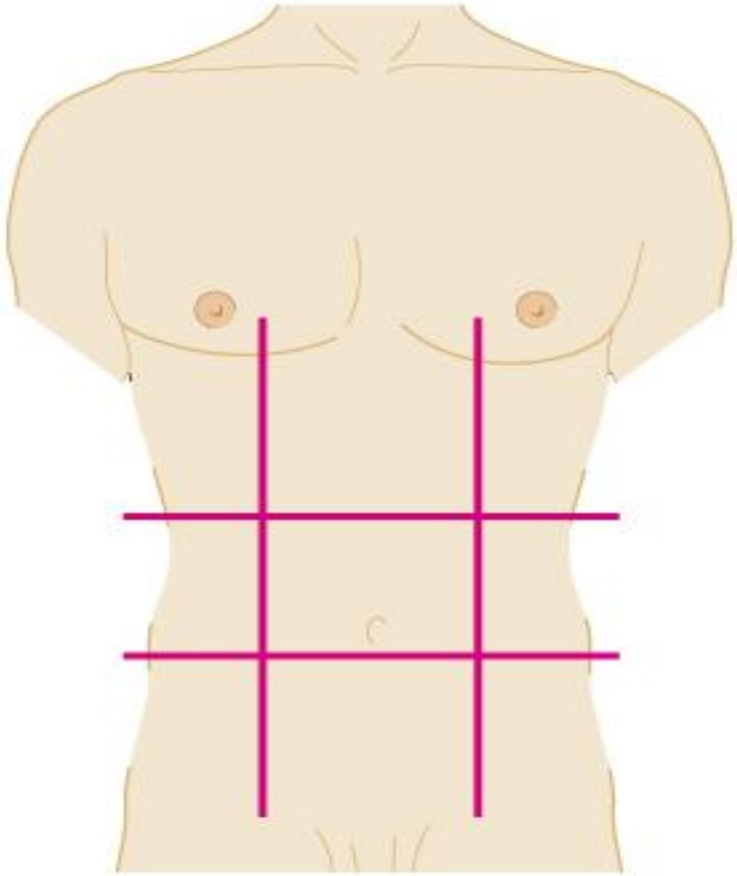
Orientations - Anatomy



(a)

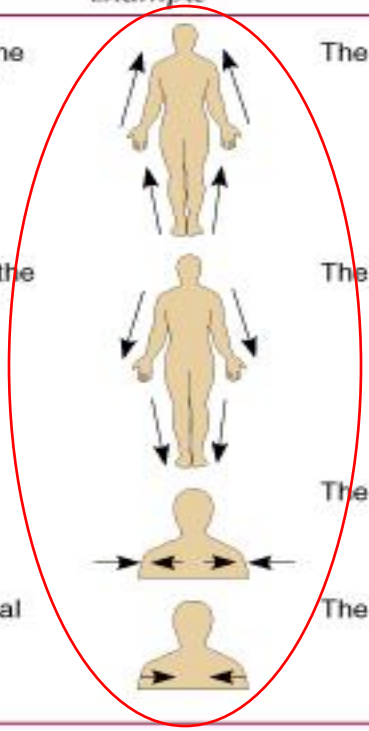
Topics

1. **Orientations**
2. **Medical Imaging**

Directions (1)

TABLE 1.1 Orientation and Directional Terms

Term	*Definition*	*Example*
Proximal	Closer to the origin of the body part or the point of attachment of a limb to the body trunk	The elbow is proximal to the wrist
Distal	Farther from the origin of a body part or the point of attachment of a limb to the body trunk	The knee is distal to the thigh
Superficial (external)	Toward or at the body surface	The skin is superficial to the skeletal muscles
Deep (internal)	Away from the body surface; more internal	The lungs are deep to the skin

