



Introduction to A&P

FOUNDATIONS

Definitions

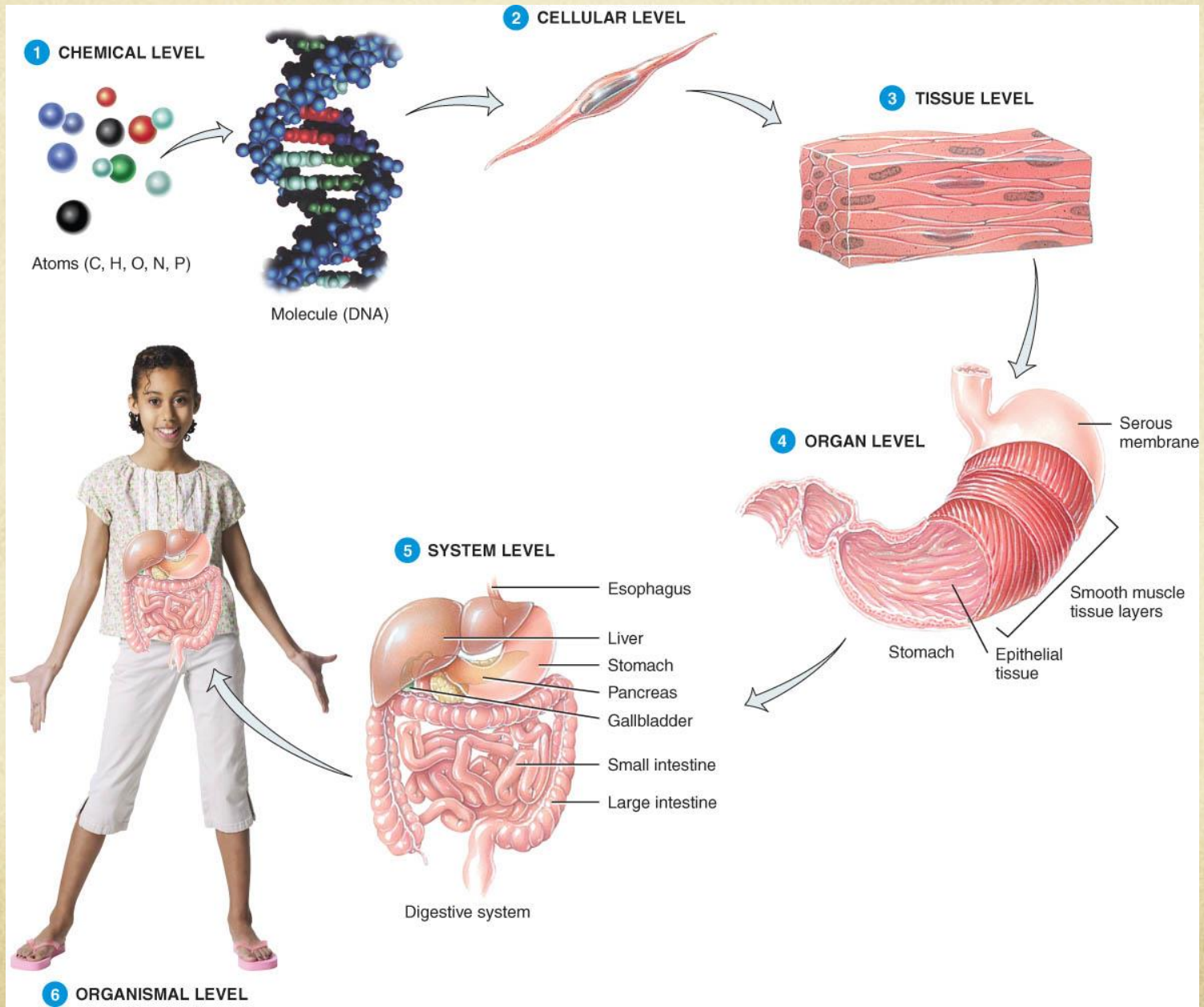
- **Anatomy**

- science of structure

- **Physiology**

- science of body functions

Levels of Organization



What is Wrong With Zombies?

BIO 201

- Integumentary
- Skeletal
- Muscular
- Nervous



Characteristics of the Living Human Organism

▣ The following are the six most important life processes of the human body:

1. *Metabolism*
2. *Responsiveness*
3. *Movement*
4. *Growth*
5. *Differentiation*
6. *Reproduction*

Homeostasis and Feedback Systems

- Homeostasis is a condition of equilibrium in the body's internal environment produced by the ceaseless interplay of all the body's regulatory processes.
- e.g. temperature, glucose levels



Homeostasis and Feedback Systems

- ▣ Homeostasis is continually being disrupted by
 - external stimuli
 - intense heat, cold , and lack of oxygen
 - internal stimuli
 - psychological stresses
 - exercise
- ▣ Disruptions are usually mild & temporary
- ▣ Disruptions may lead to imbalances....



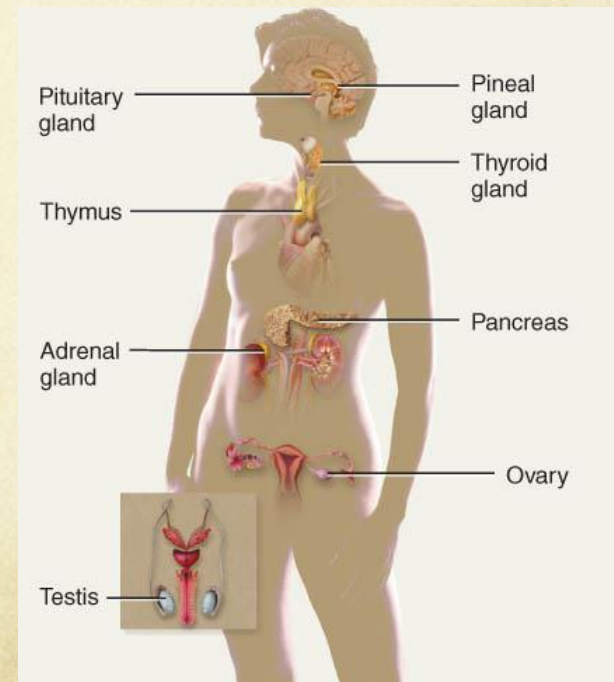
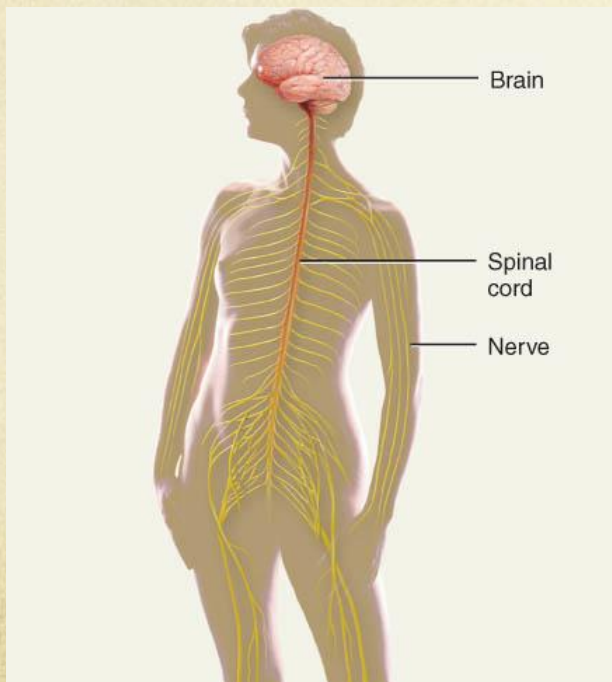
Homeostasis and Feedback Systems

- ▣ *Disorder* is any abnormality of structure or function.

- ▣ *Disease* is a more specific term for an illness characterized by a recognizable set of signs and symptoms.
 - *Signs* are objective changes that a clinician can observe and measure; e.g., fever or rash.
 - *Symptoms* are subjective changes in body functions that are not apparent to an observer; e.g., headache or nausea.

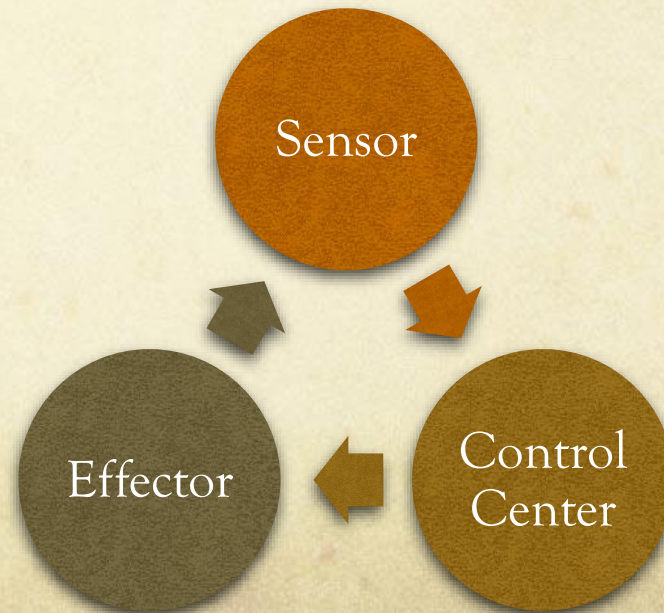
Homeostasis and Feedback Systems

- ▣ In general however, the nervous and endocrine systems maintain homeostasis
 - ▣ Soooo....how do they do this?



Homeostasis and Feedback Systems

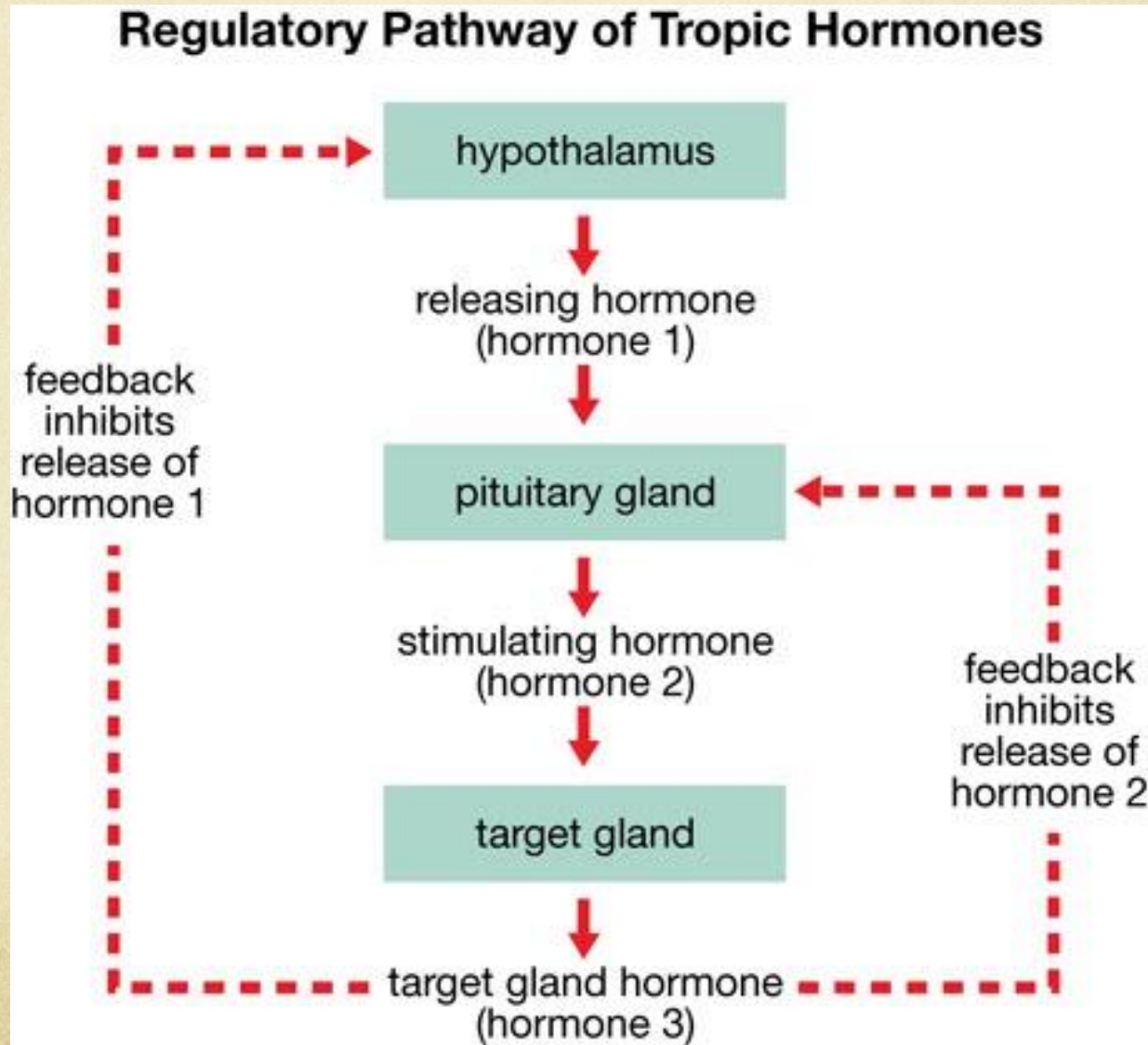
- A *feedback system* is a cycle of events in which information about the status of a condition is continually monitored and fed back (reported) to a central control region
- Any disruption that changes a controlled condition is called a stimulus.
- 3 components
 1. sensor
 2. control center
 3. effector



