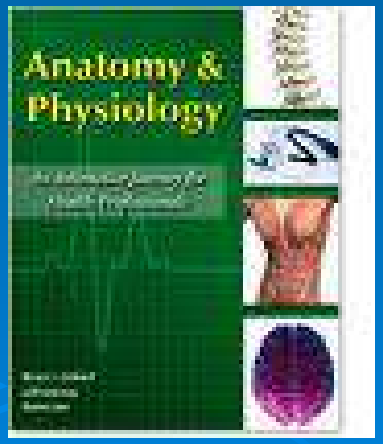
Anatomy, Physiology and Disease

Chapter 2

The Human Body:

Reading the Map



"I Have Pain in my Stomach"

What exactly does the patient mean?

- Exactly where is the pain?
- Does it move or travel to other parts of the body?
- When did it start?
- What is the intensity? on a 1-10 scale…
- Is it sharp, dull, achy, or cramping…?
- Does the patient really mean abdomen for stomach?
- Questions about type of pain, exact location, and intensity of pain can help determine etiology

Food

Menstrual

Labor

Appendicitis

Trauma

I don't know!

The Anatomical Position

- The person is standing erect, face forward, with feet parallel, arms hanging at sides, and palms facing forward

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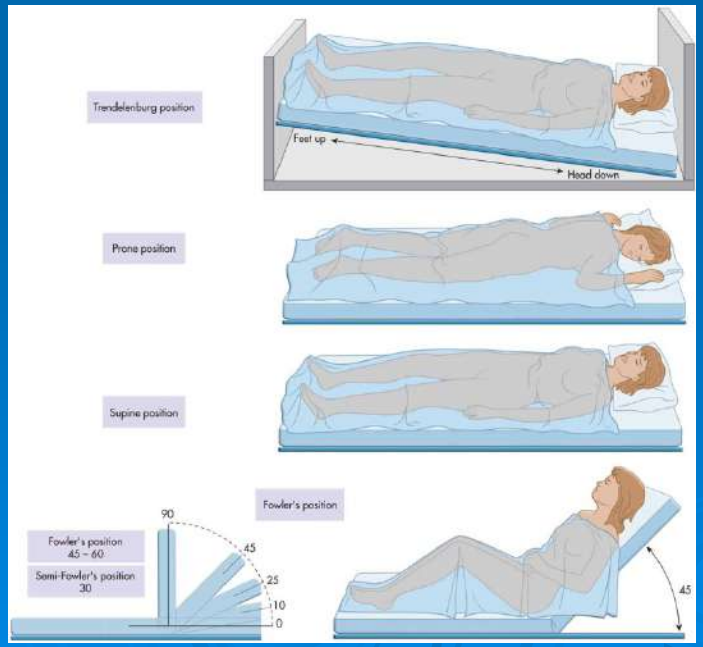
Other Body Positions

- Supine position: laying face upward, on your back
- Prone position: laying face downward, on your stomach
- Fowler's position: sitting in bed with head of bed elevated 45–60 degrees



Trendelenberg

Prone

Supine

Fowler's

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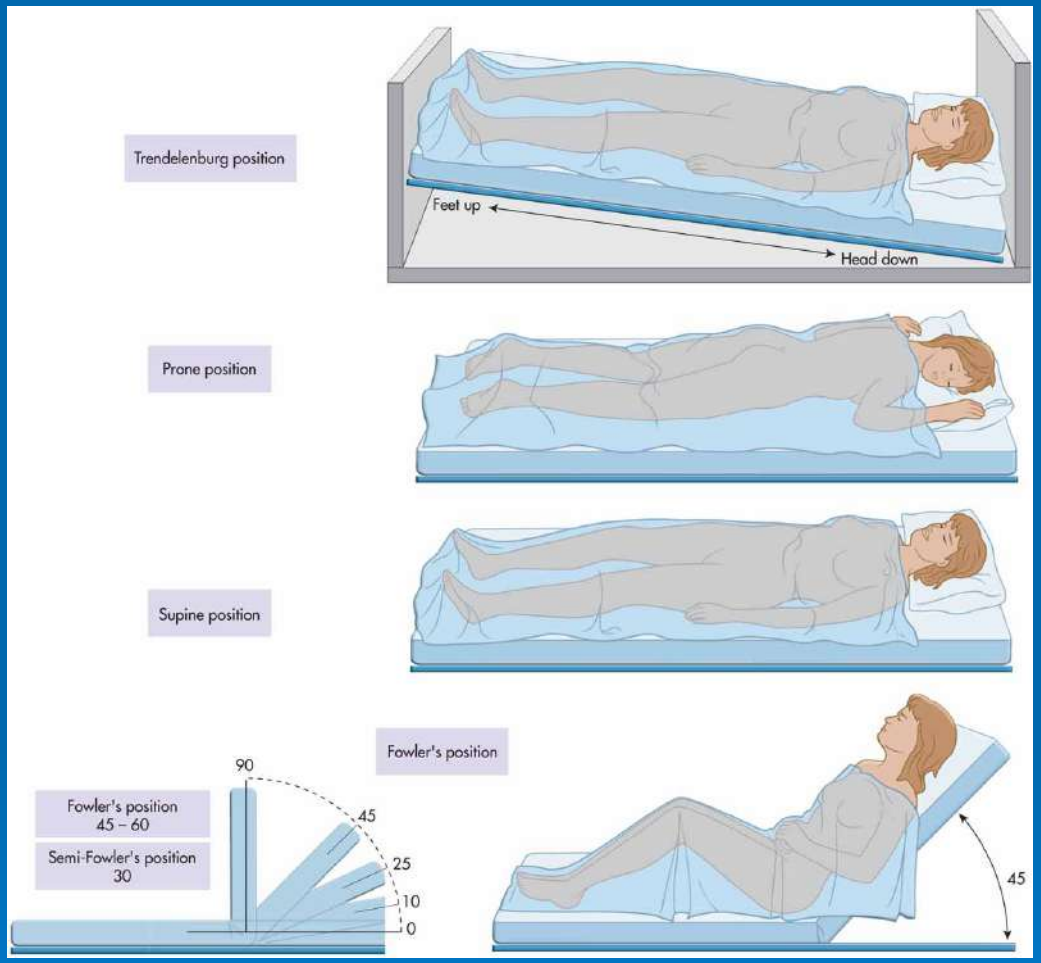

Trendelenburg

Prone

Supine

Fowler’s

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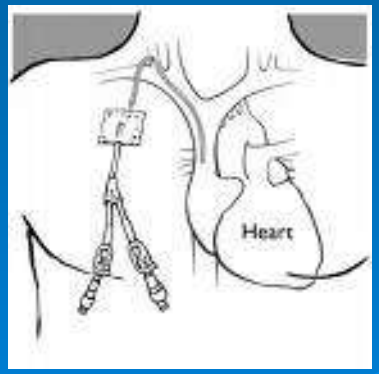
Pathology Connection

- Trendelenburg
  - helps to drain secretions from base of lungs
  - avoid with brain injury patients as it will increase intracranial pressure.
  - are at increased risk for aspirating vomitus, and should not eat within 2-4 hours of being placed in position.
  - Patients with orthopnea have difficult time breathing if they lie flat.

Pathology Connection con't

- JVD: Jugular Vein Distention

  - distend neck veins due to heart failure



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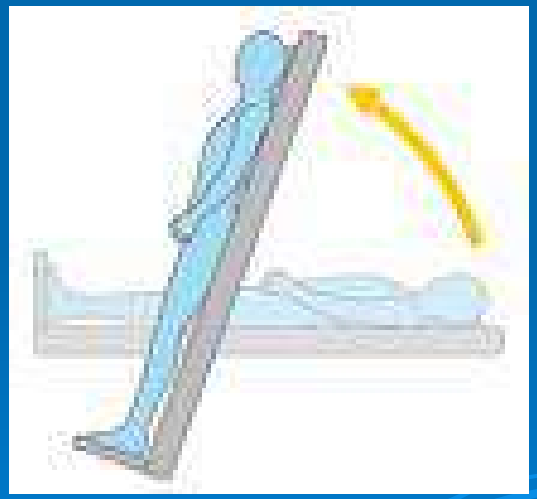
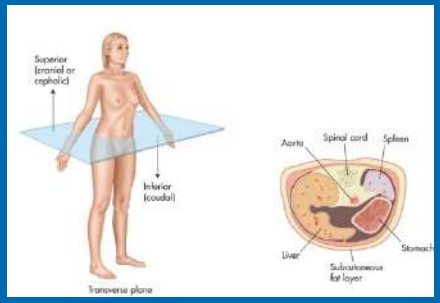
Pathology Connection con't

- **Orthostatic Hypotension**

  - Dizziness when changing from seated to standing position.



Body Planes and Directional Terms



- Plane
  - an imaginary line drawn through body or organ to separate into specific sections.
- Transverse or horizontal plane
  - divides body into superior (top) and inferior (bottom) sections, also referred to as cross-sectioning the body.
- Superior (cranial or cephalic) means toward head or upper body.
- Inferior (caudal) means away from head or toward lower part of body.

