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PART A

The Human Body: An Orientation

PowerPoint® Lecture Slide Presentation by Jerry L. Cook, Sam Houston University

ESSENTIALS OF HUMAN ANATOMY & PHYSIOLOGY

EIGHTH EDITION

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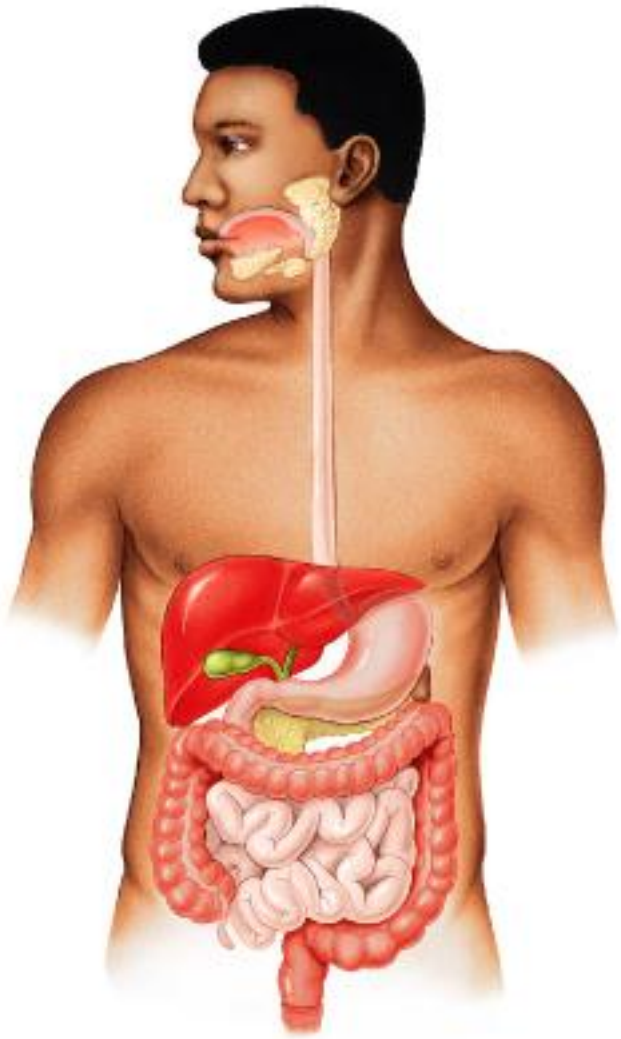
The Human Body – An Orientation

- Biology – study of all forms of life
- Anatomy – study of the structure and shape of the body and relationship of one part to another
- Physiology – study of how the body and its parts work or function

Anatomy – Levels of Study

- Gross Anatomy
  - Large structures
  - Easily observable with the naked eye
  - Morphology



Anatomy – Levels of Study

- Microscopic Anatomy
  - Very small structures
  - Can only be viewed with a microscope
  - Cytology
  - Histology