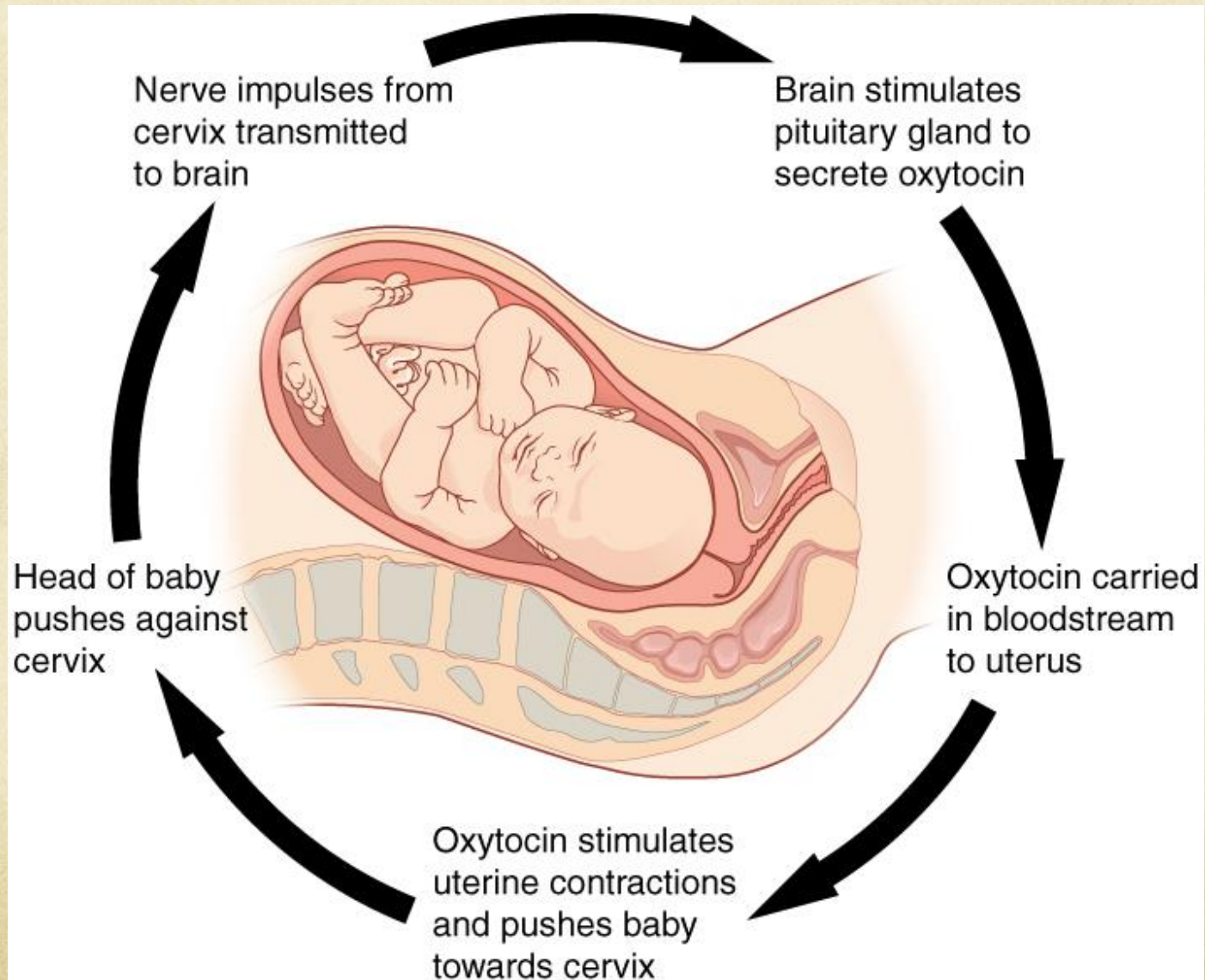
Homeostasis and Feedback Systems

- There are two types of feedback systems:
 - Negative
 - Positive
- ▣ If a response **reverses** the original stimulus, the system is a *negative feedback system*.
 - most systems work this way
- ▣ If a response **enhances** the original stimulus, the system is a *positive feedback system*.

So far so good?



So far so good?



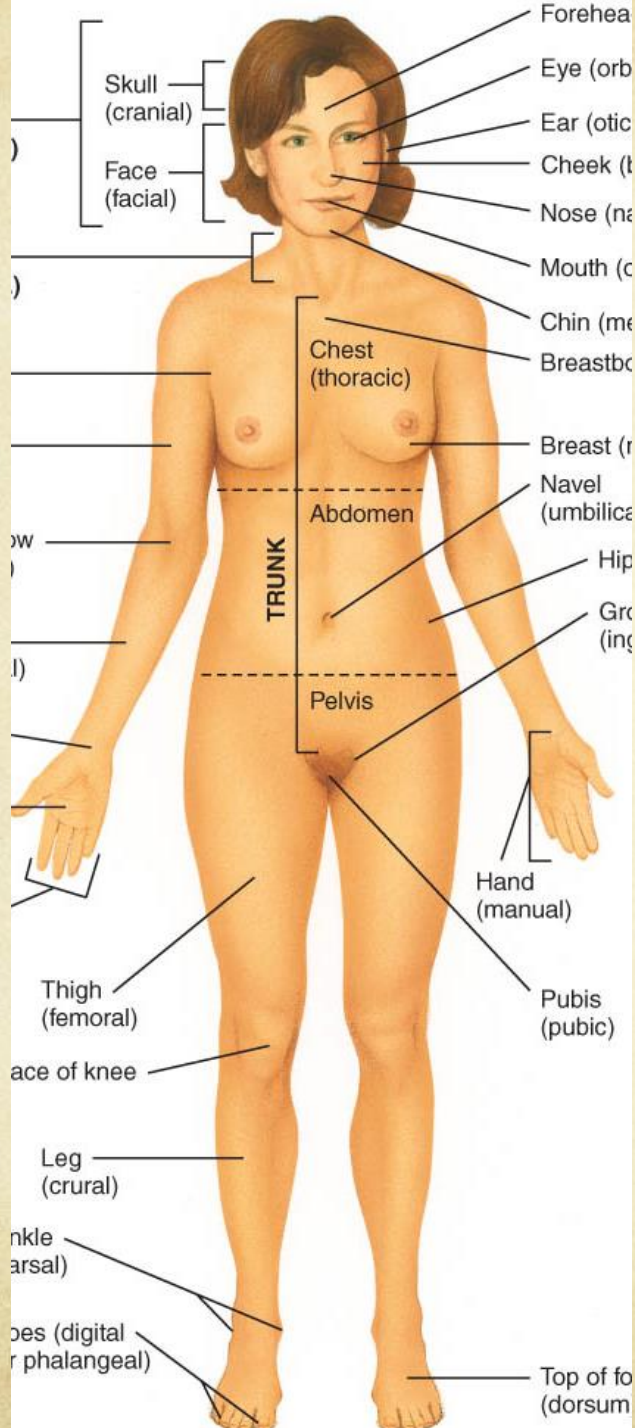
Anatomical Terminology - FOUNDATIONS

- Anatomical position
- Regions of the body
- Anatomical planes,
sections and directional
terms



**KEEP
CALM
AND
FOCUS ON
THE BASICS**

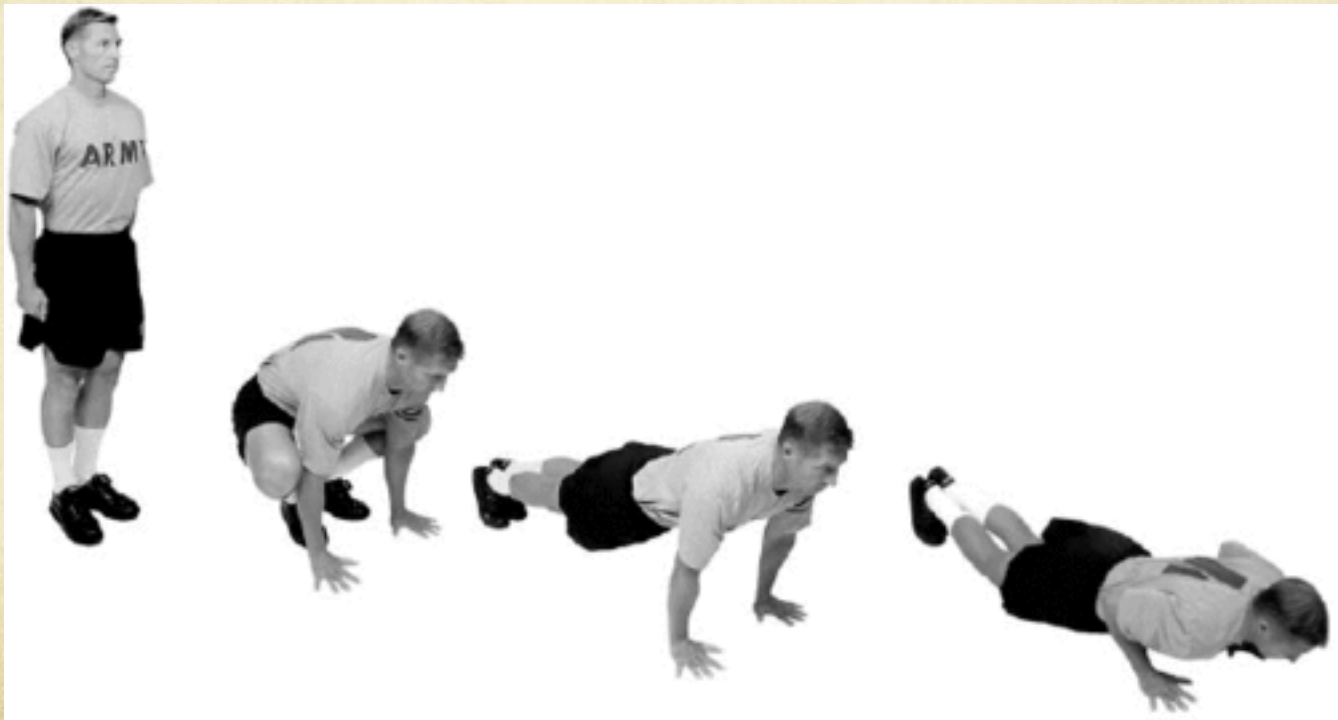
Anatomical Position



- Note the following:
 - Position of the hands
 - Position of the head
 - Position of the legs
- General orientation of the individual. I.e. is the person is standing

Other Terminology

- If the body is lying face down, it is in the prone position.
- If the body is lying face up, it is in the supine position.



Regional Names

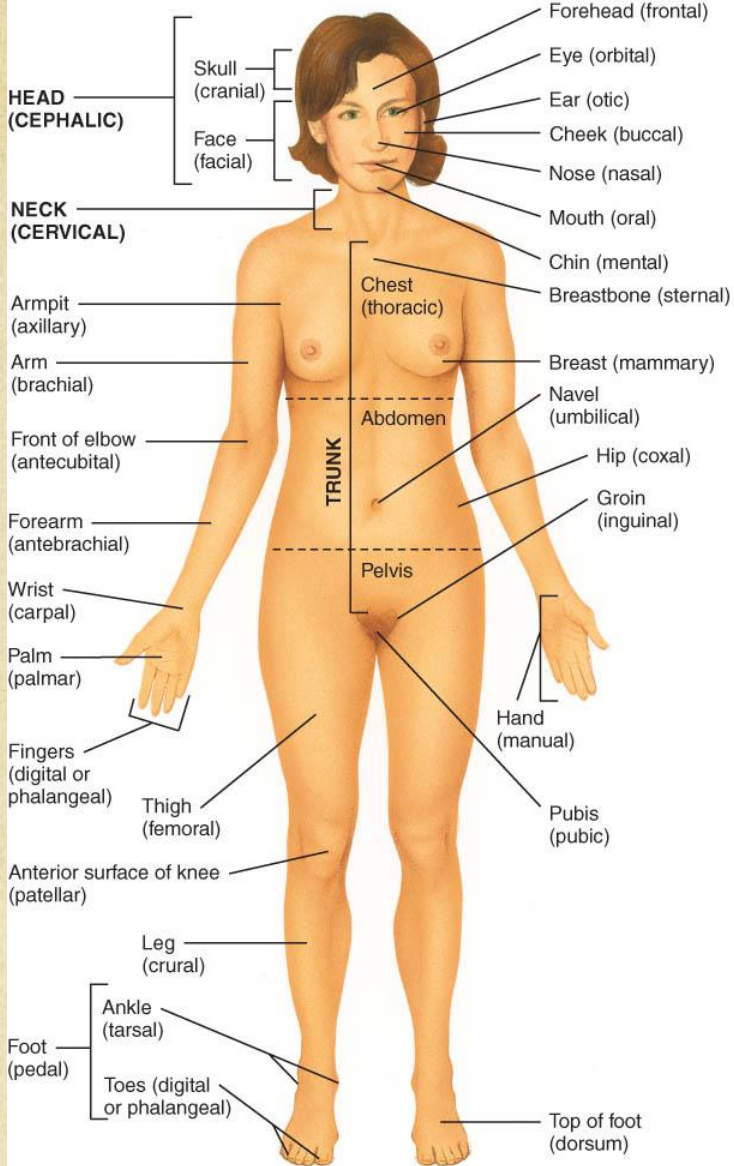
- Names given to specific regions of the body for reference.
- You MUST learn ALL of them.