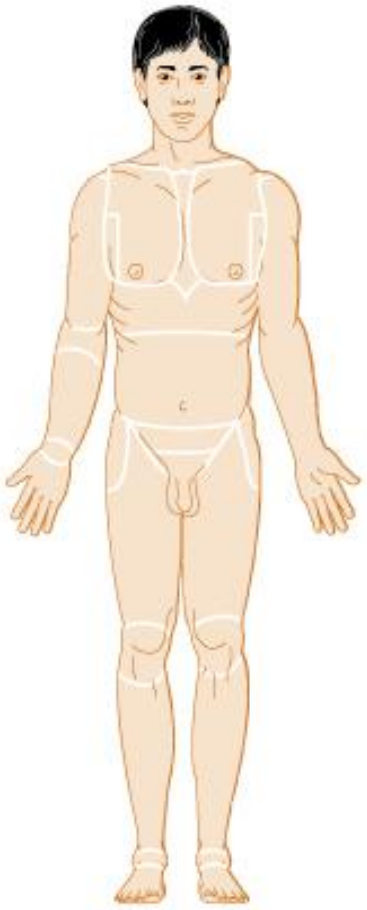


*Whereas the terms *ventral* and *anterior* are synonymous in humans, this is not the case in four-legged animals. *Ventral* specifically refers to the "belly" of a vertebrate animal and thus is the inferior surface of four-legged animals. Likewise, although the dorsal and posterior surfaces are the same in humans, the term *dorsal* specifically refers to an animal's back. Thus, the dorsal surface of four-legged animals is their superior surface.

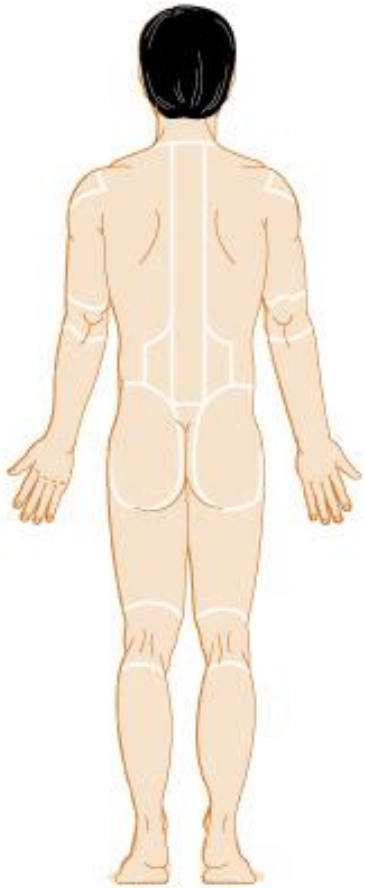
Directions (2)

1. **superior/cranial/cephalad**
2. **inferior/caudal**
3. **anterior/ventral**
4. **posterior/dorsal**
5. **medial**
6. **lateral**
7. **proximal**
8. **distal**
9. **superficial**
10. **deep**
11. **intermediate**