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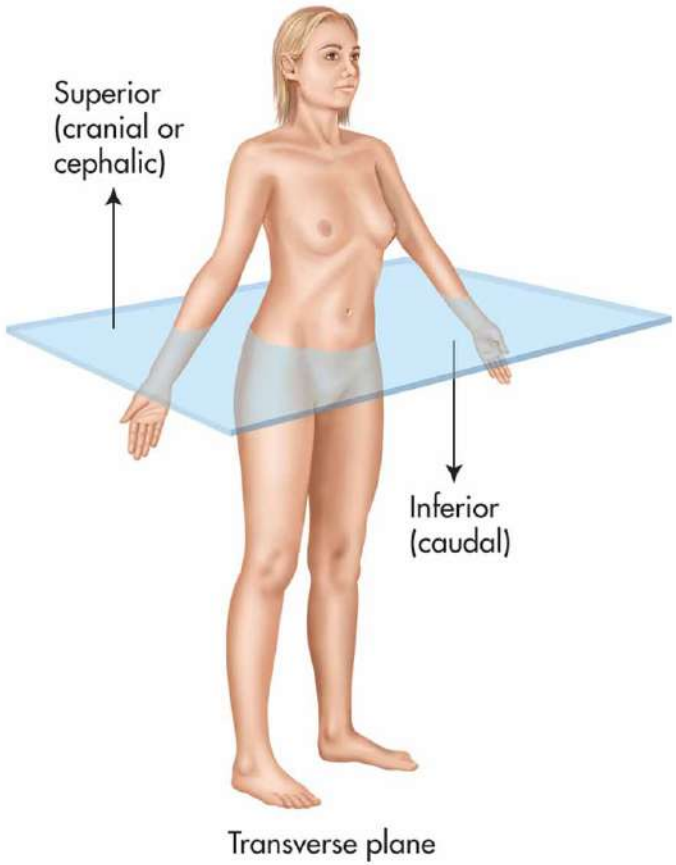
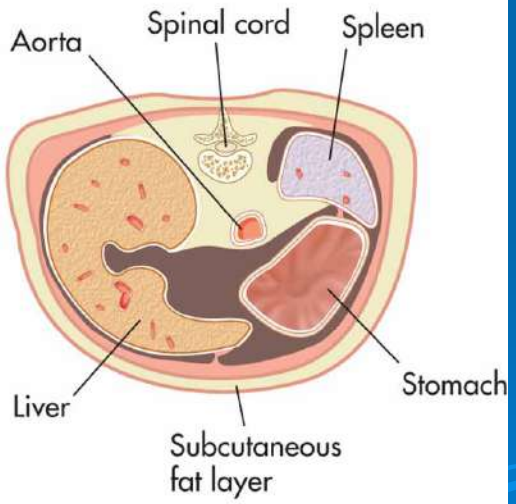
Transverse or Horizontal Plane



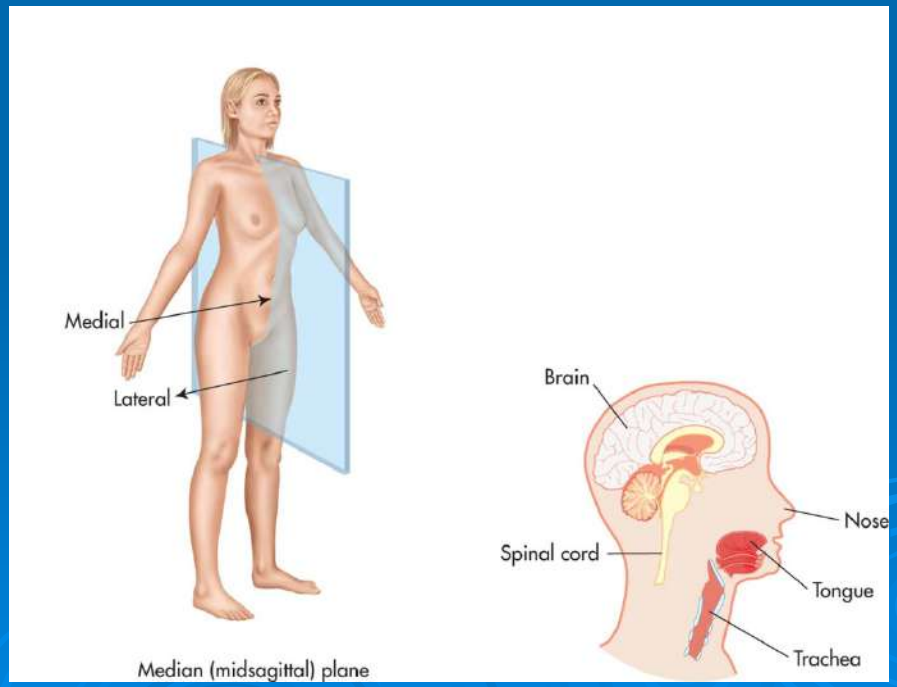


Superior view

Median or Midsagittal Plane

- Divides body into right and left halves
  - Medial refers to body parts located near middle or midline of body.
  - Lateral refers to body parts located away from midline.

Sagittal view →



← Sagittal view

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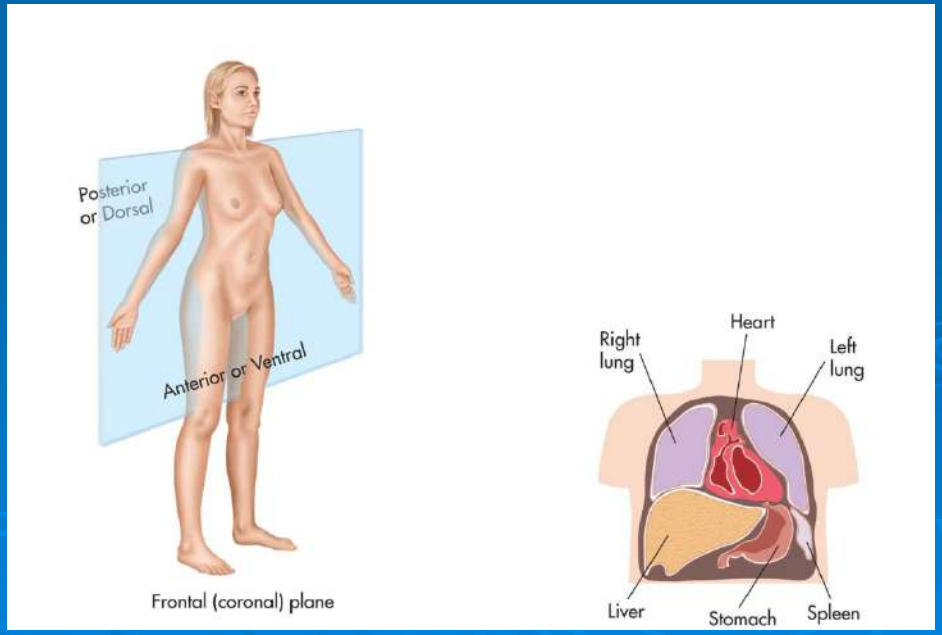
Frontal or Coronal Plane

- Divides body into front and back sections
- Anterior or ventral refers to body parts towards or on front of body
- Posterior or dorsal refers to body parts towards or on back of body

Frontal → View



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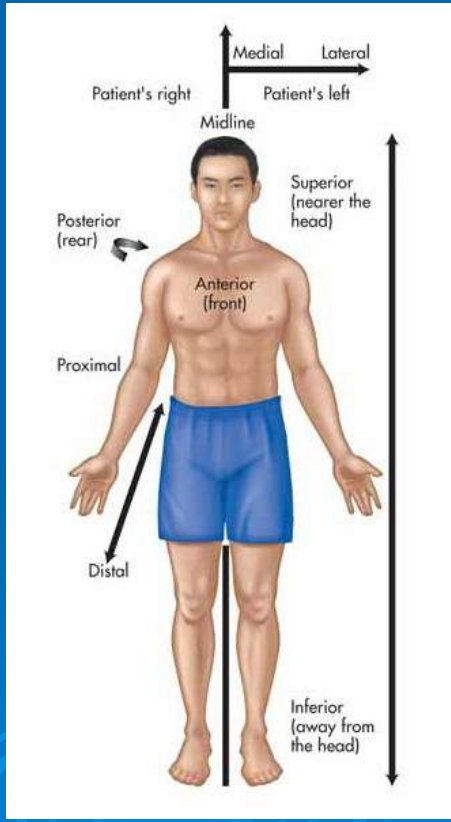
Proximal and Distal

- Proximal

  - refers to body parts close to point of reference of body.

- Distal

  - refers to body parts away from point of reference.