Regional Names

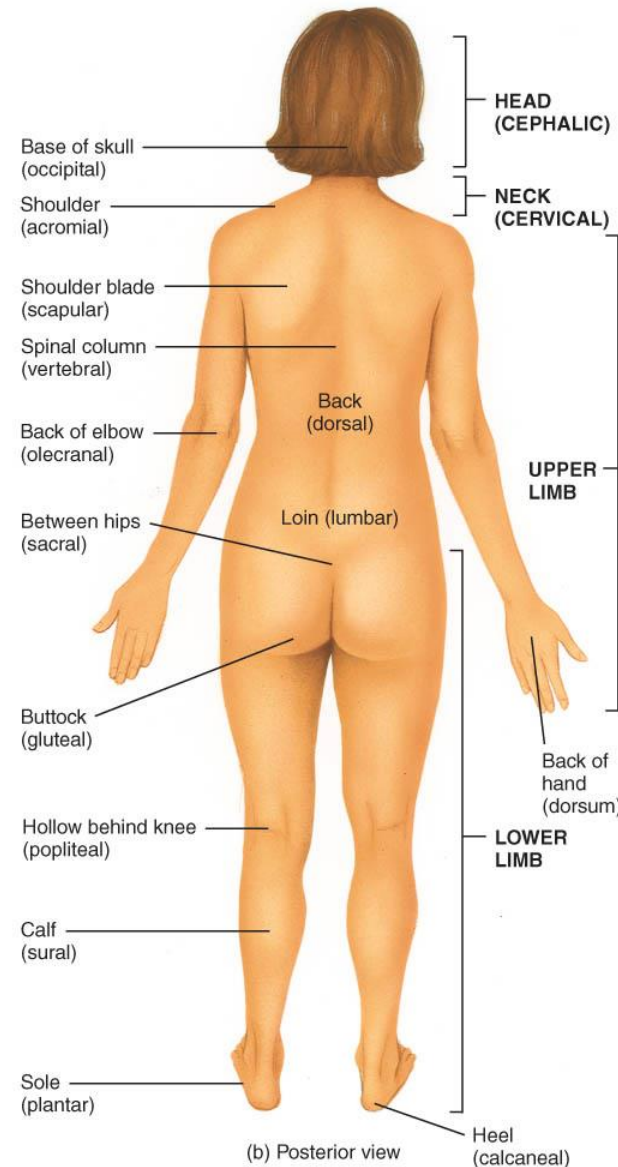
Yes, ALL of them.

This will seem like a lot now, but:

1. You need to know them for allied health programs
2. You will be using these terms throughout the semester



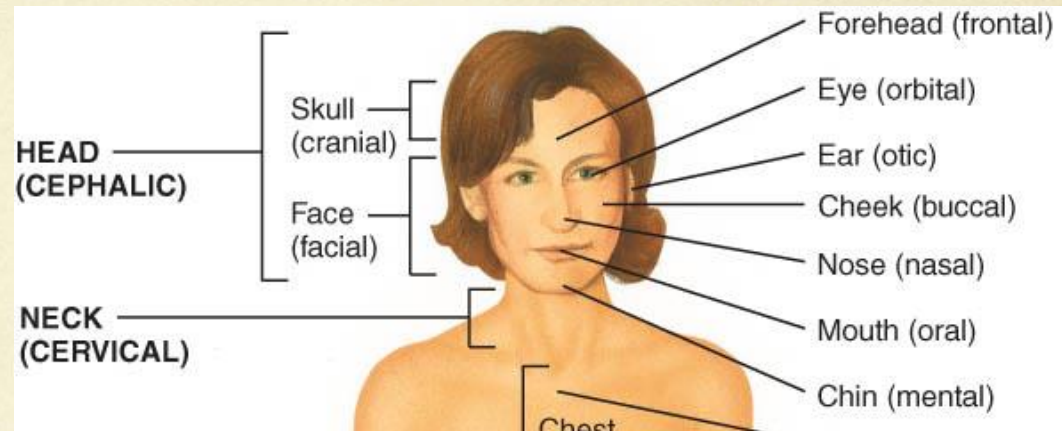
(a) Anterior view



(b) Posterior view

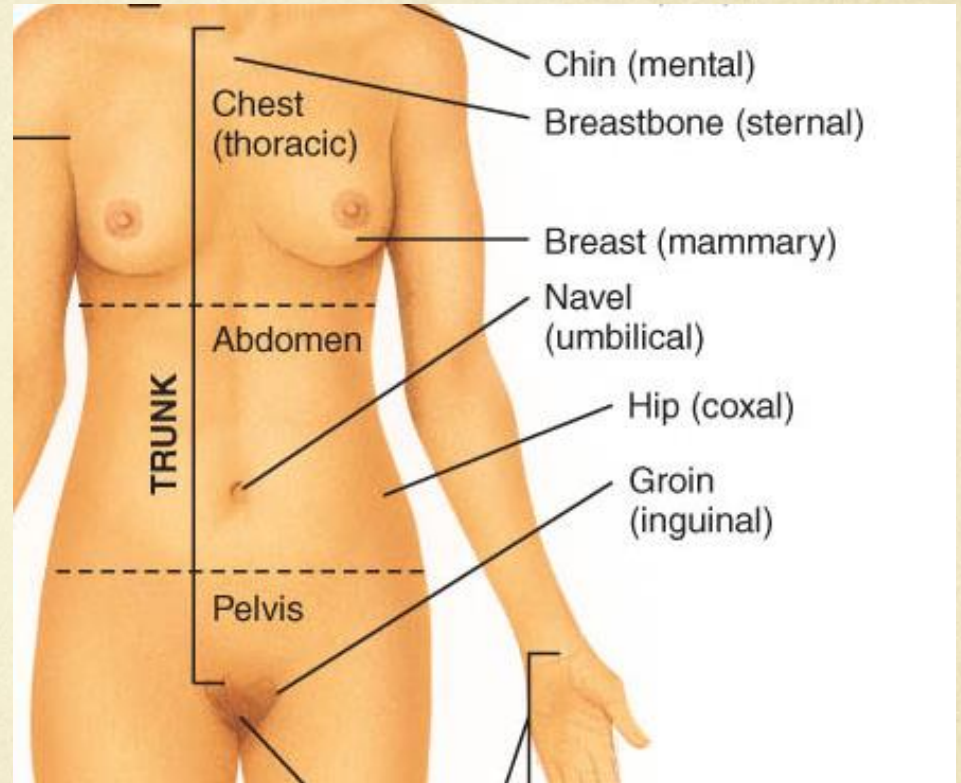
Regional Names - List

- Cephalic - Head
 - Cranial - skull
 - Facial - face
 - Frontal - forehead
 - Temporal - temple
 - Orbital/Ocular - eye
 - Otic - ear
 - Buccal - cheek
 - Nasal - nose
 - Oral - mouth
 - Mental - chin
 - Occipital - base of skull
- Cervical - Neck



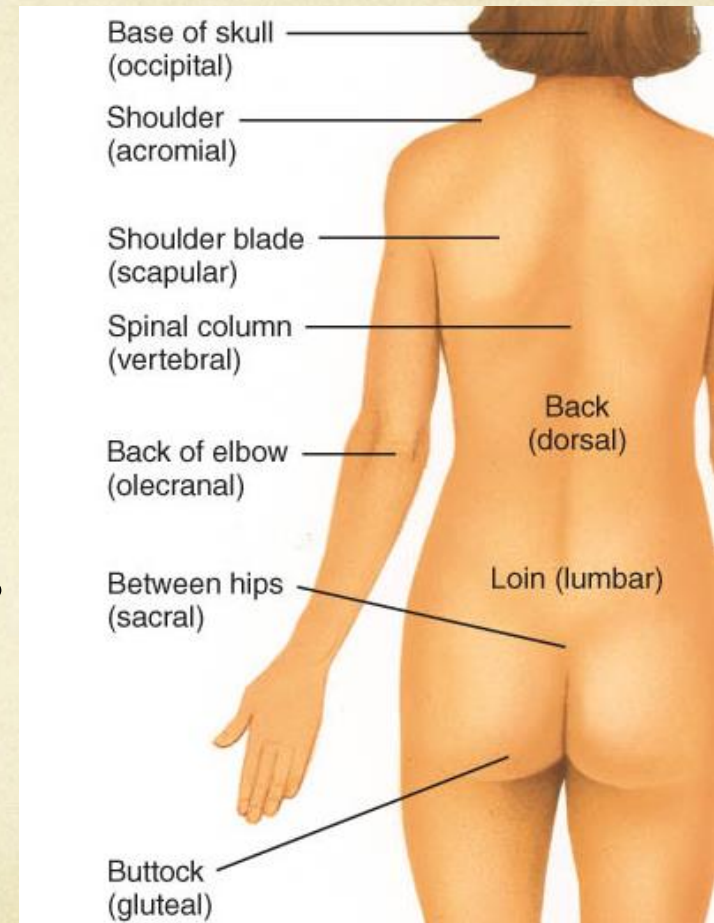
Regional Names - List

- Trunk – anterior (front)
 - Thoracic – chest
 - Sternal – breastbone
 - Mammary – breast
 - Abdominal – abdomen
 - Umbilical – navel
 - Coxal – hip
 - Pelvic – pelvis
 - Inguinal – groin
 - Pubic – pubis



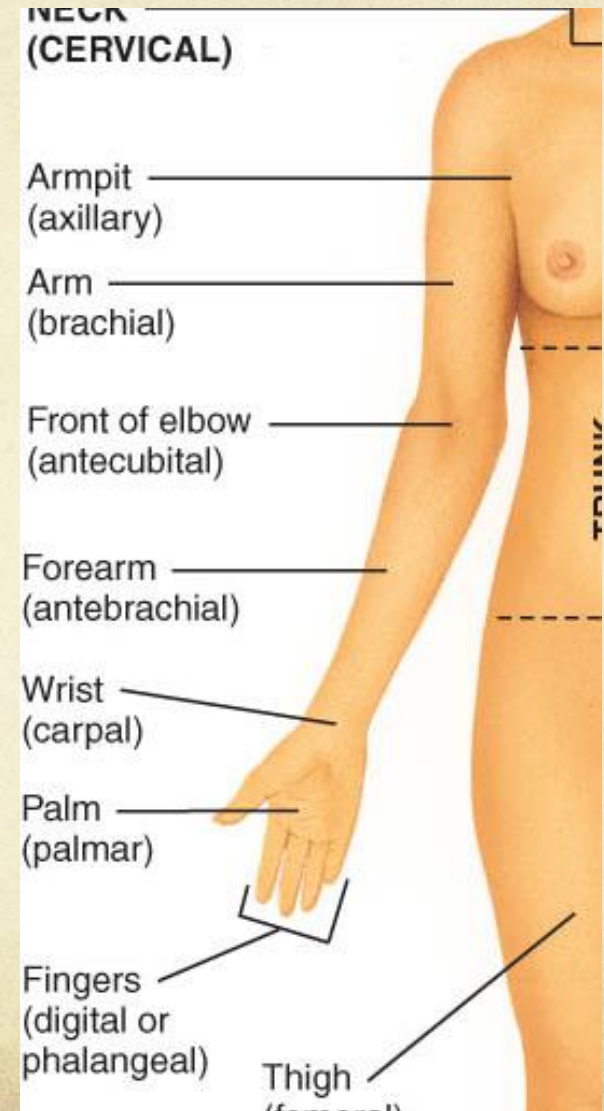
Regional Names - List

- Trunk – posterior (back)
 - Scapular – shoulder blade
 - Vertebral – spinal column
 - Sacral
 - Lumbar
 - Coccygeal – tailbone
 - Perineal – region between anus external genitals



