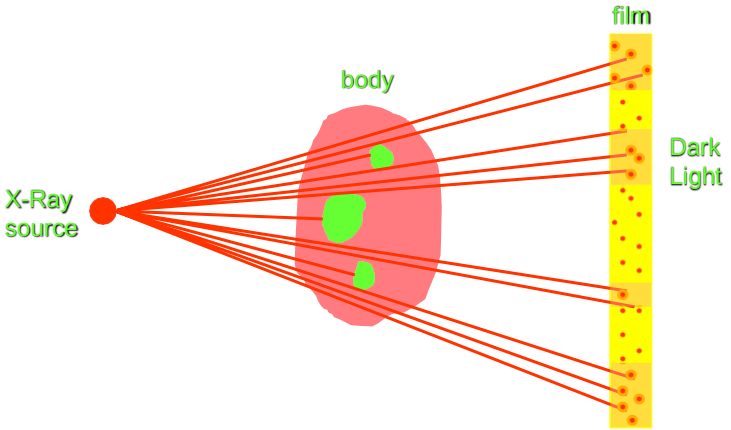
Basic x-ray physics

- X-rays: a form of electromagnetic energy
- Travel at the speed of light
- Electromagnetic spectrum
  - Gamma Rays
  - Visible light
  - Microwaves
  - Radio waves
  - X-rays
  - Infrared light
  - Radar

Three things can happen

- X-rays can:
  - **Pass** all the way **through** the body
  - Be deflected or **scattered**
  - Be **absorbed**

Three things can happen



X-rays Passing Through Tissue

- Depends on the energy of the x-ray and the atomic number of the tissue
- Higher energy x-ray - more likely to pass through
- Higher atomic number - more likely to absorb the x-ray

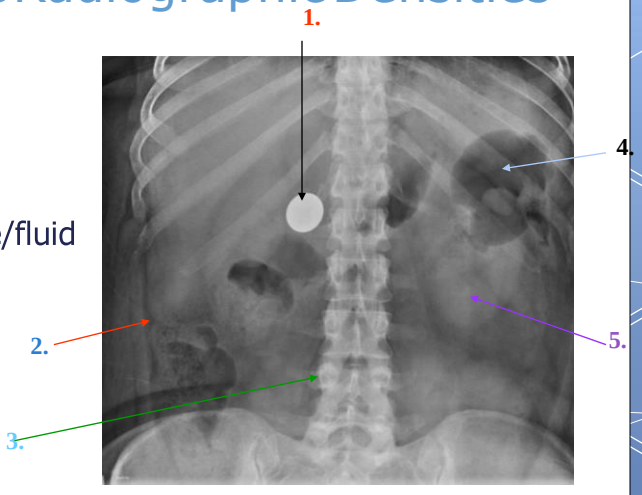
Diagnosis?

How do x-rays passing through the body create an image?

- X-rays that pass through the body to the film render the film dark (black)
- X-rays that are totally blocked do not reach the film and render the film light (white)
- Air = low atomic # = x-rays get through = image is dark
- Metal = high atomic # = x-rays blocked =image is light (white)