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External and Internal

- External means on the outside
  - Skin is located externally and is body's largest organ
- Internal means on the inside
  - Most organs located internally

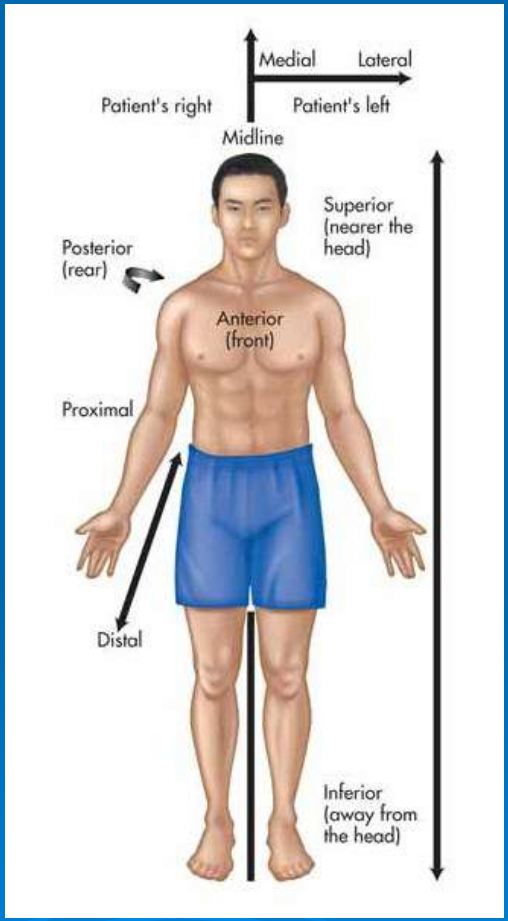
Additional Directional Terms

- Superficial means toward or at body surface
- Deep means away from body surface
- Central refers to locations around center of body
- Peripheral refers to extremities or outer region

TABLE 2-1 Directional Terms

DIRECTIONAL TERM	MEANING	USE IN A SENTENCE
Proximal	near point of reference	The wrist is *proximal* to the fingers.
Distal	away from point of reference	The shoulder is *distal* to the fingers.
External	on the outside	The *external* defibrillator is used on the outside of the chest.
Internal	on the inside	He received *internal* injuries from the accident.
Superficial	at the body surface	The cut was only *superficial*.
Deep	under the body surface	The patient had *deep* wounds from the chainsaw.
Central	locations around center of body	The patient had *central* chest pain.
Peripheral	surrounding or outer regions	The patient had *peripheral* swelling of the feet.
Medial	toward the midline	The nose is *medial* to the eyes.
Lateral	toward the sides	The ears are *lateral* to the eyes.

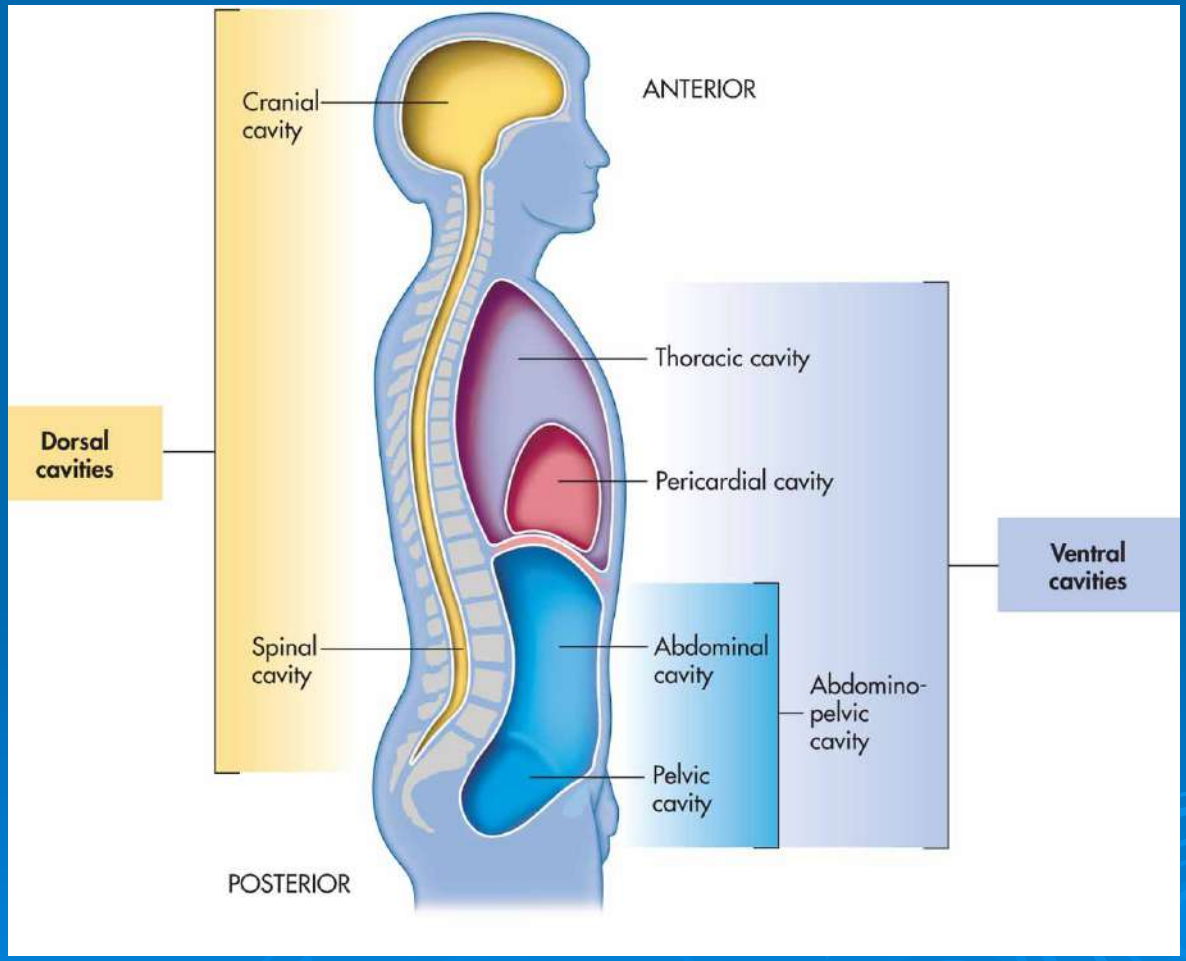
Body Location Terms



Body Cavities

- Body has two large open spaces called cavities that house and protect organs
- Dorsal (posterior) cavity located on back of body
- Ventral (anterior) Larger cavity located on front of body is divided into two smaller cavities
  - Thoracic cavity
  - Abdominopelvic cavity: further divided into abdominal and pelvic cavities
- These two smaller cavities are divided by the diaphragm

Main Body Cavities



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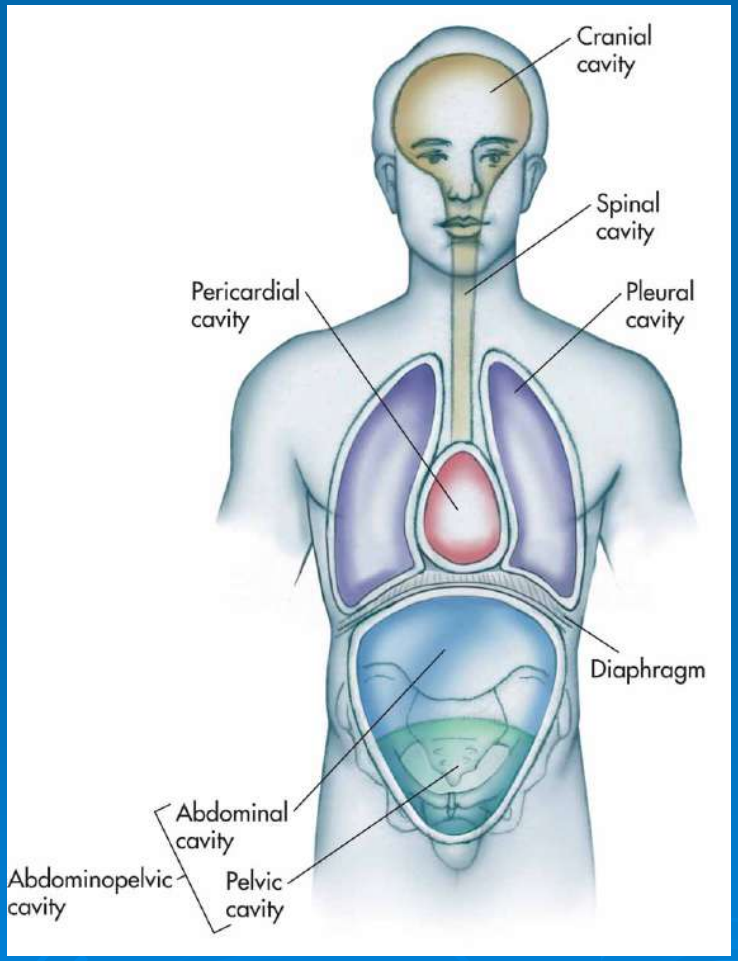
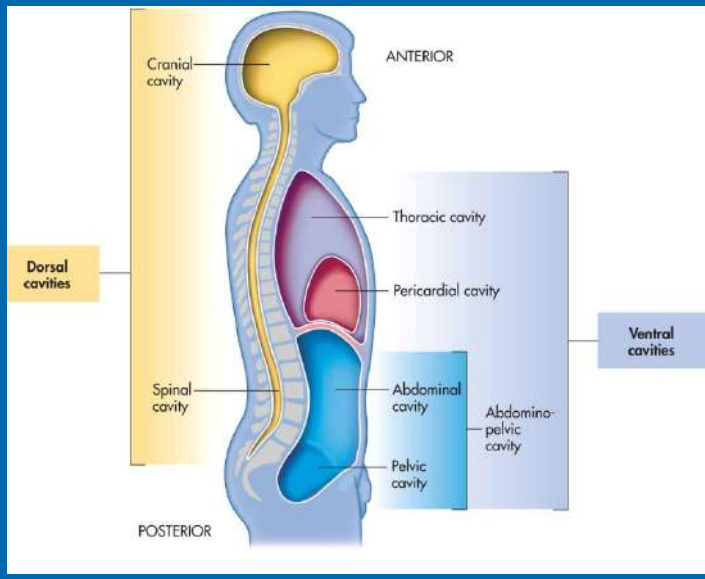
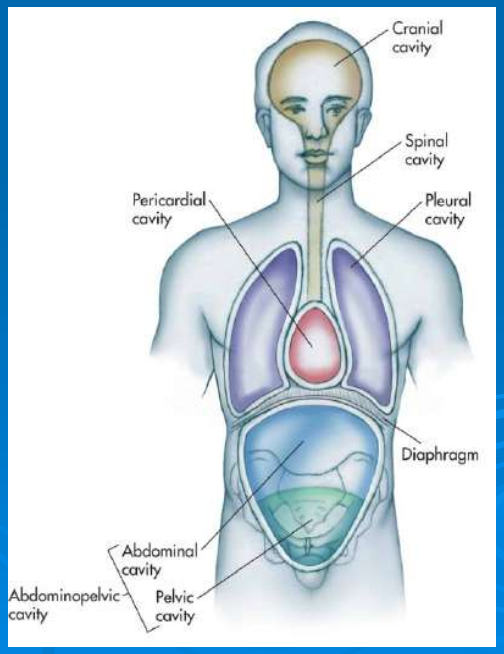
Main Body Cavities