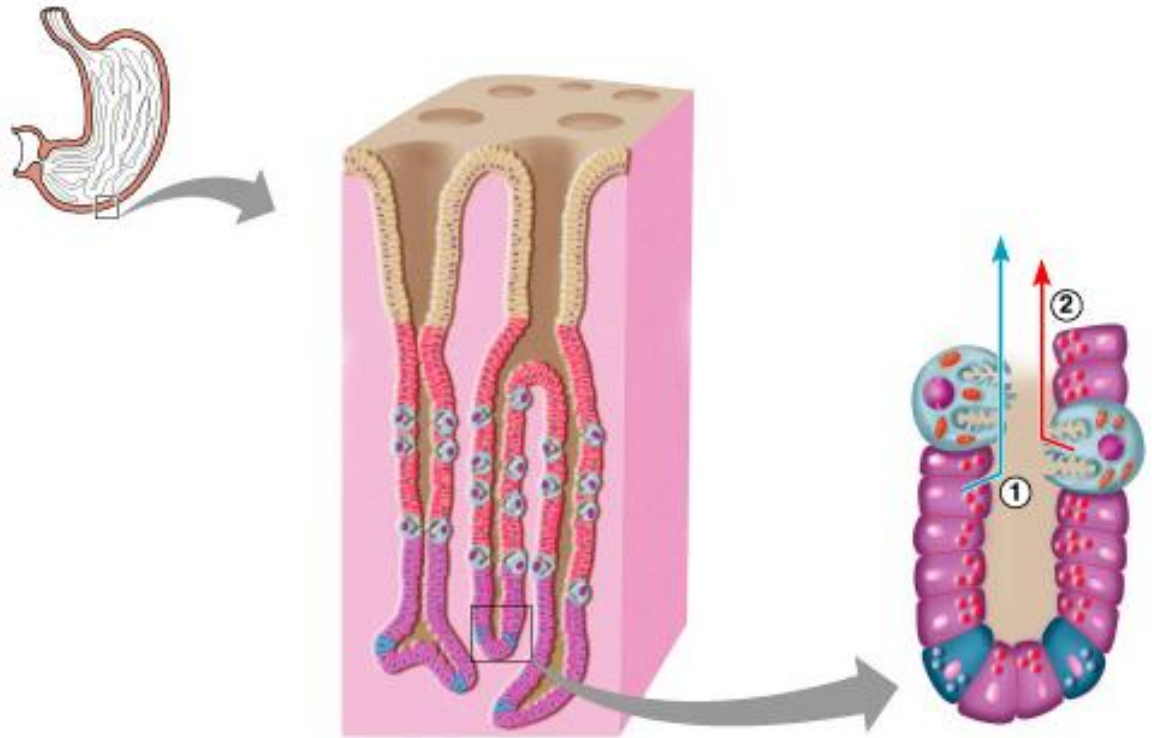
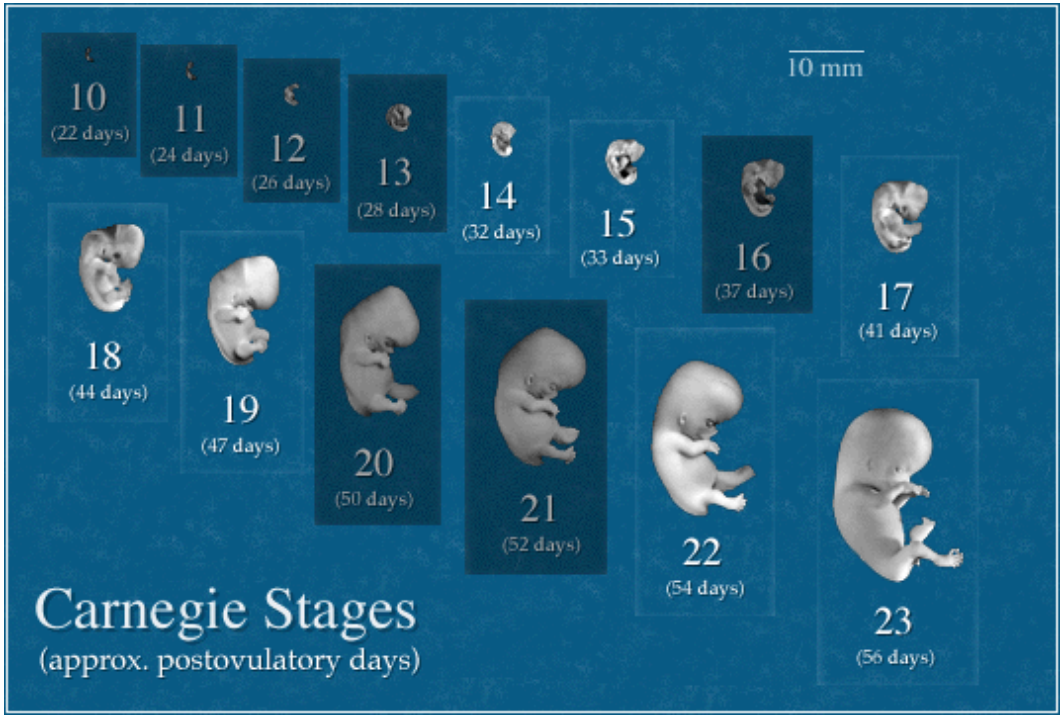
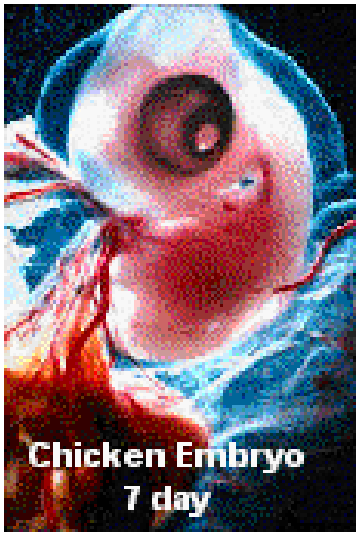


Figure 14.4

Anatomy – Levels of Study

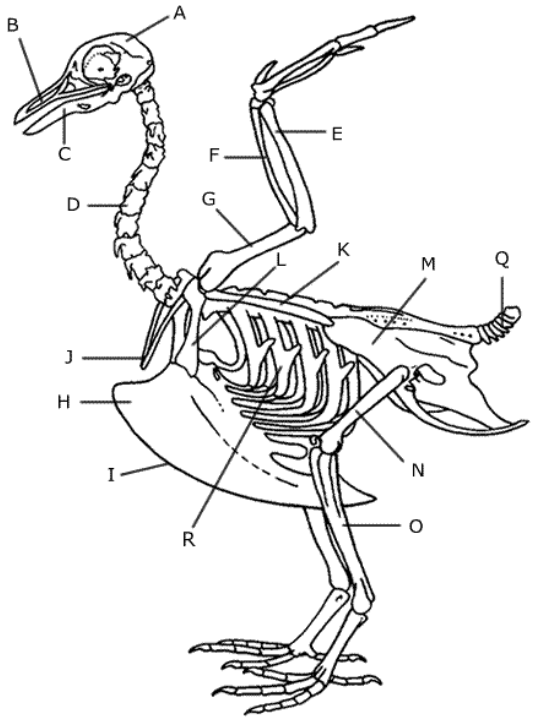
- Developmental Anatomy
  - Growth of organism
  - Embryology