5 Basic Radiographic Densities

- Air
- Fat
- Soft tissue/fluid
- Mineral
- Metal

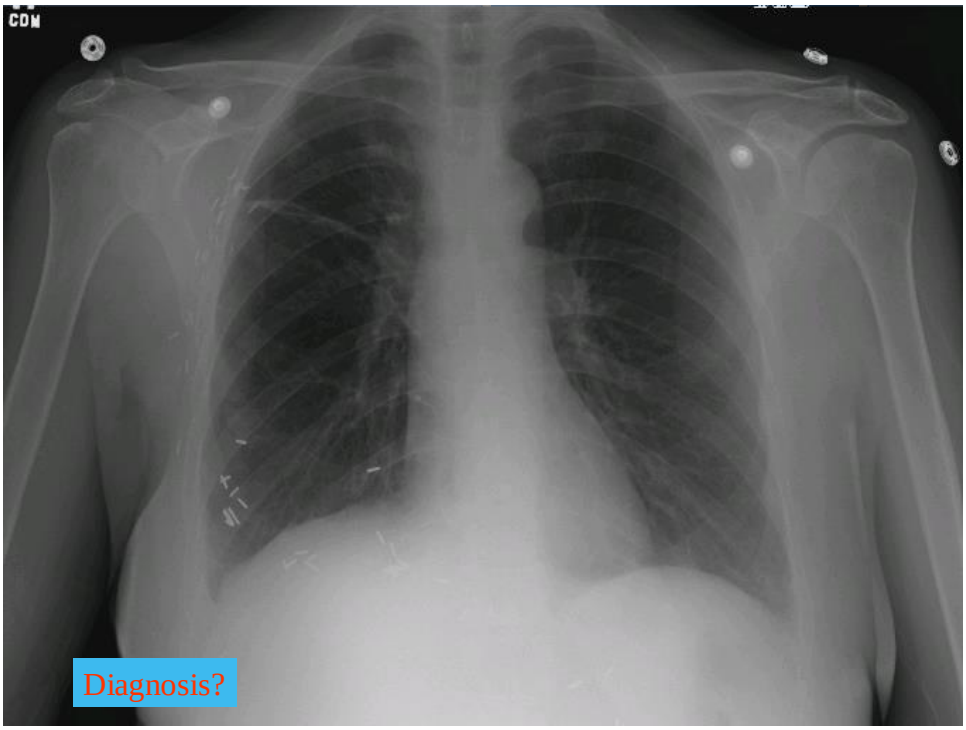


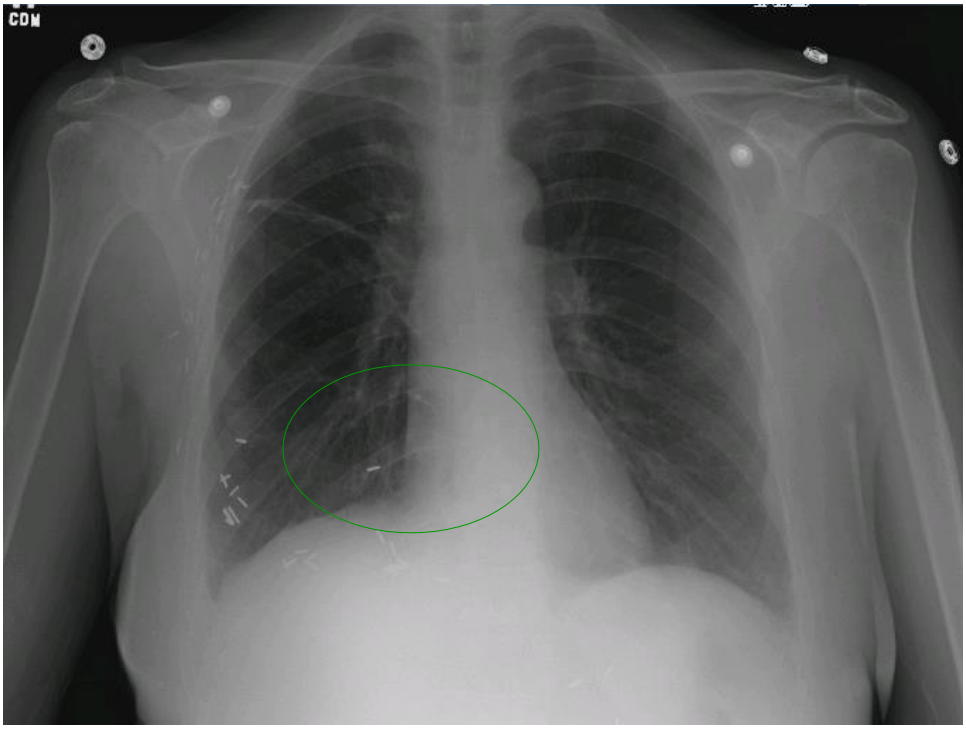
Name these radiographic densities.

Optimal Viewing

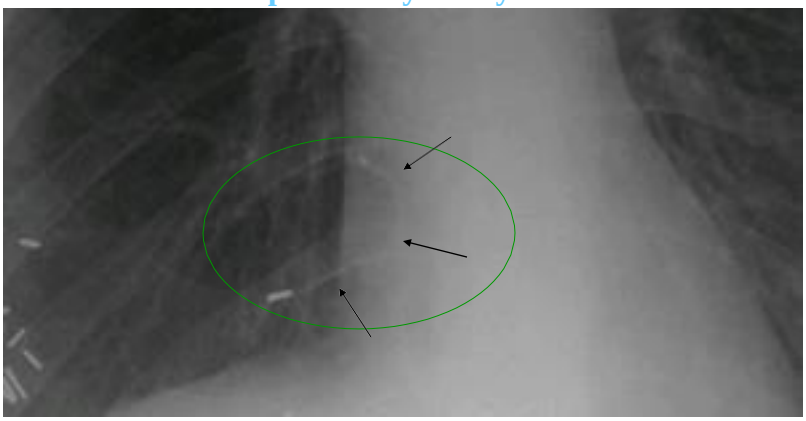
- Dedicated light source
- Darkened environment (like a movie theater)

X-ray viewing station


CDM
Diagnosis?