Thoracic Cavity

- Contains
  - Heart
  - Lungs
  - Large blood vessels





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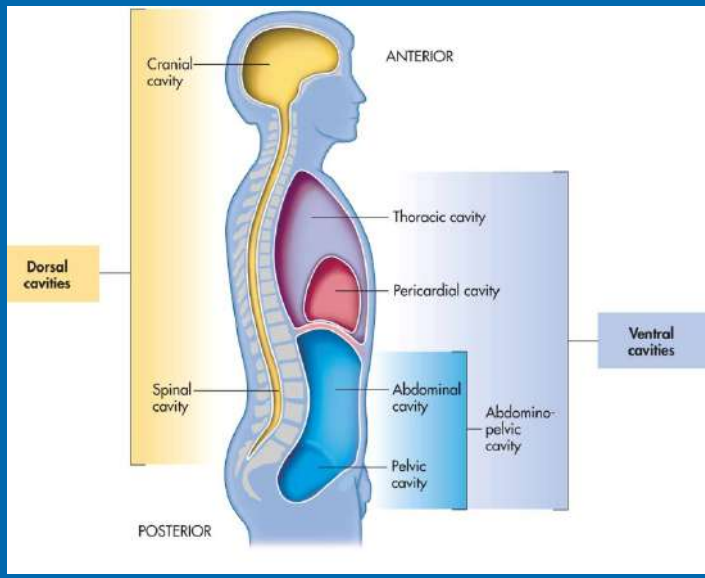
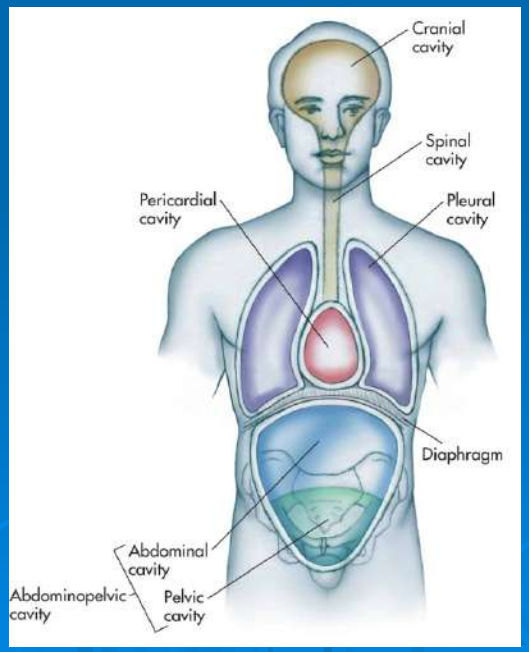
Abdominal Cavity

- Contains digestive organs
  - Stomach
  - Intestines
  - Liver
  - Gallbladder
  - Pancreas
  - Spleen





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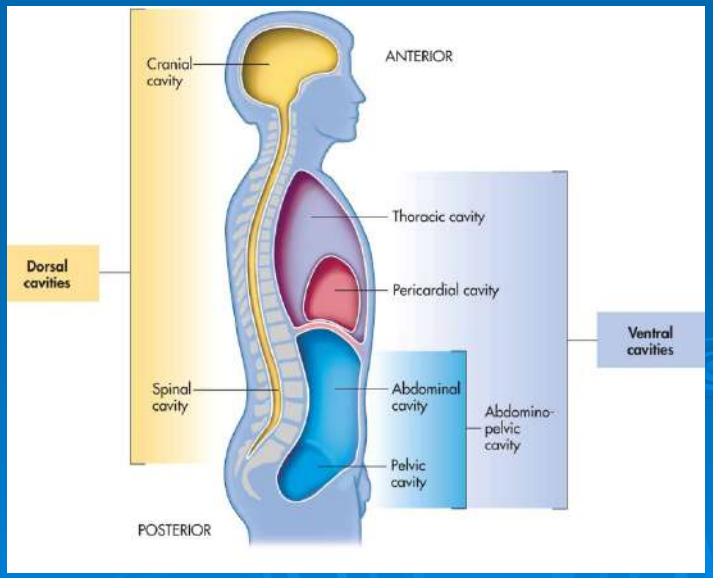
Pelvic Cavity

- Lower portion of abdominopelvic cavity contains
  - Urinary organs
  - Reproductive organs
  - Large part of large intestine



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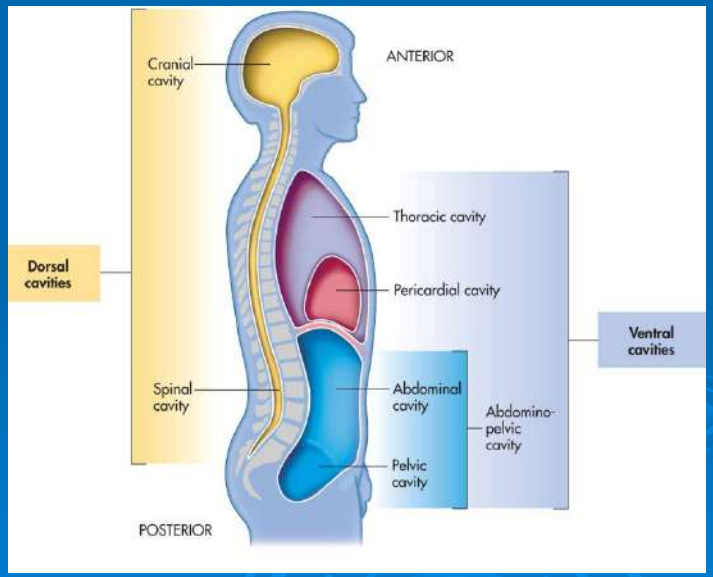
Dorsal Cavity

- Located in back of body and consists of two cavities
  - Cranial cavity houses brain
  - Spinal cavity contains spinal column