Landmarks/Body Regions



(a) Anterior

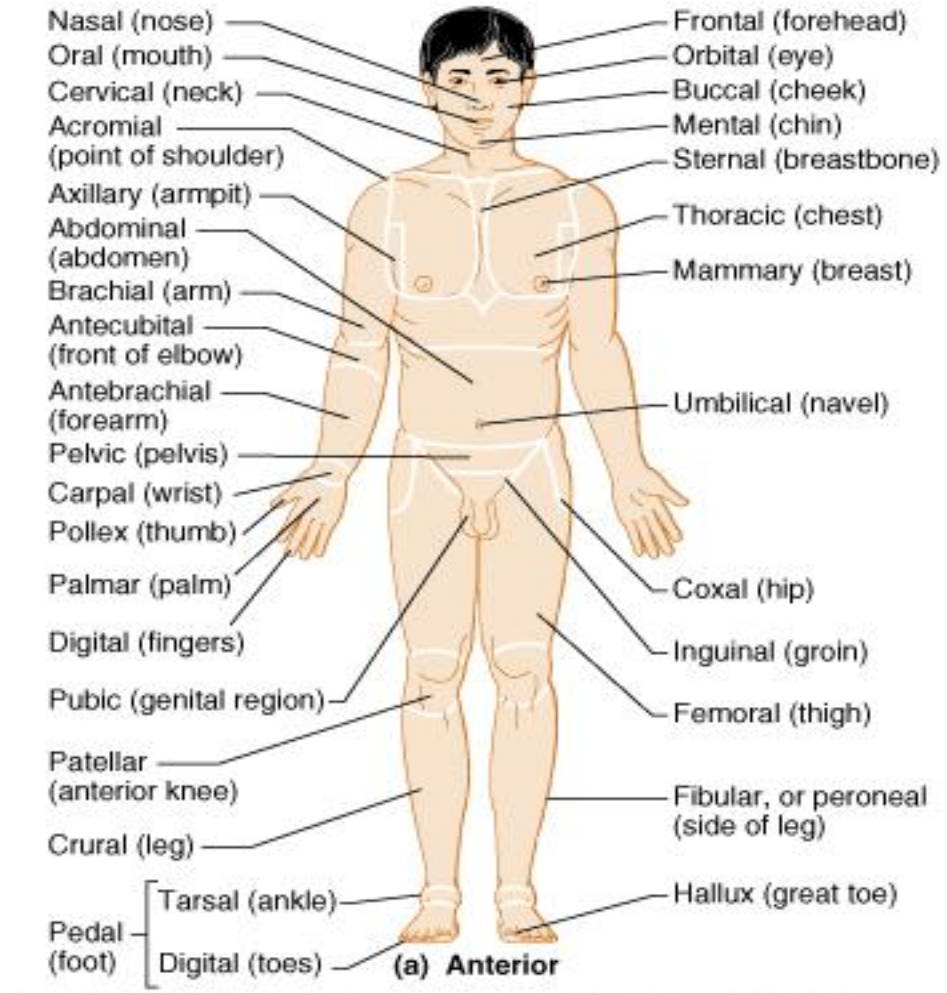


(b) Posterior

Anterior Body Regions (1)

1. abdominal
2. acromial
3. antebrachial
4. antecubital
5. axillary
6. brachial
7. buccal
8. carpal
9. cervical
10. coxal
11. digital
12. crural
13. femoral
14. frontal
15. inguinal
16. mammary
17. mental
18. nasal
19. oral
20. orbital
21. palmar
22. patellar
23. pedal
24. pelvic
25. peroneal
26. pubic
27. sternal
28. tarsal
29. thoracic
30. umbilical

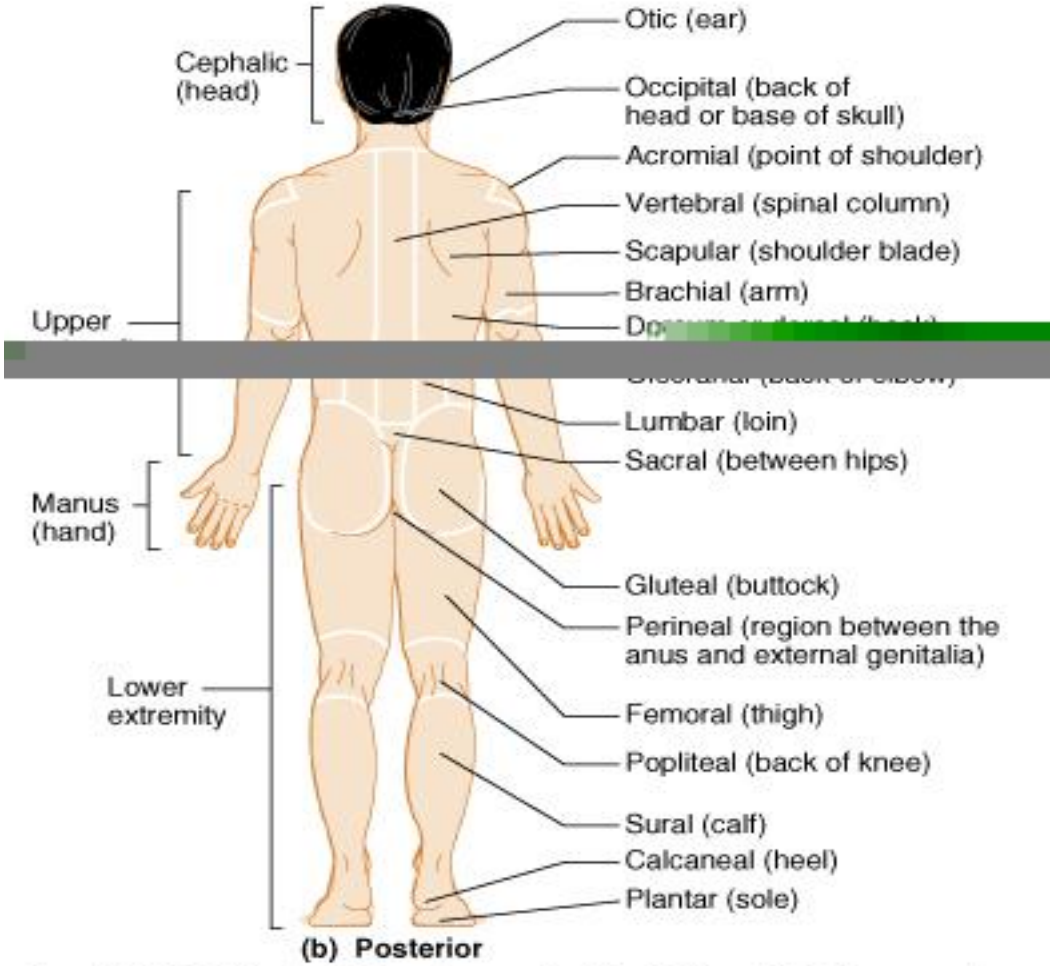
Anterior Body Regions (2)