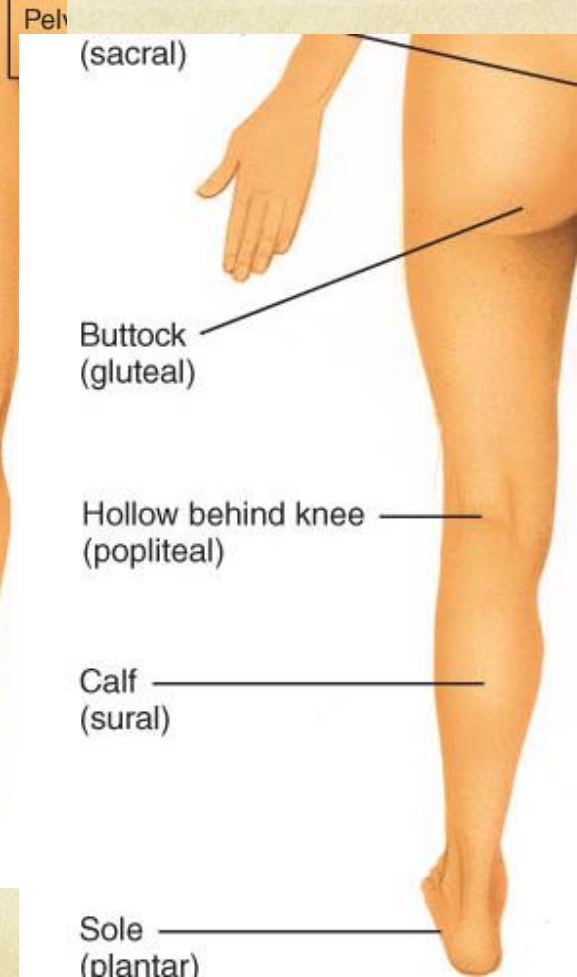
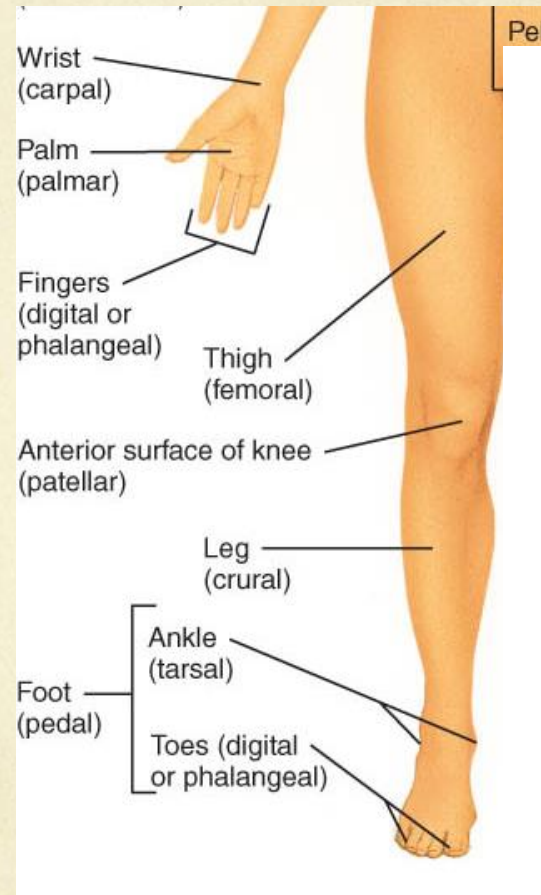
Regional Names - List

- Upper Limb
 - Acromial - shoulder
 - Axillary - armpit
 - Brachial - arm
 - Antecubital - front of elbow
 - Antebrachial - forearm
 - Carpal - wrist
 - Manual - hand
 - Palmar - palm
 - Dorsum - back of hand
 - Digital/phalangeal - fingers
 - Pollex - thumb
 - Olecranal/cubital - back of elbow



Regional Names - List

- Lower Limb
 - Gluteal - buttock
 - Femoral - thigh
 - Patellar - kneecap
 - Popliteal - back of knee
 - Crural - leg
 - Sural - calf
 - Pedal - foot
 - Tarsal - ankle
 - Calcaneal - heel
 - Digit/phalangeal - toes
 - Dorsum - top of foot
 - Plantar - bottom or sole of foot
 - Hallux - big toe



Phew!

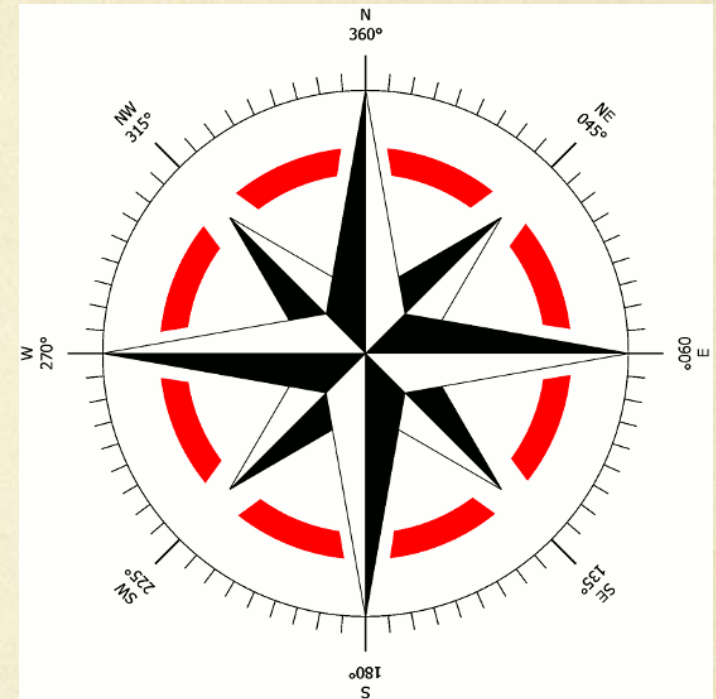


Major Directional Terms SUPER IMPORTANT



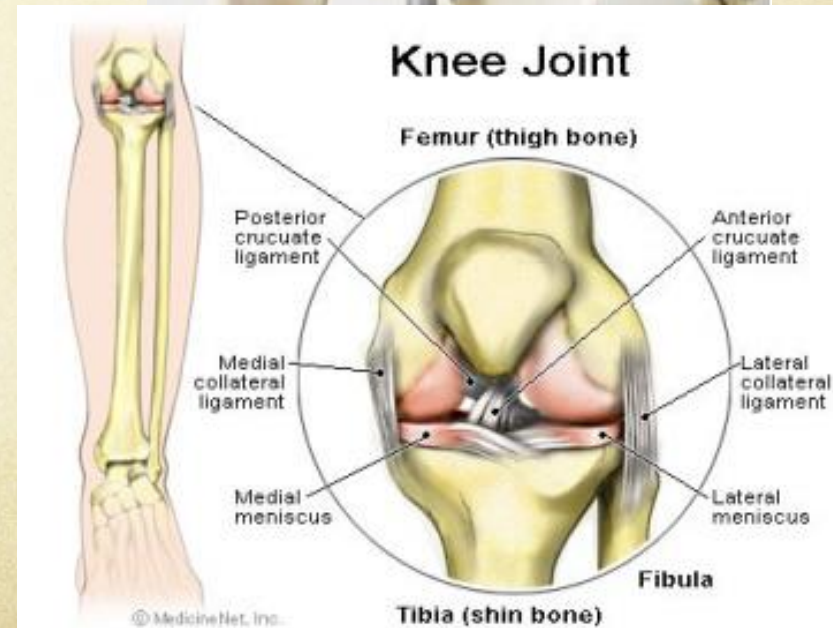
Major Directional Terms

- Are generally used one of two ways:
 1. In the name of a structure
 2. Describing the location of a structure or injury or abnormality or pain etc.



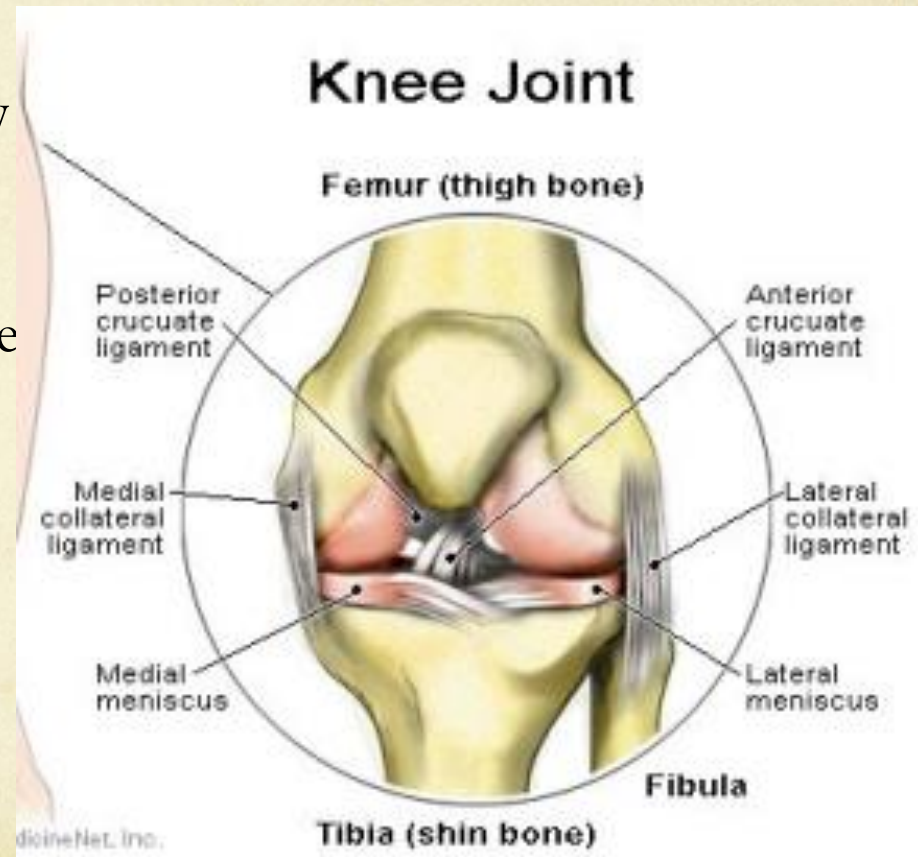
Major Directional Terms

- Dorsal or Posterior
 - Towards the back of the body
- Ventral or Anterior
 - Towards the front of the body
- Example 1: The heart is posterior to the sternum. OR: The sternum is anterior to the heart.
- Example 2: Posterior cruciate ligament and anterior cruciate ligament
- Example 3: The bruise was on the anterior surface of the left arm.



Major Directional Terms

- Medial - Towards the midline
- Lateral - Towards the sides/Away from the midline
- Example 1: In proper anatomical position, thumbs are lateral to the pinkies. OR: pinkies are medial to thumbs.
- Example 2: Medial collateral ligament and lateral collateral ligament
- Example 3 - The tattoo was located on the lateral surface of the left arm.



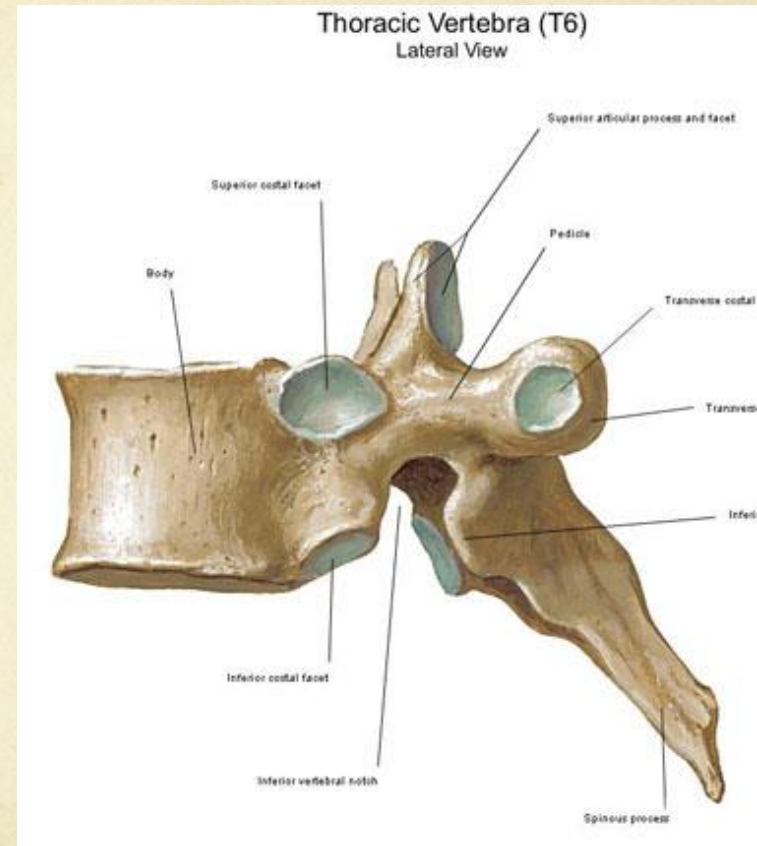
Major Directional Terms

- Proximal – nearer to the attachment of a limb to the trunk
- Distal – farther from to the attachment of a limb to the trunk
- Example 1: The hand is distal to the arm. OR the arm is proximal to the hand.
- Example 2: Proximal and distal epiphyses
- Example 3: The damage was on the proximal end of the humerus