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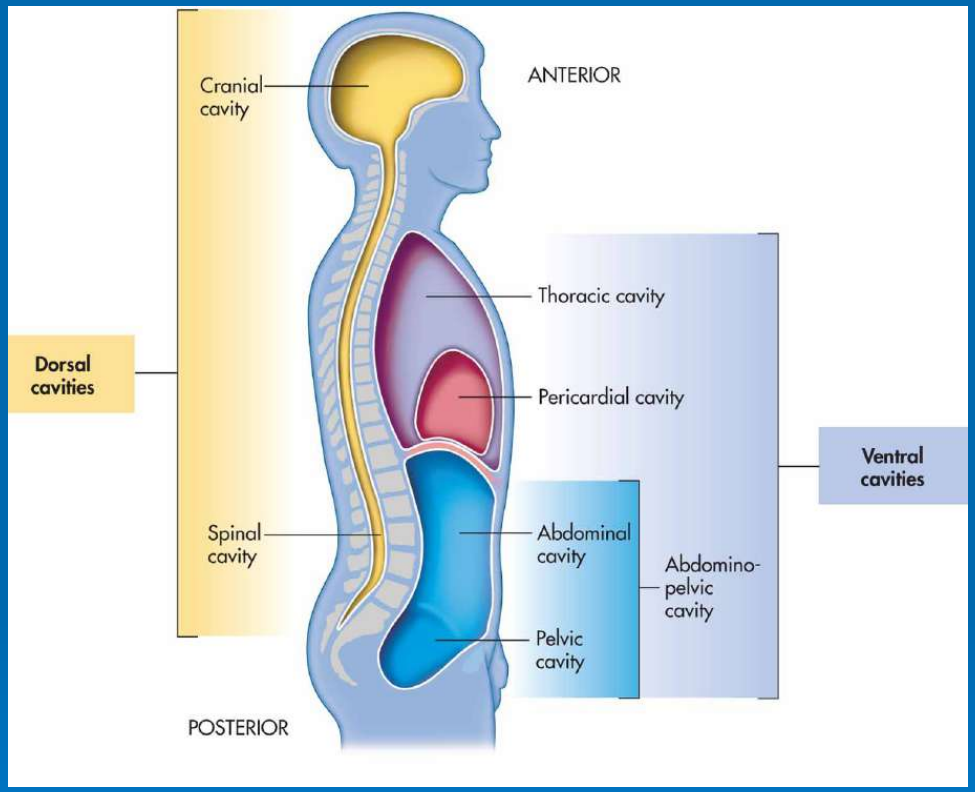
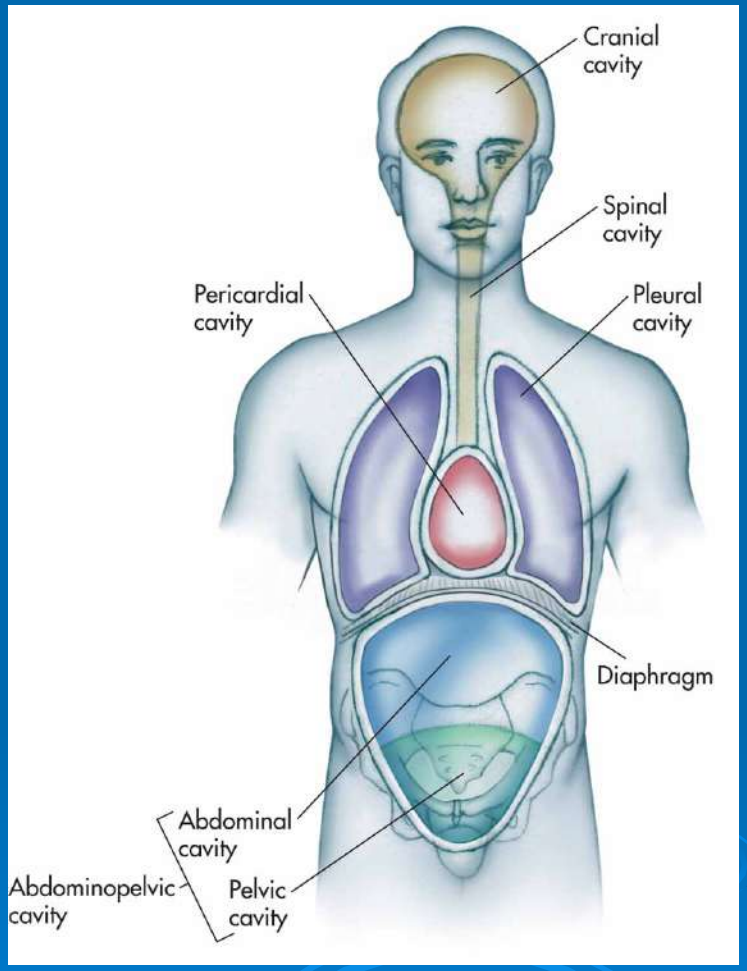
Review of Body Cavities





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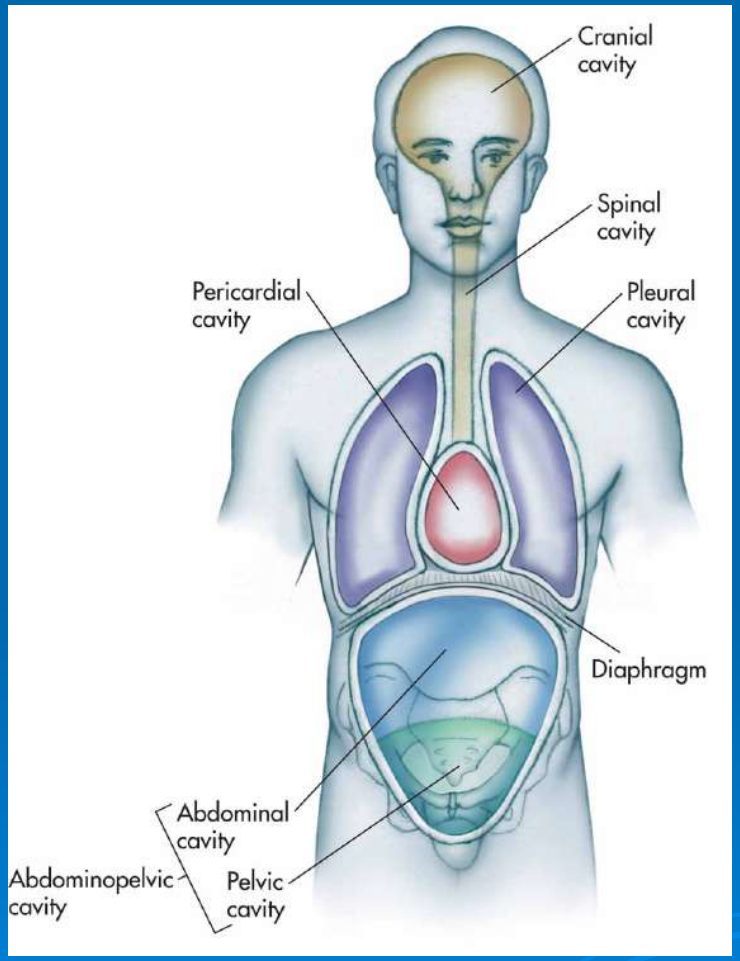
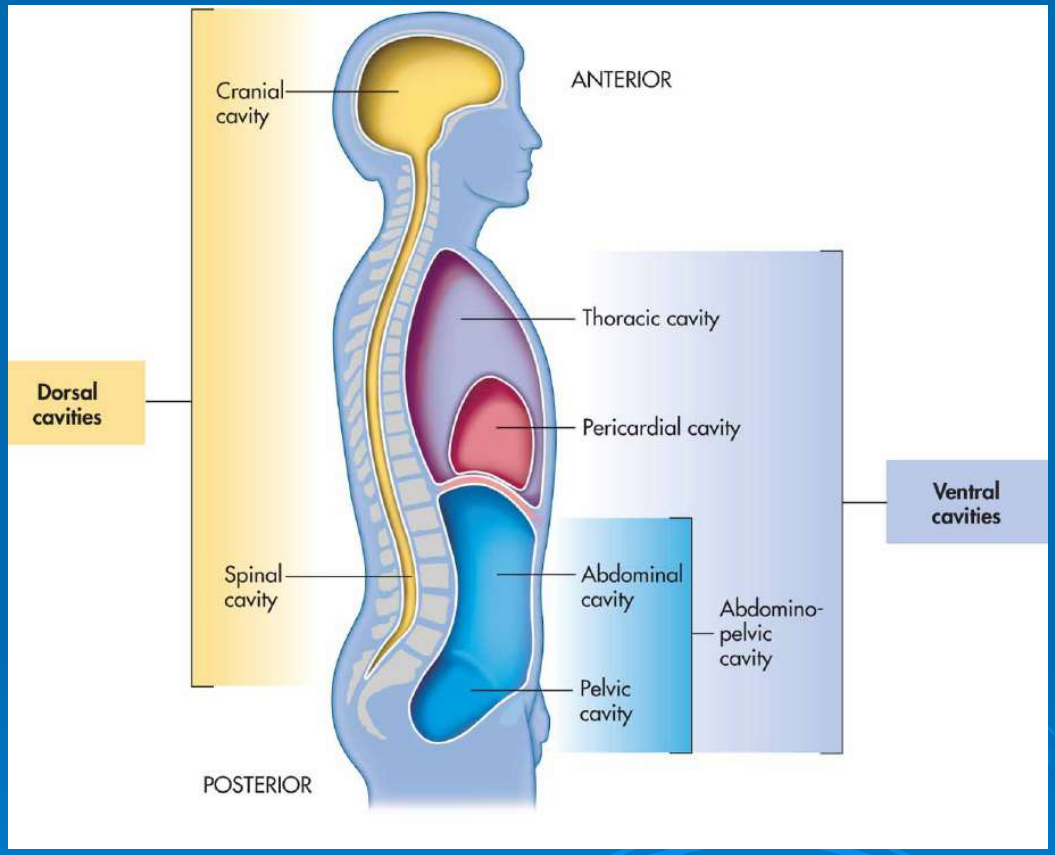
Review of Body Cavities