A broken central venous catheter has migrated into the right lower lobe pulmonary artery



Can you recognize shapes and density?

Find the pathology
What clues do you have?

Medical Imaging

- Primary purpose is to identify pathologic conditions.
- Requires recognition of normal anatomy.

History: 11 y/o twisting injury of the foot

Summary: How do x-rays create an image of internal body structures?

- X-rays pass through the body to varying degrees
- Higher atomic number structures block x-rays better, example bone.
- Lower atomic number structures allow x-rays to pass through, example: air in the lungs.

What density are the lungs?

Why?

The list: air, fat, soft tissue, mineral and metal

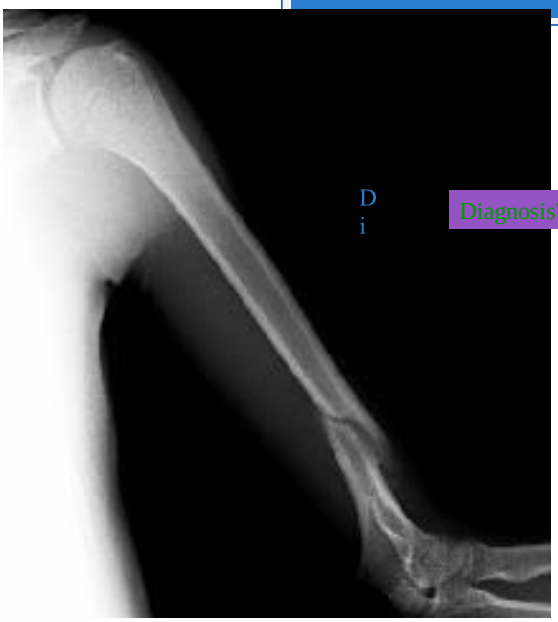
air

CT scan of the abdomen

X-rays used

skin

What density is this?



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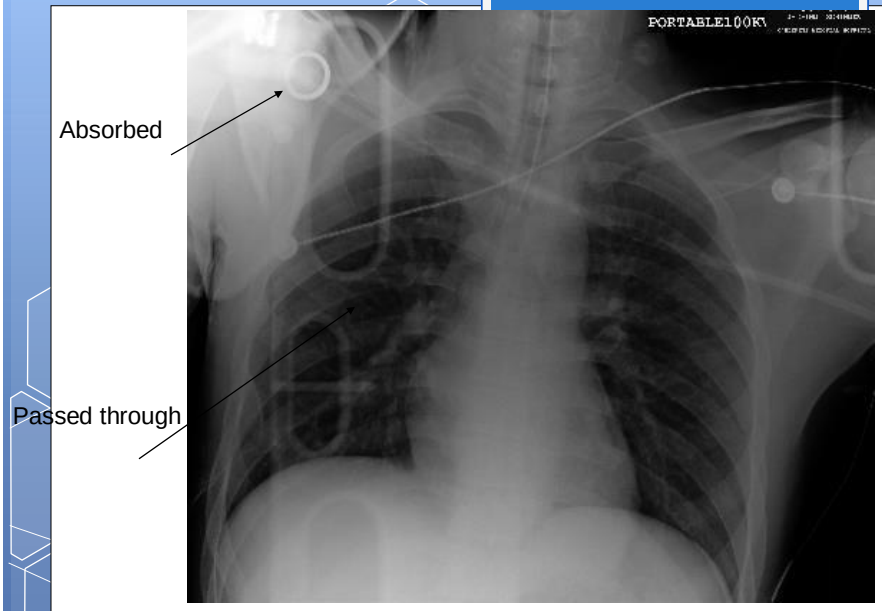
Diagnosis?

Radiographic Analysis

- Any structure, normal or pathologic, should be analyzed for:
  1. **Size**
  2. **Shape and contour**
  3. **Position**
  4. **Density (You must know the 5 basic densities)**



Medullary bone

Soft tissue

Metal

Note:
Right-left marker
Technologist's initials

Name these densities