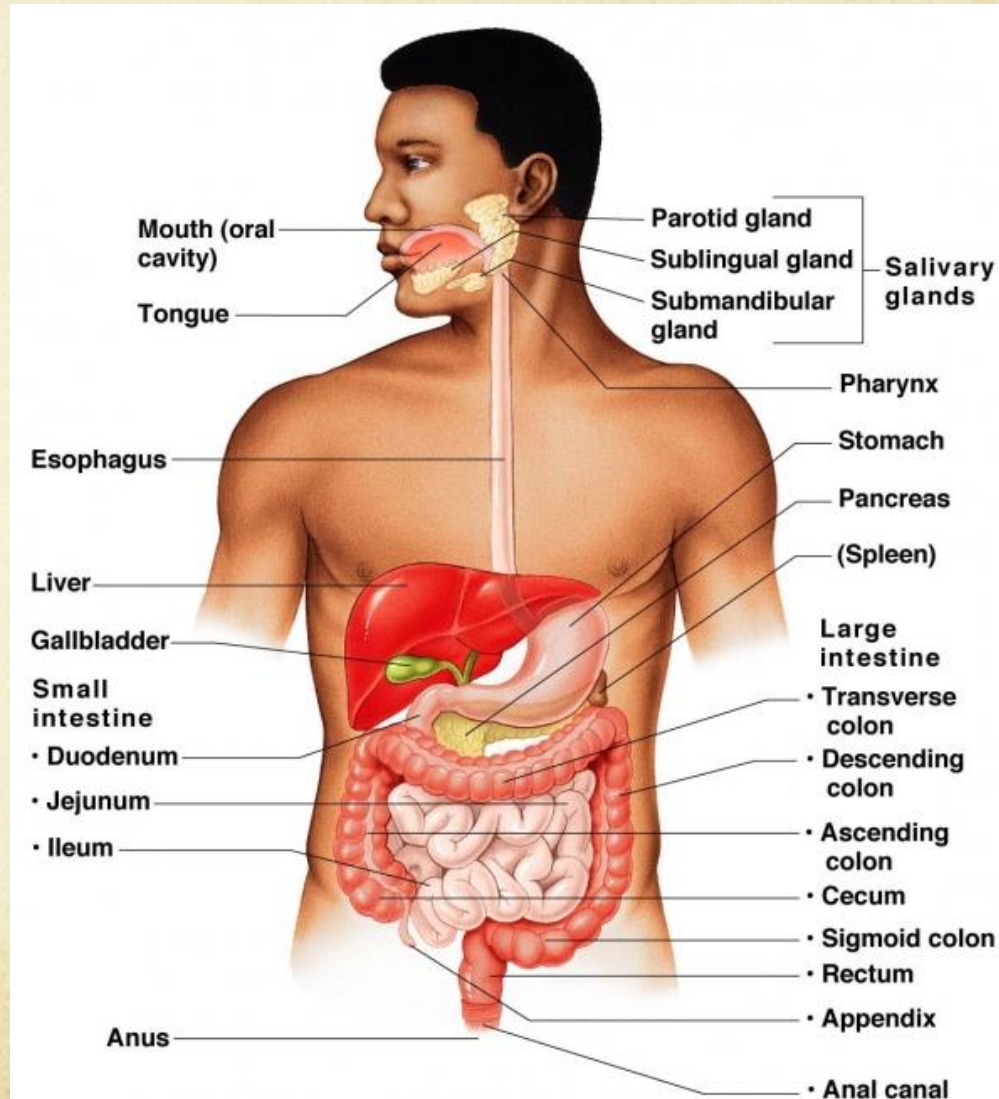
Major Directional Terms

- **Superior** – Toward the head/upper part of a structure
- **Inferior** – Away from the head/lower part of a structure
- Example 1: The heart is superior to the liver. OR the liver is inferior to the heart.
- Example 2: Superior articular facet and inferior articular facet on vertebra
- Example 3: The projectile pierced the inferior portion of the left eye.



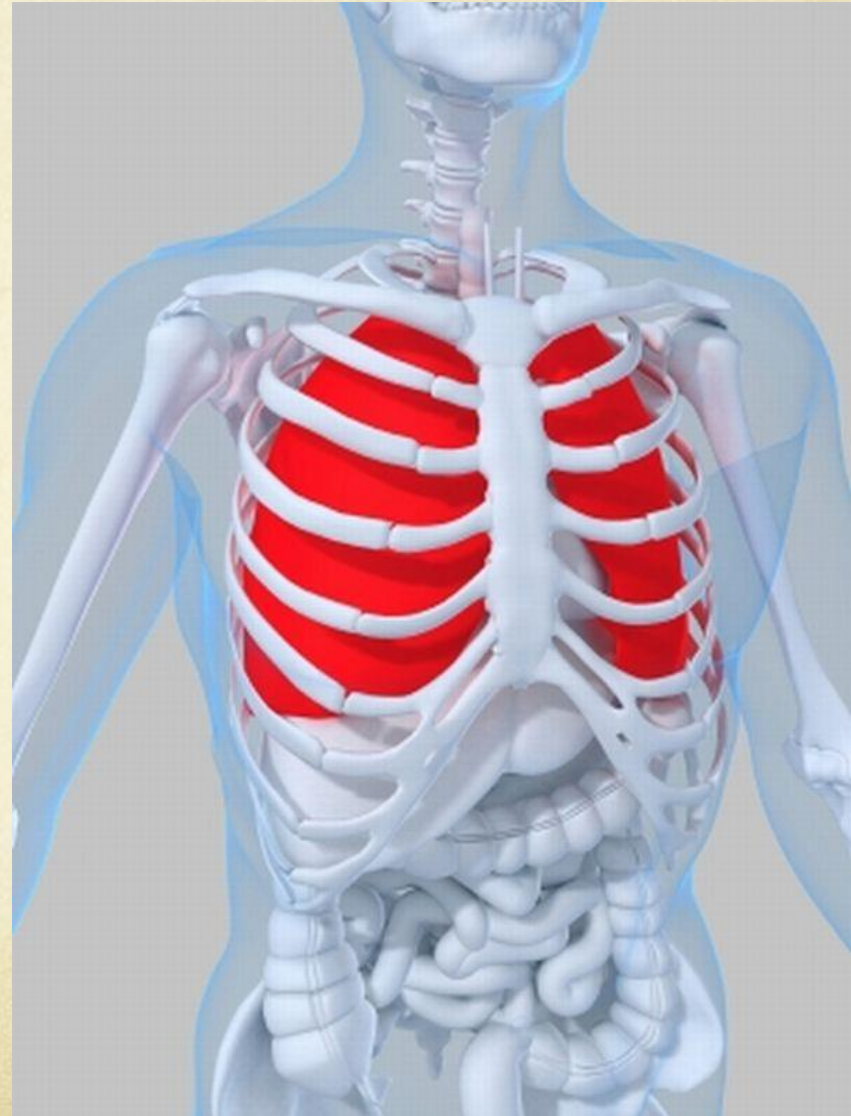
Major Directional Terms

- **Ipsilateral** – on the same side of the body as another structure
- **Contralateral** – on the opposite side of the body as another structure
- Example 1: The gallbladder and ascending colon are ipsilateral.
- Example 2: The ascending and descending colons are contralateral.
- Example 3: While the stroke was on the right side of the brain it resulted in paralysis on the contralateral side.



Major Directional Terms

- Superficial – toward the surface of the body
- Deep – away from the surface of the body
- Example 1 : Blood samples are taken from superficial veins.
- Example 2: The cut is superficial and will not require stitches.



Still With Me?



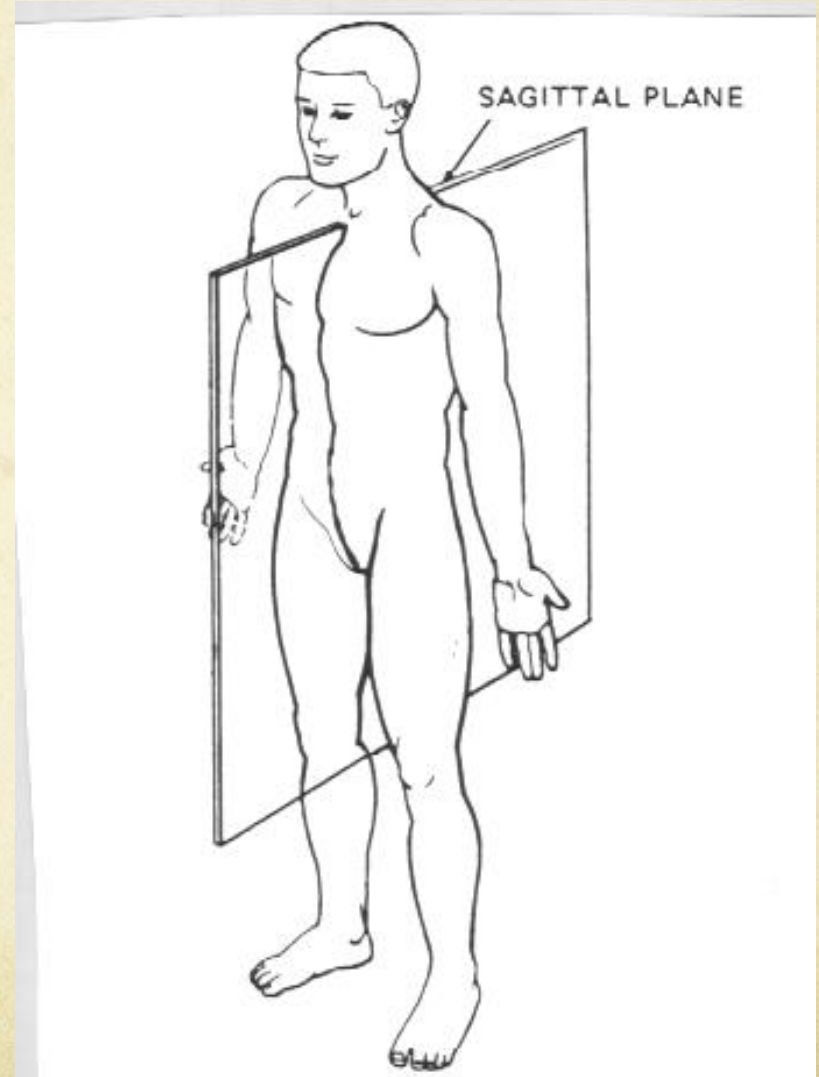
"O.K., there's the sun, so that direction is 'up.'"

Planes and Sections

- **Planes** - imaginary flat surfaces that are used to divide the body or organs into definite areas
- **Sections** - flat surfaces resulting from cuts through body structures, named according to the plane on which the cut is made (transverse, frontal, and midsagittal sections)
- When do we use these?

Planes and Sections

- **Sagittal plane**
 - divides the body or an organ into left and right sides
- **Midsagittal plane**
 - produces equal halves
- **Parasagittal plane**
 - produces unequal halves



Planes and Sections

- **Frontal or coronal plane**

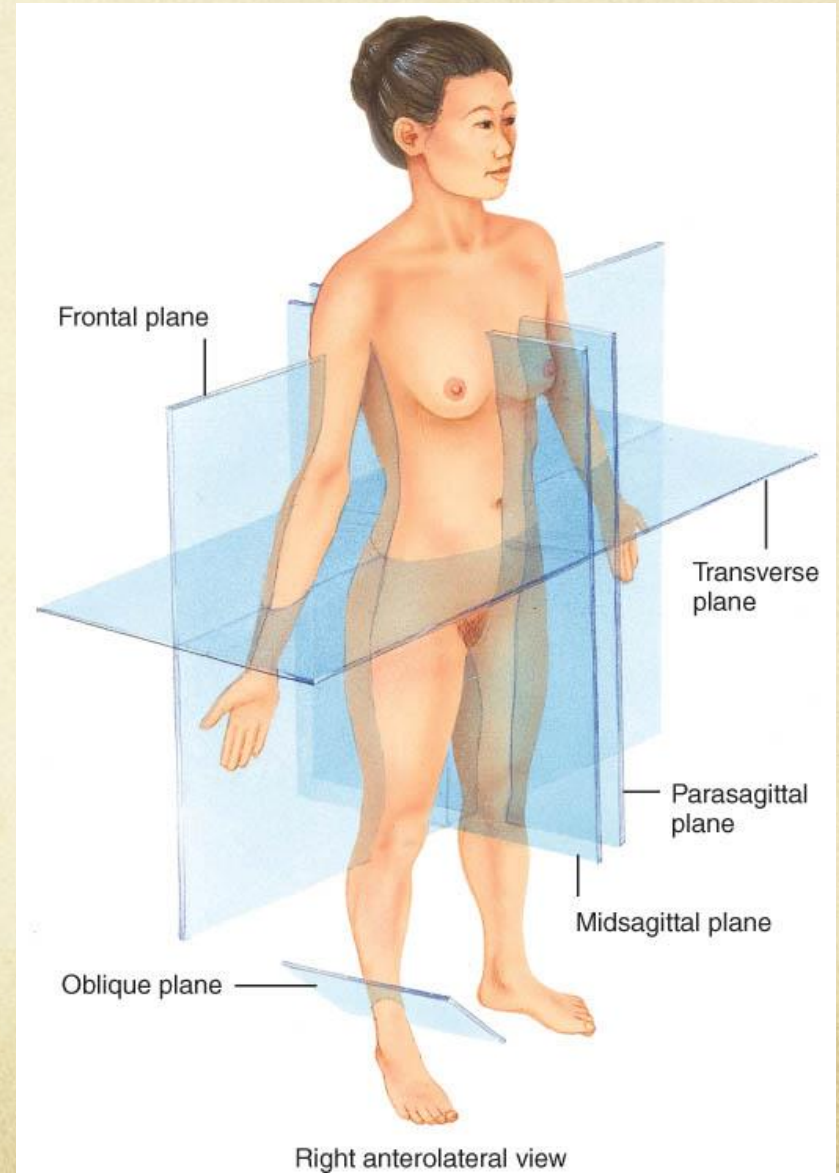
- divides the body or an organ into front (anterior) and back (posterior) portions

- **Transverse(cross-sectional) or horizontal plane**

- divides the body or an organ into upper (superior) or lower (inferior) portions