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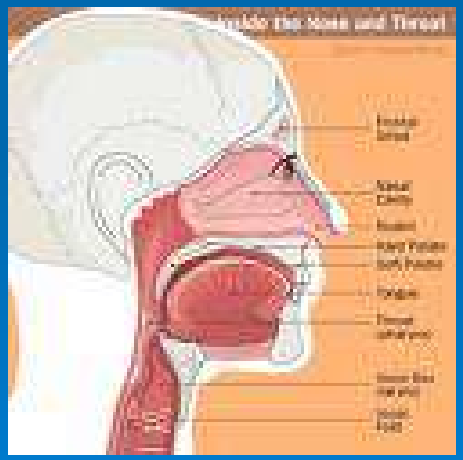
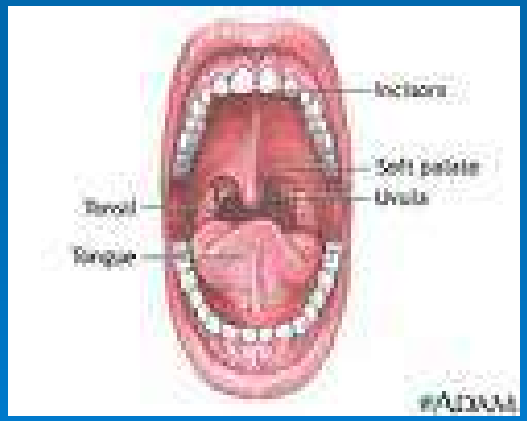
Smaller Cavities

- Nasal cavity: space behind nose
- Buccal cavity: space within mouth
- Orbital cavity: houses eyes



Nasal



Buccal

Orbital

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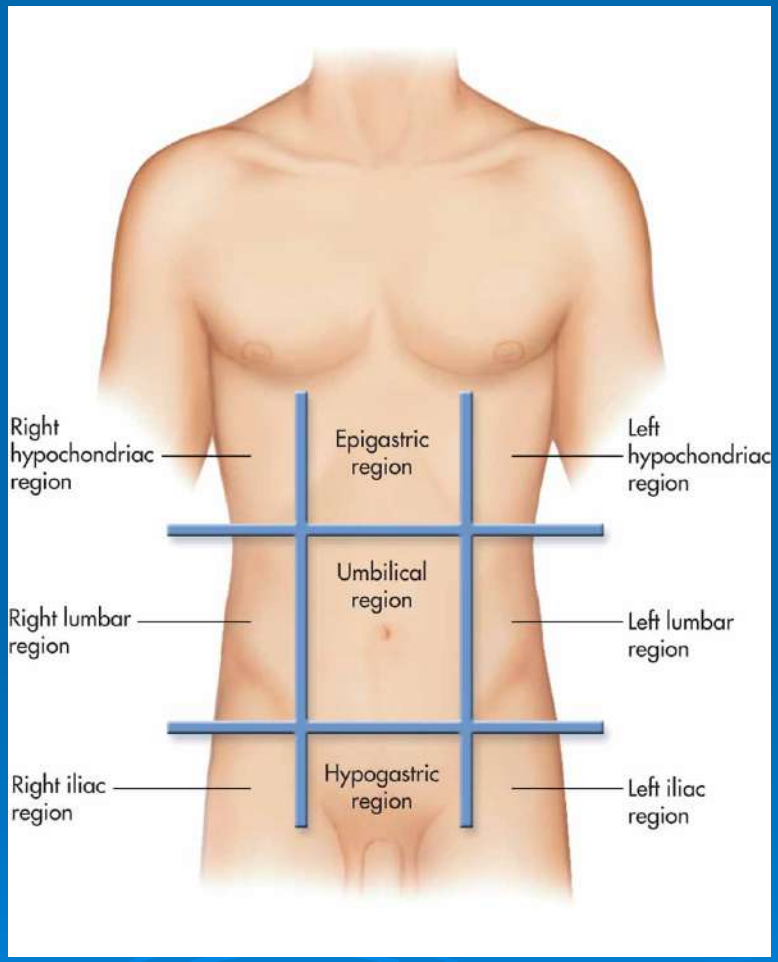
Abdominal Regions



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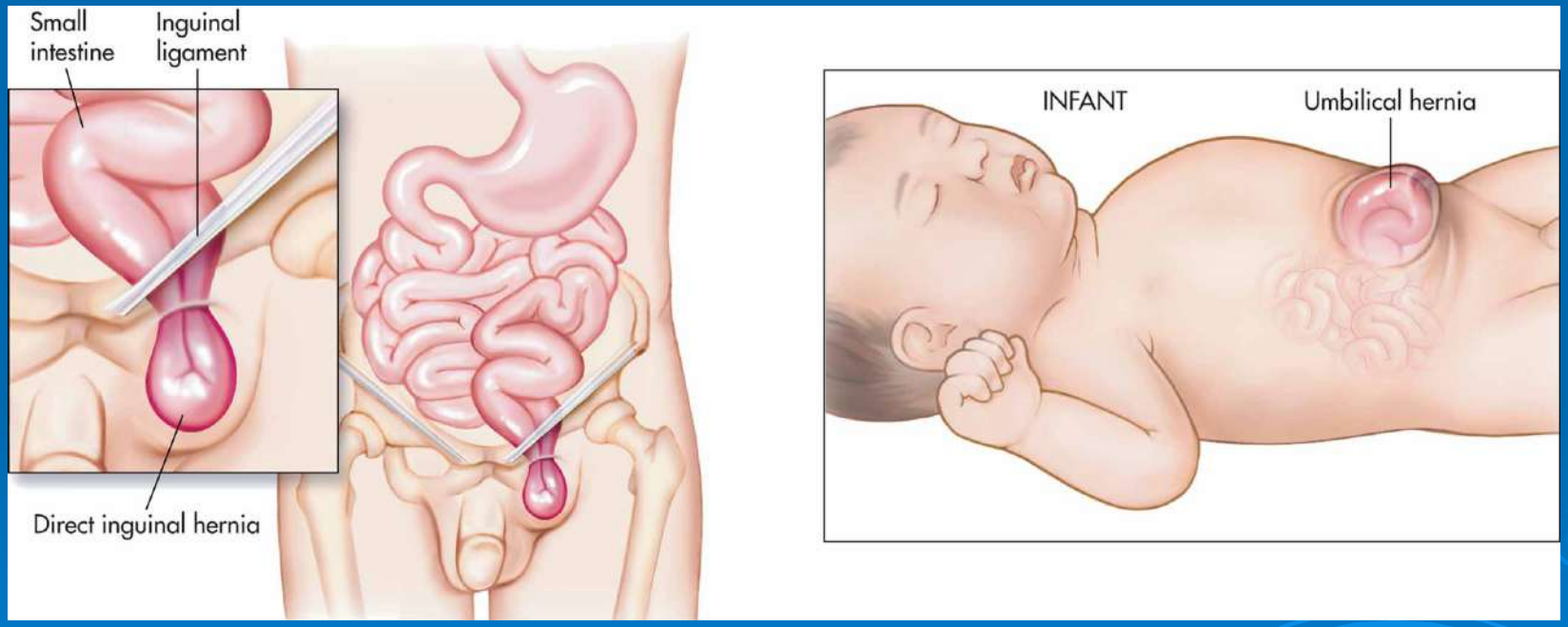
Illustrations of inguinal and umbilical hernias



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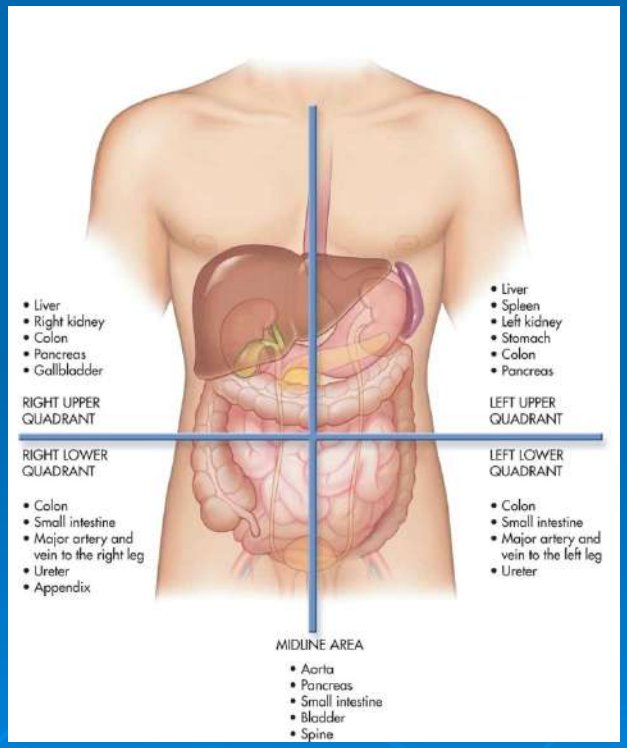
Abdominal Quadrants