Posterior Body Regions (1)

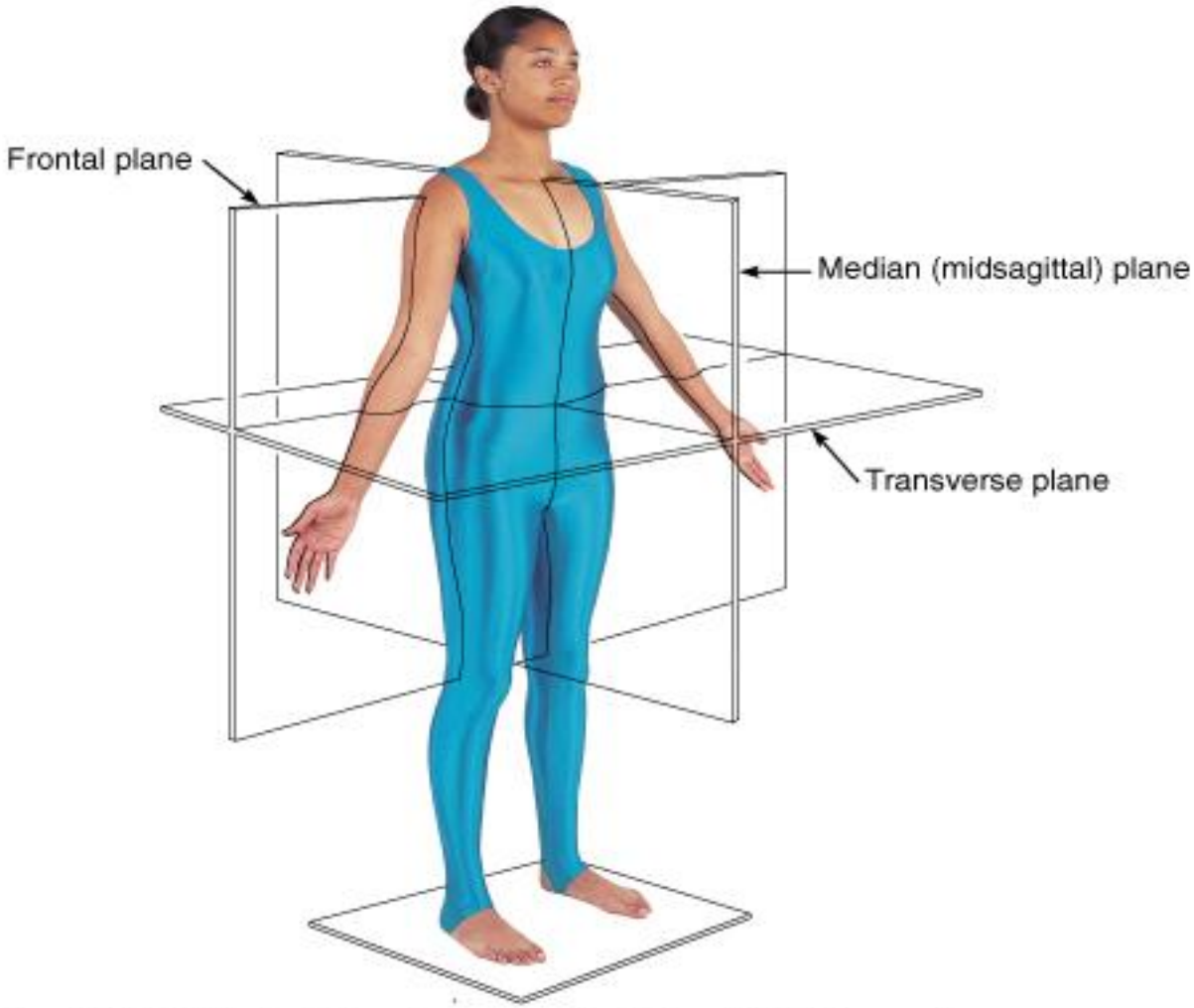
1. acromial
2. brachial
3. calcaneal
4. cephalic
5. dorsal
6. femoral
7. gluteal
8. lumbar
9. occipital
10. olecranal
11. otic
12. perineal
13. plantar
14. popliteal
15. sacral
16. scapular
17. sural
18. vertebral