- **Oblique plane**

- some combination of 2 other planes



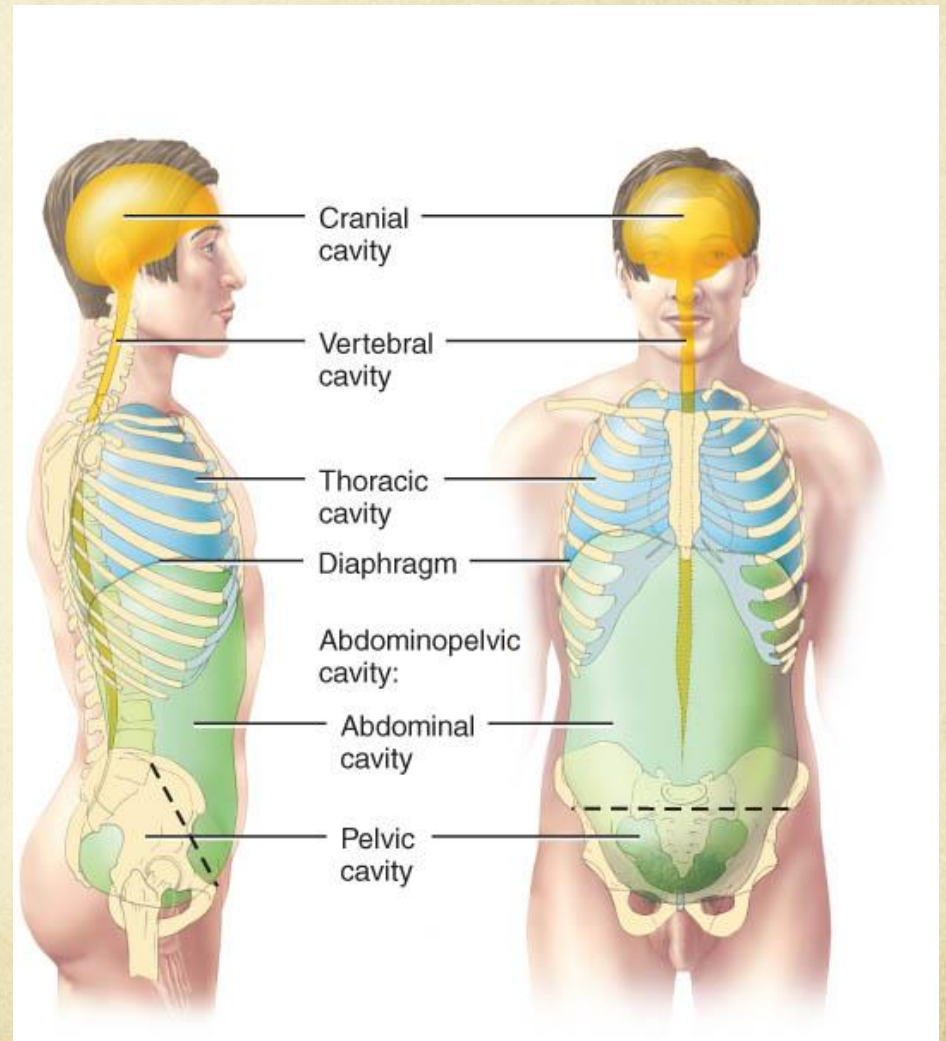
Other Basic Stuff

- Body cavities
- Membranes
- Abdominopelvic regions and quadrants
- Medical imaging



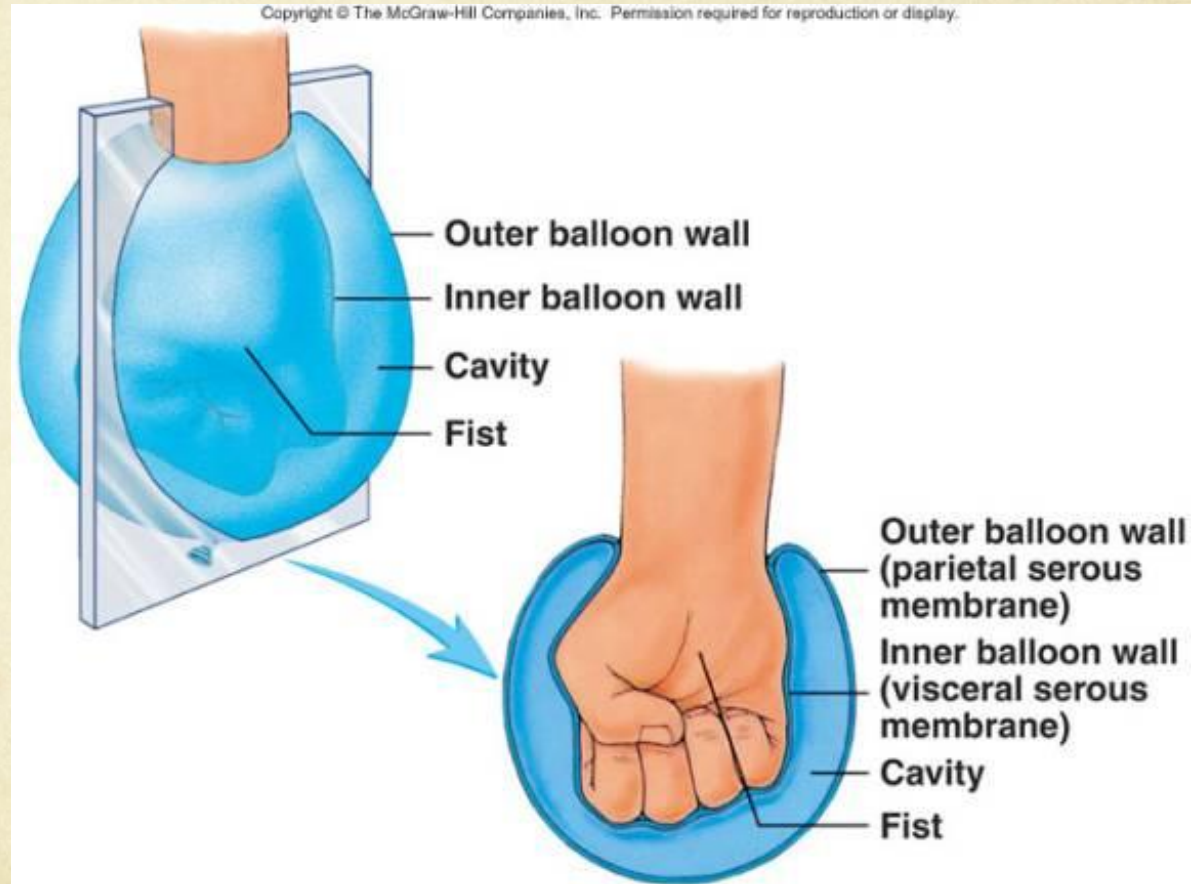
Body Cavities

- ▣ Cranial cavity
- ▣ Vertebral canal
- ▣ Thoracic cavity
 - Pleural cavity
 - Pericardial cavity
 - Mediastinum
- ▣ Abdominopelvic
 - Abdominal cavity
 - Pelvic cavity
- ▣ Oral
- ▣ Orbital
- ▣ Middle ear
- ▣ Synovial



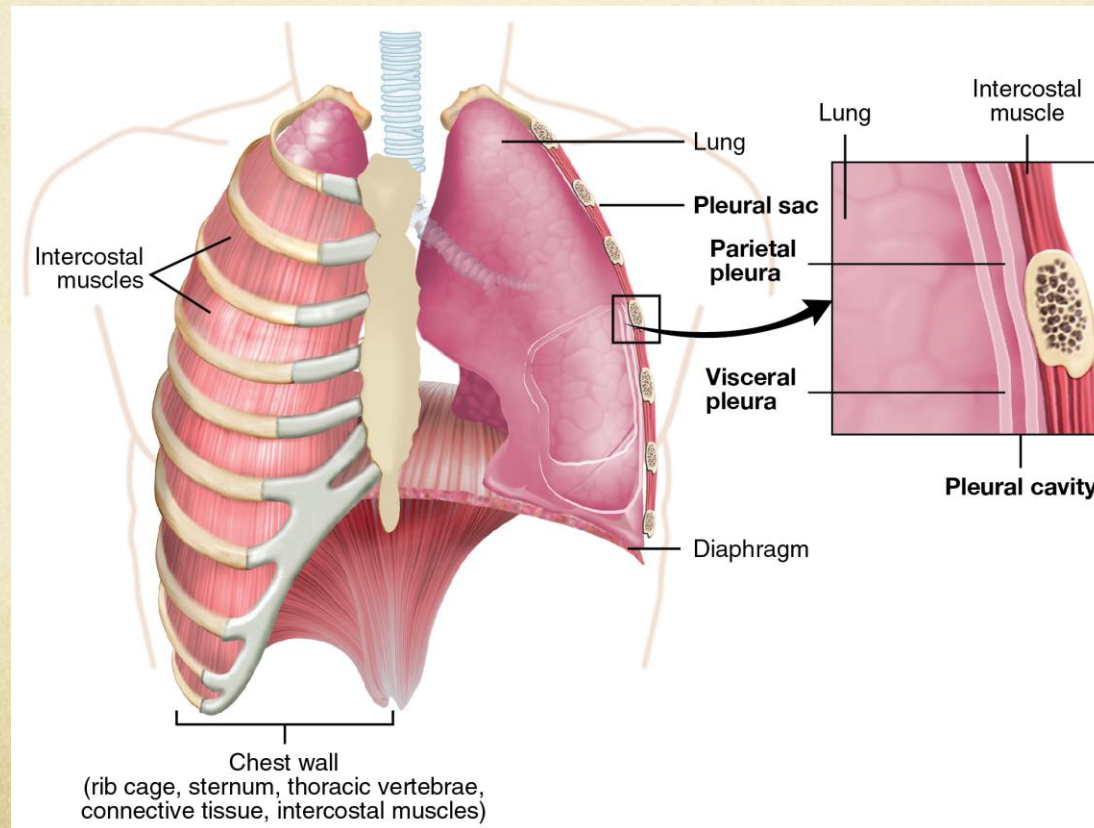
Membranes

- Body cavities that do not open to the outside world are lined with a slippery membrane
- There are two parts to the slippery membrane
 - Parietal layer
 - Visceral layer
- In between the parietal and visceral layers is a fluid – serous fluid – reduces friction



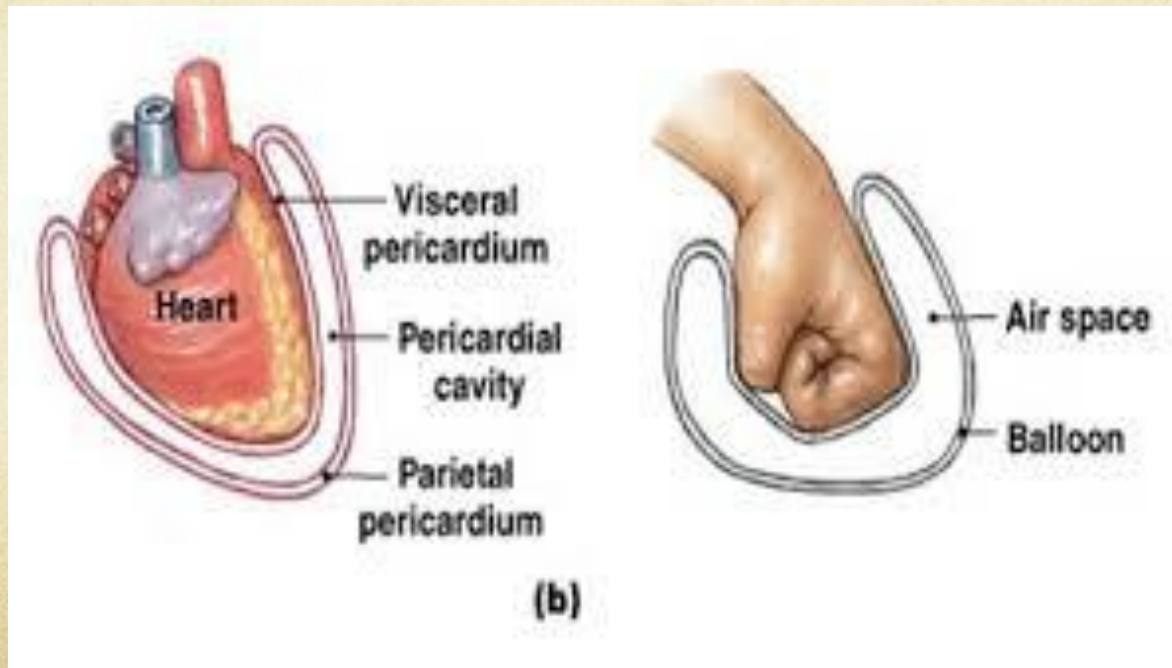
Membranes – Pleural cavity

- Pleural cavity
 - ▣ The pleural membrane surrounds the lungs
 - visceral pleura clings to the surface of the lungs
 - parietal pleura lines the chest wall