- Simpler way to compartmentalize abdominal region is to separate into anatomical quadrants
- Helpful in describing location of abdominal pain



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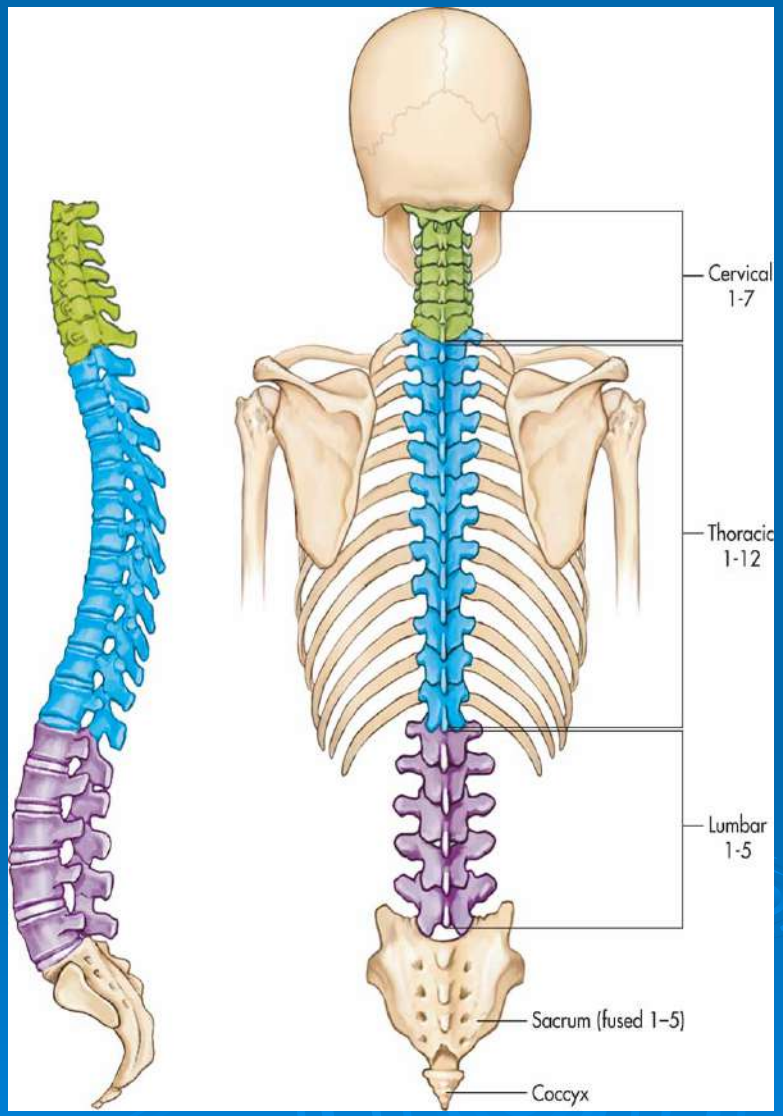
Abdominal Pain

- Knowing organs located in quadrant where pain is arising can give a clue as to what type of problem the patient has
  - Right lower quadrant (RLQ) pain: appendicitis
  - Right upper quadrant (RUQ) pain: liver or gallbladder problems
  - Right or Left flank pain: Renal calculi (Kidney stones)
  - Right or left inguinal pain: Renal calculi or hernia

The spinal column

- Cervical Column
  Vertebra 1-7 (Neck)
- Thoracic Column
  Vertebra 1-12 (Chest)
- Lumbar Column
  Vertebra 1-5 (low Back)
- Sacrum (fused)
  Vertebra 1-5 (very low Back)
- Coccyx: tail-bone



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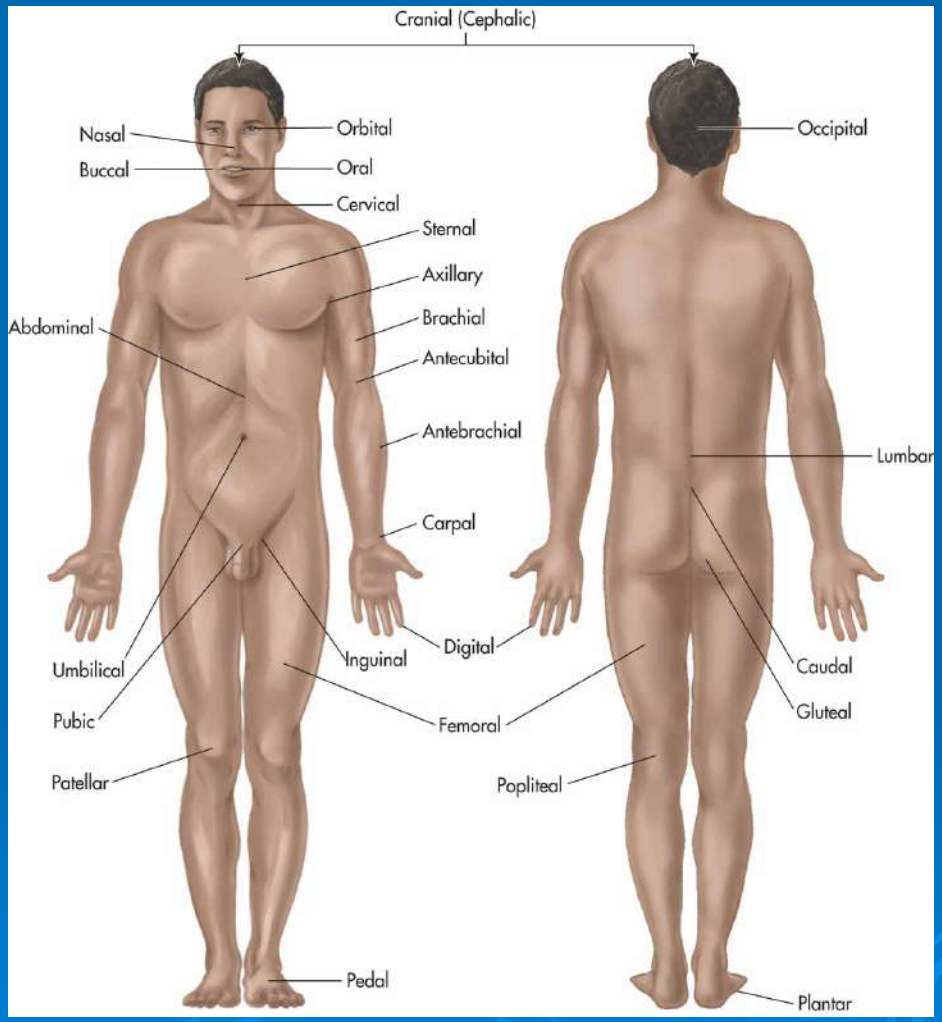
Additional Body Regions



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Body Regions

TABLE 2-2 Examples of Body Regions and Their Locations

BODY REGION	LOCATION	MEDICAL EXAMPLE
Antebrachial	forearm	between the wrist and elbow
Antecubital	depressed area in front of elbow	area used to draw blood or start an IV
Axillary	armpit	can be used to take temperature
Brachial	upper arm	used to take blood pressure
Buccal	cheek	check buccal region for central cyanosis
Carpal	wrist	carpal tunnel syndrome
Cervical	neck	cervical collar needed for neck injuries
Digital	fingers	place digital oxygen sensors
Femoral	upper inner thigh	femoral pulse indicates adequate circulation to legs
Gluteal	buttocks	the buttock is an injection site

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Body Regions cont.

Lumbar	lower back	lumbar pain often occurs on long car trips
Nasal	nose	medications can be given by nasal spray
Oral	mouth	oral route is most common route for medications
Orbital	eye area	orbital injury can cause damage to sight
Patellar	knee	patellar injuries are very common in sports
Pedal	foot	people with heart problems may have pedal edema (swelling)
Plantar	sole of foot	plantar warts can be painful
Pubic	genital region	the pubic region is often checked for body lice
Sternal	breastbone area	the sternal area is used for CPR
Thoracic	chest	the thoracic area is used to listen to heart and lung sounds

X-Rays (Radiograph or Roentgenogram)

Produced by passing X-ray radiation through body onto photographic film.

- Exposure to X-rays causes photographic film to darken.
- Radiolucent areas of body allow X-rays to pass through to film easily; produce dark areas on film.
- Radiopaque areas of body allow fewer X-rays to pass through to film; produce light areas on the film.