Posterior Body Regions (2)



(b) Posterior

Planes/Sections (1)



Planes/Sections (2)

1) **sagittal: vertical, lengthwise cut**
   -> right and left sections

2) **frontal or coronal: vertical, lengthwise cut**
   -> anterior and posterior sections

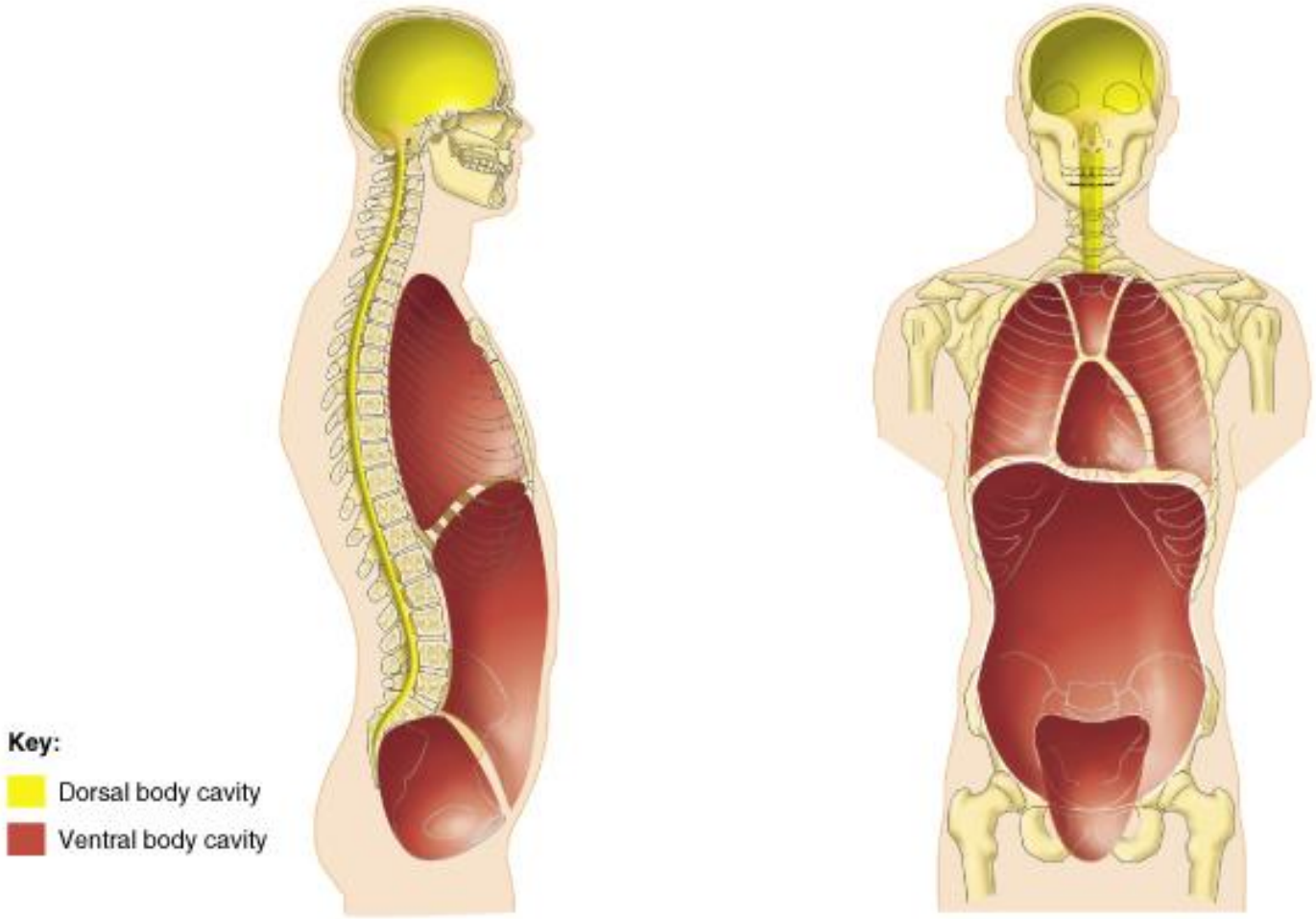
3) **transverse or horizontal: horizontal cut**
   -> superior and inferior sections