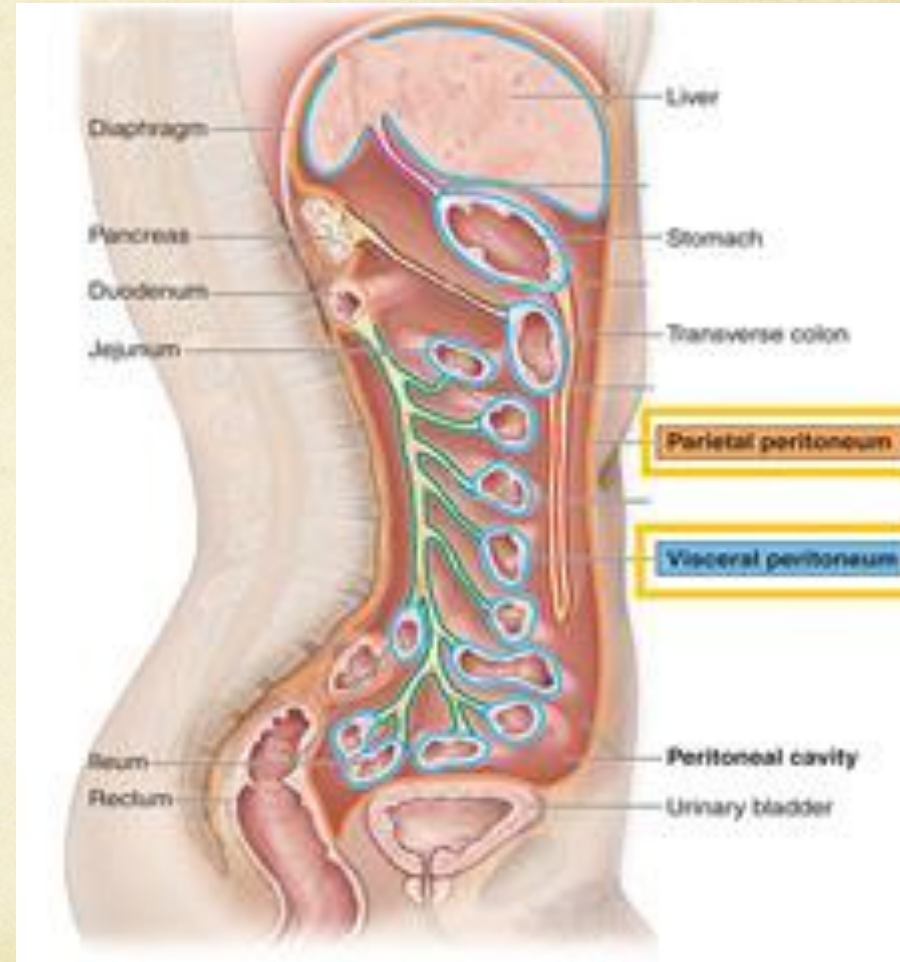
Membranes – Pericardial cavity

- Pericardial cavity
 - ▣ The pericardium is the serous membrane of the pericardial cavity
 - visceral pericardium covers the surface of the heart
 - parietal pericardium forms tough sac in which heart is



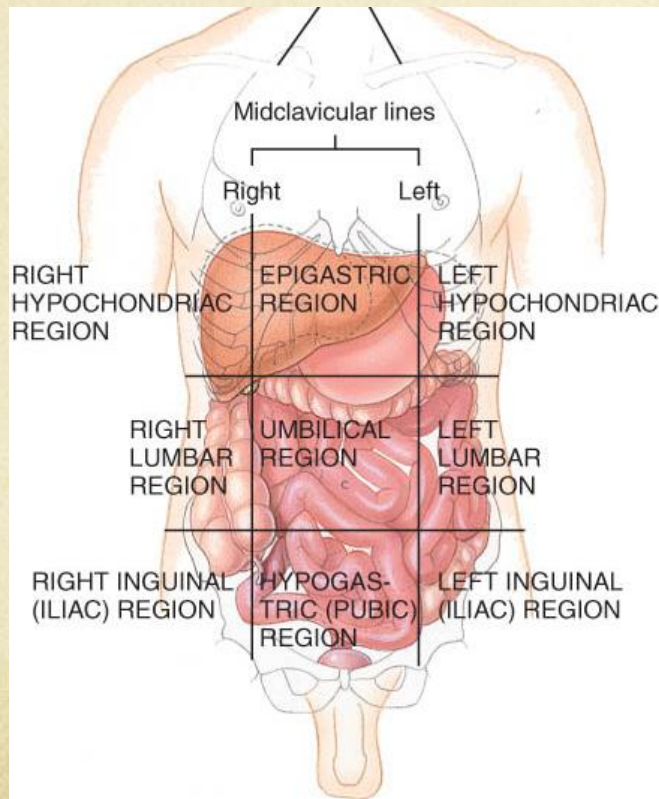
Membranes – Abdominopelvic cavity

- Abdominopelvic
 - ▣ The peritoneum is the serous membrane of the abdominal cavity
 - visceral peritoneum covers the abdominal viscera
 - parietal peritoneum lines the abdominal wall

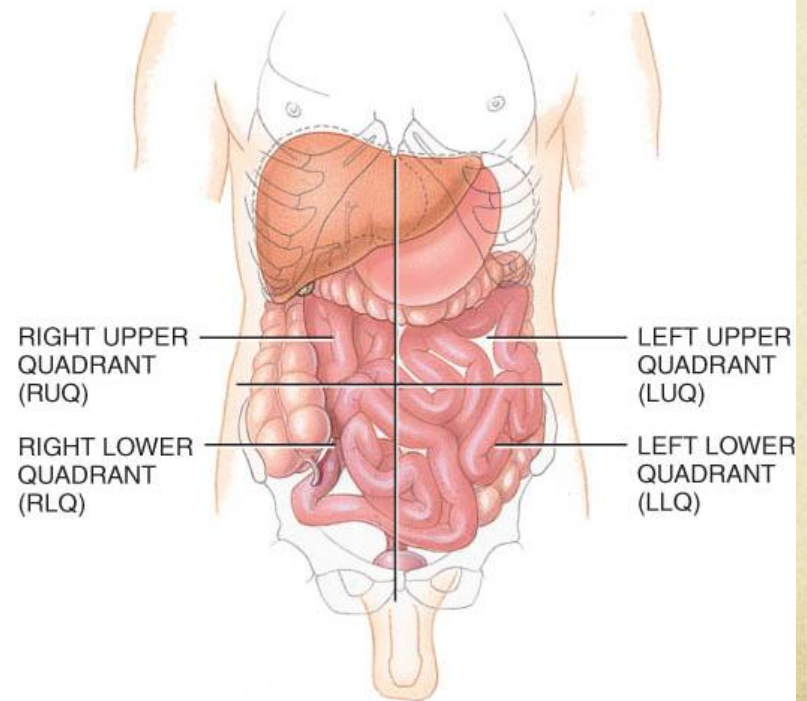


Abdominopelvic regions and quadrants

- Used to describe sources of pain or dysfunction or pathology



(b) Anterior view showing location of abdominopelvic regions



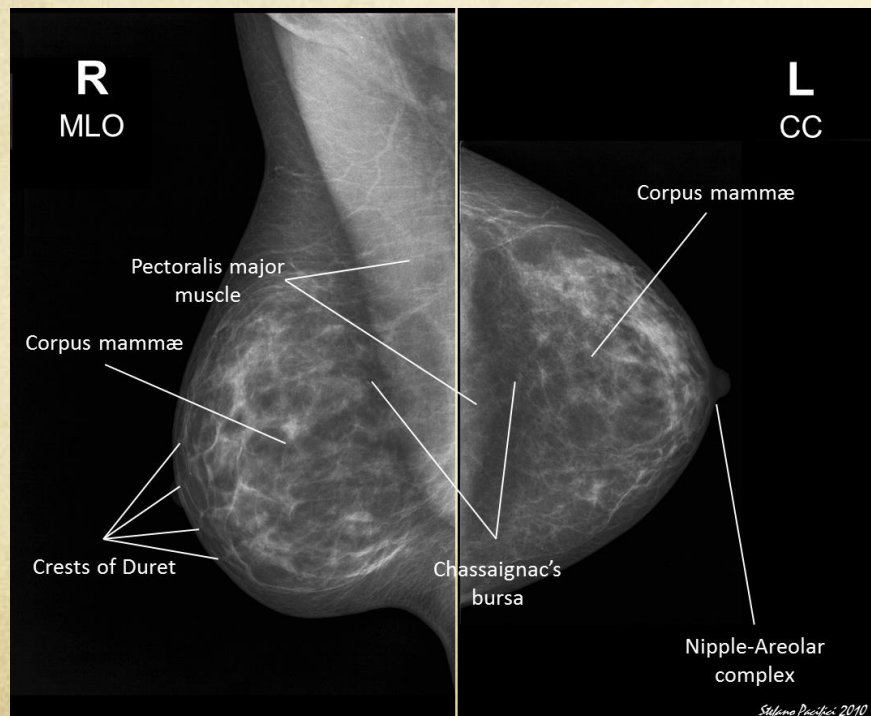
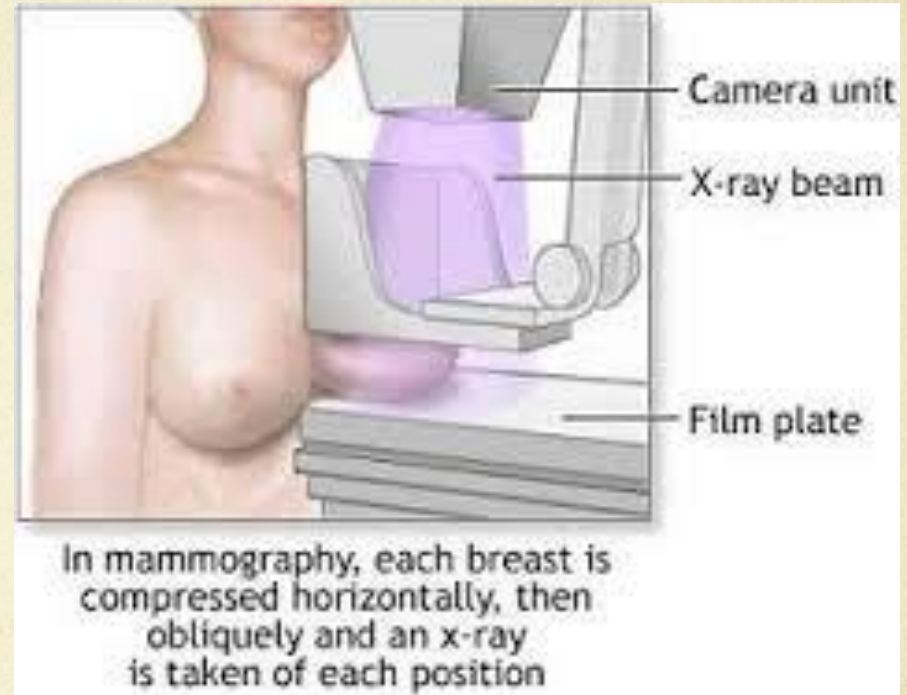
(c) Anterior view showing location of abdominopelvic quadrants

Medical Imaging

- Radiography
- Magnetic Resonance Imaging (MRI)
- Computed Tomography (CT)
- Ultrasound
- Positron Emission Tomography (PET)
- Endoscopy