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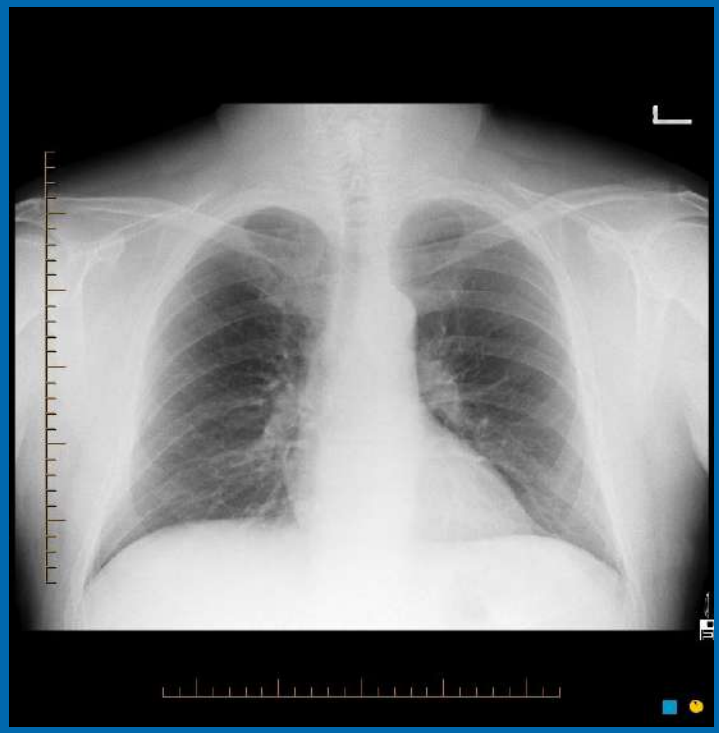
X-Rays cont'd

Each component of body has a characteristic density & appearance on X-ray.

- Air: least dense; shows up black on X-ray.
- Tissue/Fat: density depends on thickness of tissue; thicker the tissue, lighter the appearance on X-ray.

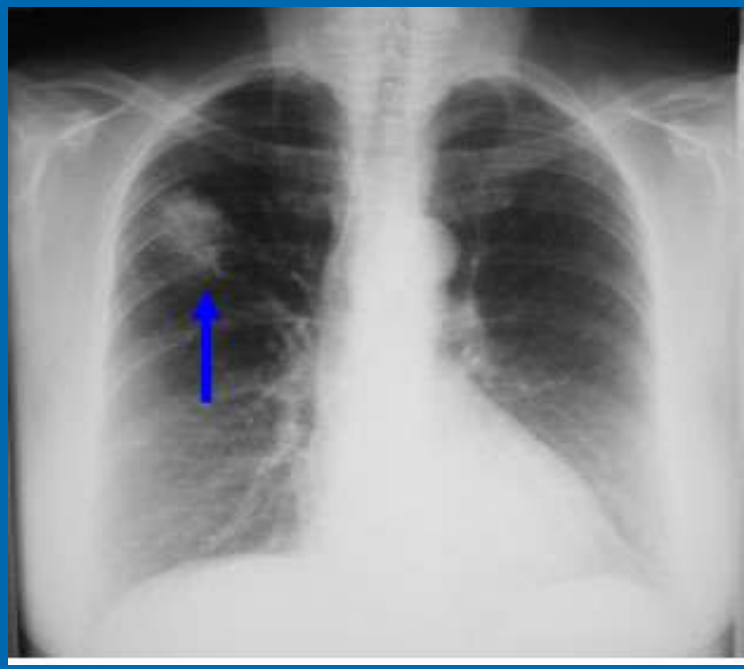


Is this x-ray normal or abnormal?

Why?

X-ray cont

- Water, Blood & Edema: mid-range density. Appearance is lighter than air, but not as white as bone/metal.
- Bone/metal: highest density. Appears white on X-ray.



Is this x-ray normal or abnormal?

Why?

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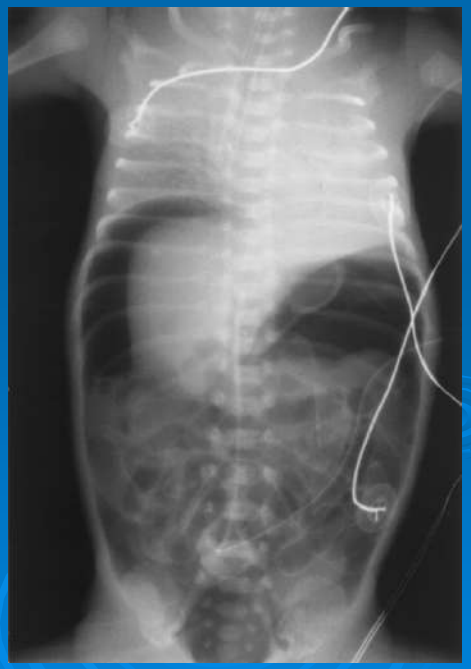
Standard X-Ray Positions

- Posteroanterior (PA)
  - X-ray beam passes from patient's back to patient's front and then onto film
  - Standard view for chest X-ray

- Anteroposterior (AP)
  - X-ray beam passes from patient's front to patient's back and then onto film
  - Often used in portable chest X-rays



Pneumothorax

Is this a Left or Right Pneumothorax?

Why?

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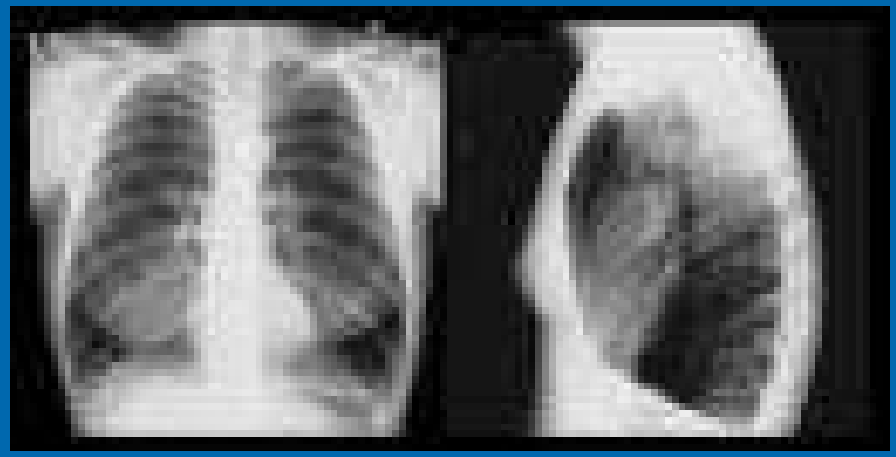
Lateral Chest X-Ray

- Lateral
  - X-ray beam passes from one side of patient to other, and then onto film
  - Often used as compliment to PA views, to get better 3-D perspective



Is this a Left or Right Lateral CXR?

Why?

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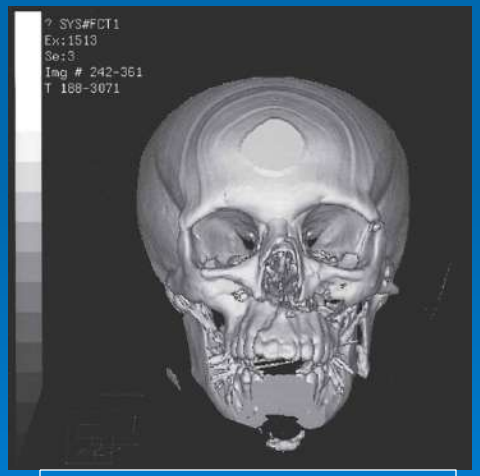
Computerized Tomography (CT or CAT Scan)

- Produces series of cross-sectional "slices" through body
- Generates high-resolution images with more information about 3-D orientation of structures
- Exposes body to much higher levels of radiation than traditional X-ray

What view is this CTScan?

Why?



What view is this CTScan?

Why?

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Magnetic Resonance Imaging (MRI)

- Uses magnetic energy to image body
- Produces cross-sectional images
- Images have much better clarity than CT

What view are these MRIs?

Why?

End Of Slide

Magnetic Resonance Imaging (MRI) (cont'd)

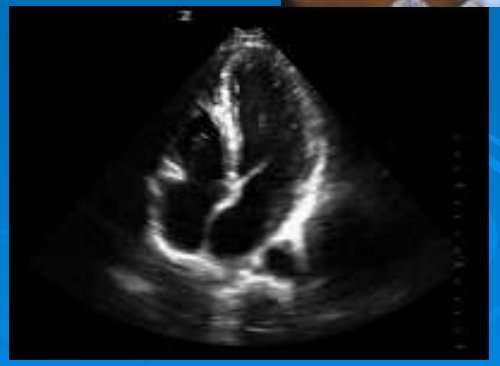
- Cannot be used by all patients
  - Patients with certain metallic components in body (like metallic aneurysm clips or heart valves) cannot be exposed to magnetic field of MRI; would make metal components shift in body
  - Patients who are claustrophobic may not be able to tolerate entering small tunnel of traditional (closed) MRI; open MRIs are alternative for these patients

Ultrasound (Sonography)

- Uses sound waves to image body
- Allow body actions to be imaged in real time
- Uses include:
  - Observing fetal development and movement
  - Observing actions of heart valves

Abdominal Ultrasound

Cardiac Ultrasound



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