Body Cavities (1)

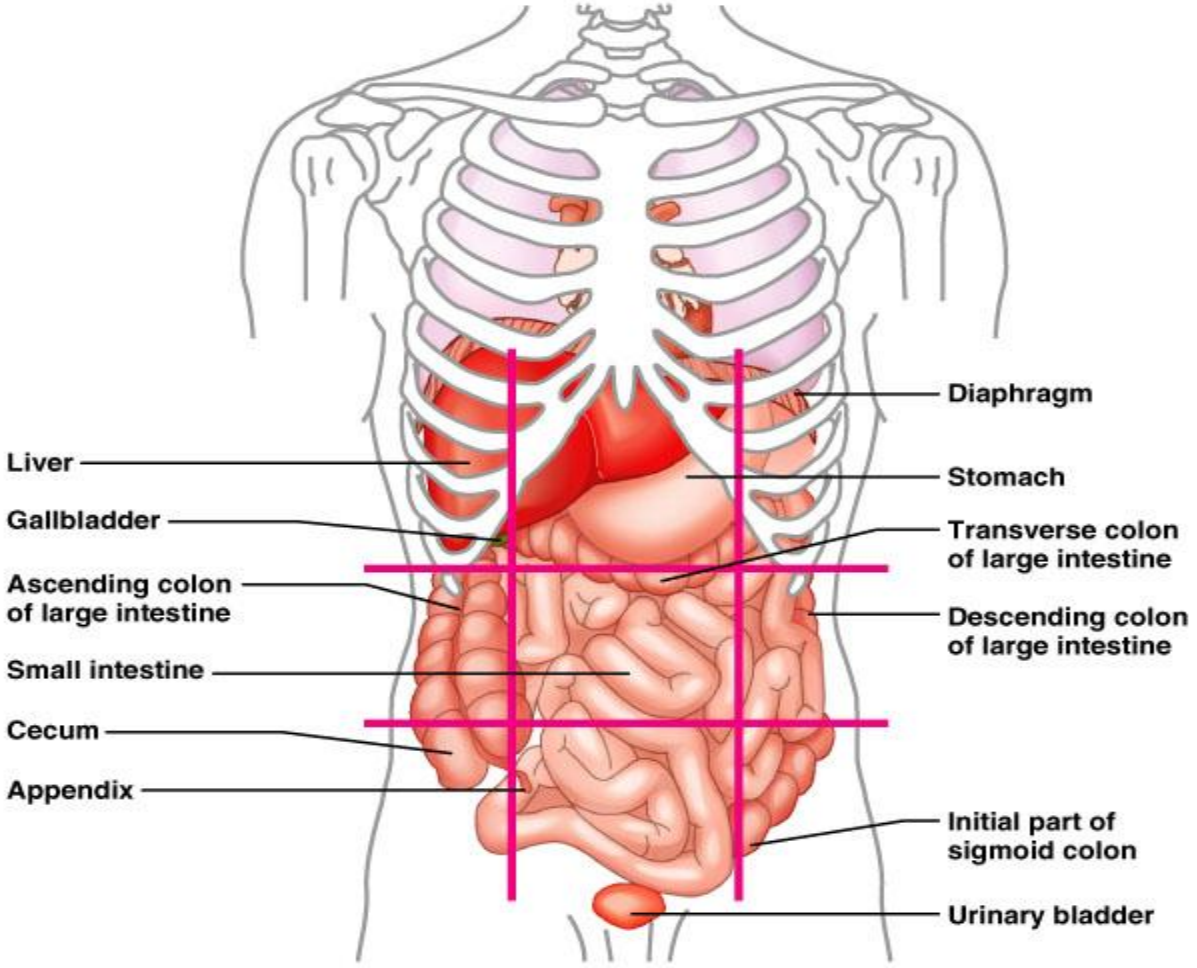
1) **dorsal cavity:**
   - **cranial & spinal cavity: brain, cord**