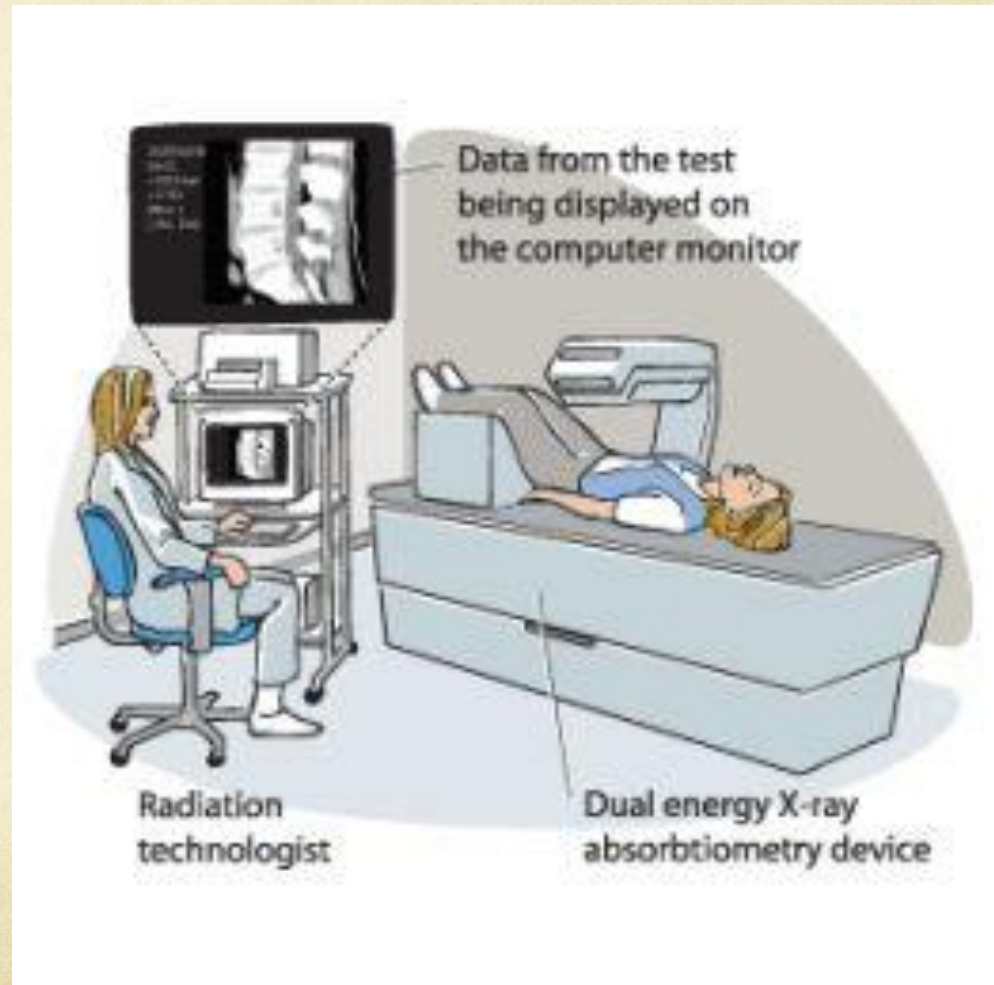
Medical Imaging

- Radiography
 - Xrays
 - Mammography
 - Bone densitometry



Medical Imaging

- Radiography
 - Xrays
 - Mammography
 - Bone densitometry



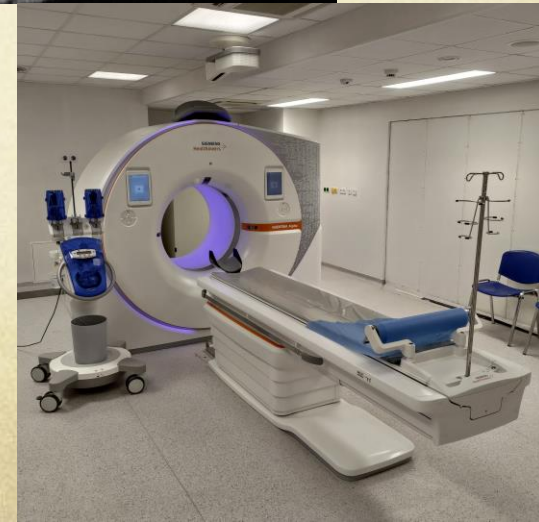
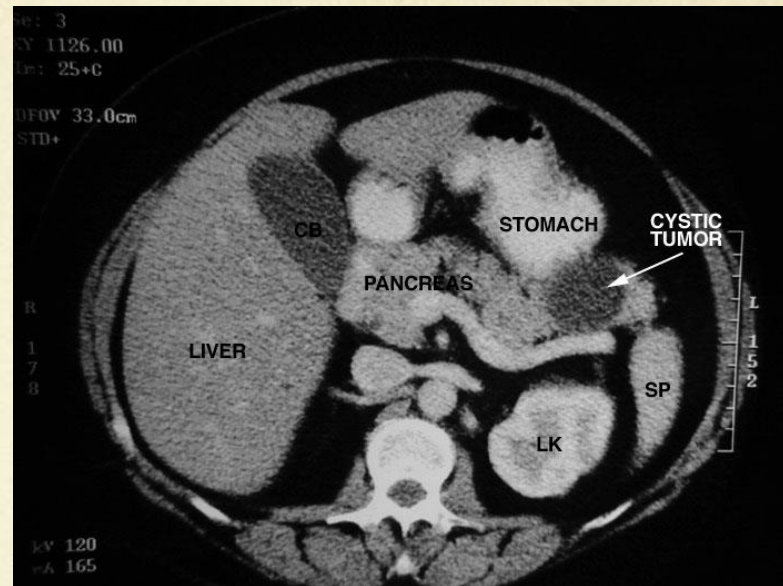
Medical Imaging

- Magnetic Resonance Imaging (MRI)
 - Body exposed to high-energy magnetic field
 - This causes protons to arrange themselves relative to the field
 - Pulse of radio waves “reads” ion patterns
 - Computer turns it into an image



Medical Imaging

- Computed Tomography (CT)
 - Uses radiography at multiple angles around the body
 - Computer puts information together forming a slice of the body
 - Good for screening of some types of cancer



CT v MRI

- Advantages of each
 - CT – effective for surveying entire body for cancer; fairly fast; usually first choice of scan
 - MRI – can identify abnormalities of certain soft tissues better than a CT scan
- Disadvantages of each
 - CT – uses ionizing radiation so there's an extra risk of developing cancer due to the scan
 - MRI – have to hold a position still for a long period of time; people with claustrophobia can have difficulty; older medical devices made of metal can heat up

Medical Imaging

- Ultrasound
 - Sends high-frequency sound waves through body tissue that is picked up and interpreted by the same instrument.
 - Used in ?

2D Ultrasound



3D 4D Ultrasound

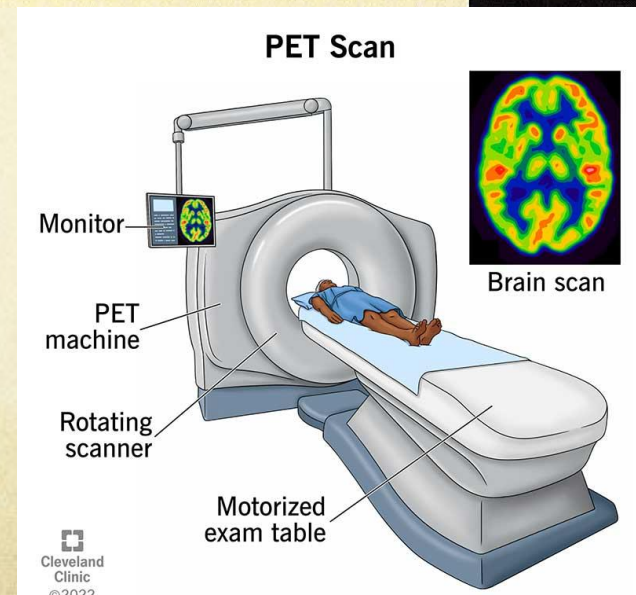
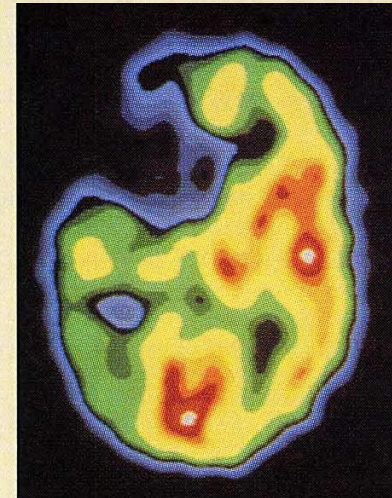
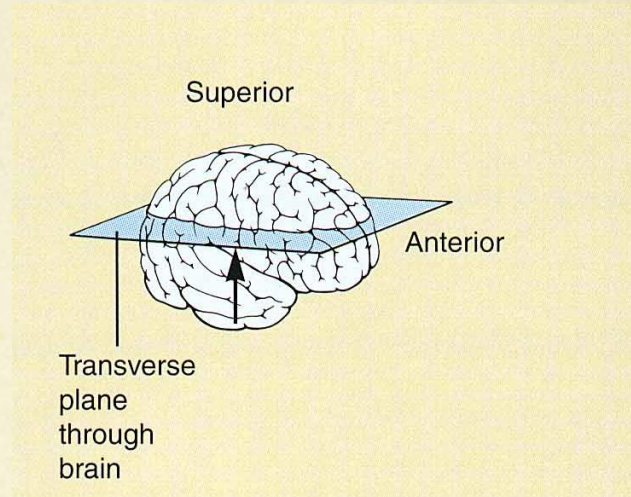


HD Live Ultrasound



Medical Imaging

- Positron Emission Tomography (PET)
- Positron emitting substance injected into the body and is absorbed by tissue
- Positrons collide with electrons forming gamma rays
- Special cameras detect gamma rays and send info to computer where it is turned into an image
- Used for physiology



Medical Imaging

- Endoscopy
 - Instrument called an endoscope has a camera
 - It is inserted into the body and takes realtime images



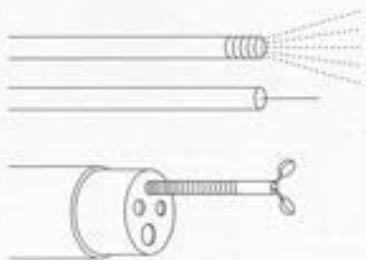
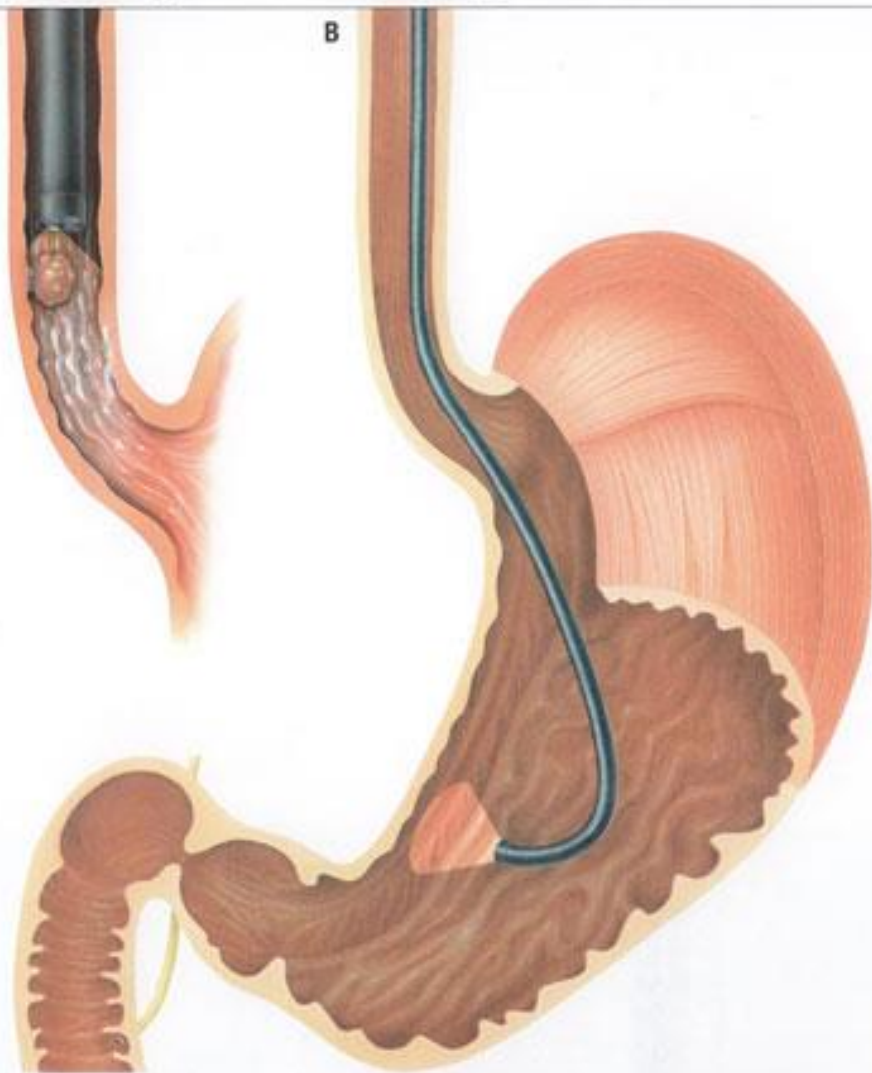
Oesophagoscopy

A



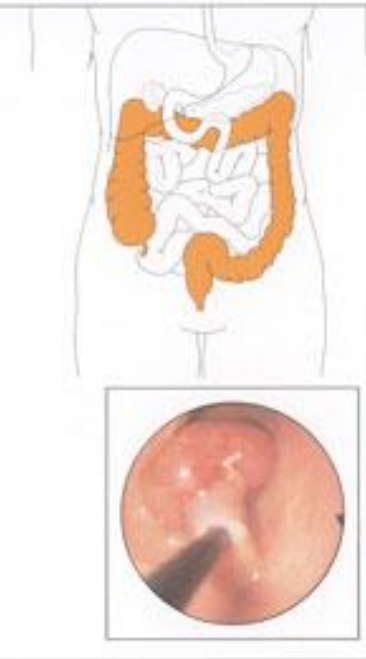
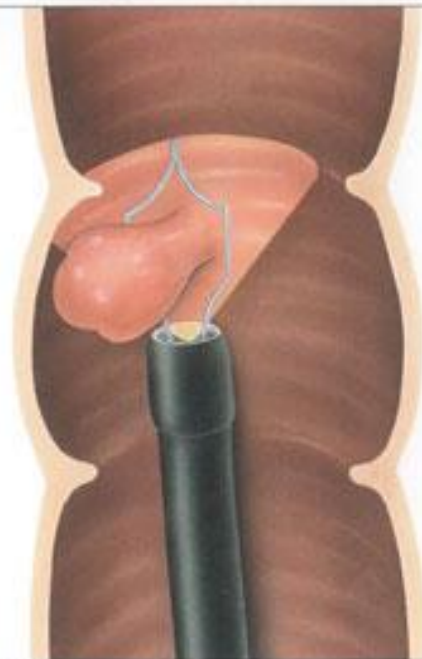
Gastroscopy

B



Colonoscopy

C



ERCP

D