2) **ventral cavity:**
   a) **thoracic cavity: lungs, heart**
   b) **abdomino-pelvic cavity:**
      - **stomach, liver, intestines**
      - **genitalia, bladder, rectum**

Body Cavities (2)



Body Cavities (3)



(b)

Orientation Assignment*

Draw and label:

1) **directions (11)**
2) **landmarks/body regions**
   - **anterior (30), posterior (18)**
3) **planes/sections (3)**
4) **body cavities (2)**
   - **outline organs inside cavity**

***assignments are due next week**

Medical Imaging

= non-invasive scans into body for diagnosis

Common features:

1) **EM wave or sound bombardment**
2) **ingestion of radio-isotopes tagged to organic compounds, eg glucose**
3) **computer analysis to create visual anatomical images and graphs**

Problem:

1) computer-created images are not photographs,
2) inferior to "direct observation"

X-Ray

procedure:

- **x-ray bombardment**
- **lead shield cover**
- **dense areas absorb more x-rays -> “light areas”**
  eg bones & tumors
- **hollow areas absorb less x-rays -> “dark areas”**
  eg fat and hollow organs

advantage: cheap, safe with limited use, direct image, easily available, produce large area image

- **used for bone conditions, tumors**

disadvantage: overlapping images, unclear soft tissues

CT/CAT

= computed axial tomography

procedure:

- like x-ray, but beams focus on sections

advantage: no overlapping areas,
detailed sections only
- used for head trauma, strokes, abdom. prob.

disadvantage: high cost for equipment, computer analysis, and medical diagnosis

PET

= positron emission tomography

procedure:

- ingest sweet fluid with radio-isotopes tagged to glucose

- bombard with gamma rays

advantage:

produce images of metabolic proc., strokes, epilepsy, Alzheimer

disadvantage: high cost for equipment, computer analysis, and medical diagnosis

Ultra-sound

procedure:

- soundwave bombardment

- echo analysis to recreate internal image

advantage:

cheap, safe, easy to use

- used to monitor fetal development and position

disadvantage:

not show air structures (lung) or bone-surrounded structures (brain, cord)

MRI

= magnetic resonance imaging

procedure:

- **strong magnet acts on hydrogen present in water (75% of body is water)**

advantage:

- **diferentiates tissues with different water % eg gray and white matter in brain, cord**
- **penetrates surrounding bone (skull, vertebr.)**
- **used for MS plaque detection**

disadvantage: high cost for equipment, computer analysis, and medical diagnosis

- **strong magnet, affects metal parts in body**

Medical Imaging Review*

1) Compare and contrast the 5 methods

2) As a health professional, which method would you select for these injuries? State your reasons.

- **chronic knee pain**
- **broken rib**
- **heart burn**
- **concussion (head)**

3) Read the article in the text:
"Medical Imaging - Illuminating the body"

***reviews are not collected**