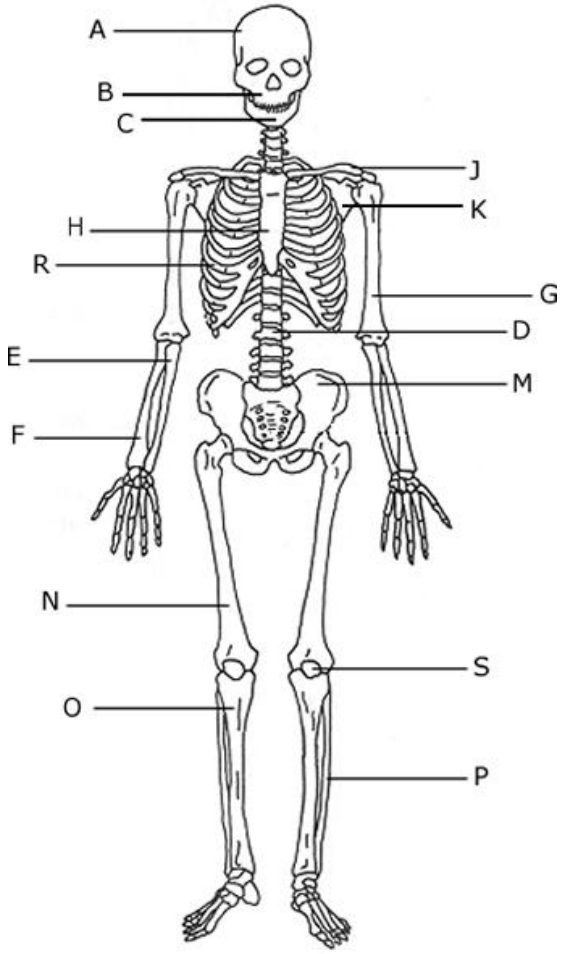




Anatomy – Levels of Study

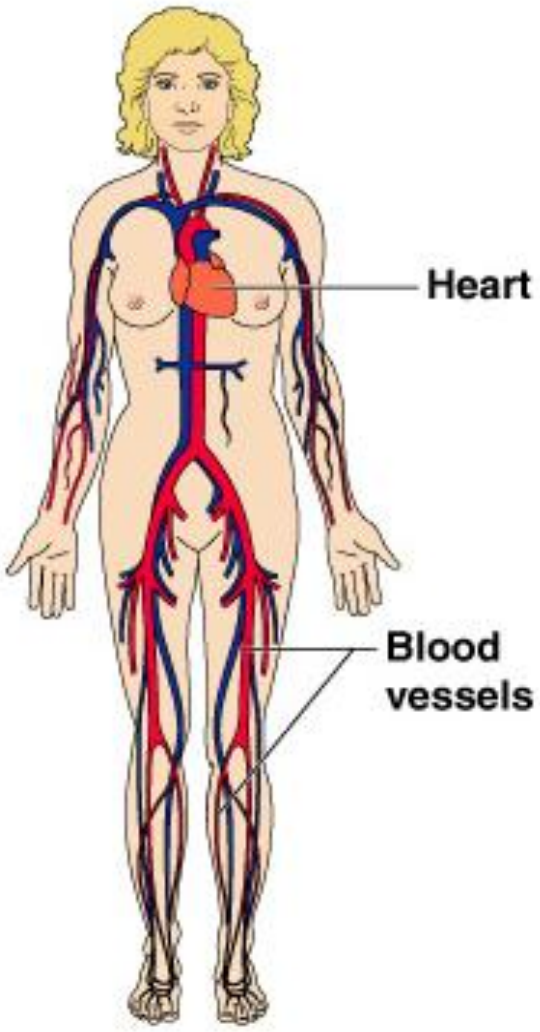
- Comparative Anatomy
  - Similarities & Differences to other animals





Anatomy – Levels of Study

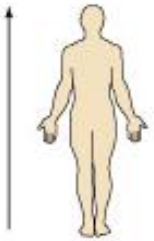
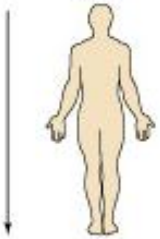
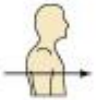
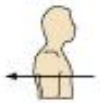
- Systematic Anatomy
  - Structure and function of organ systems and relationship to organism



The Language of Anatomy

- Special terminology is used to prevent misunderstanding
- Anatomical Position
- Exact terms are used for:
  - Position
  - Direction
  - Regions – superficial/deep & internal/external
  - Structures

Orientation and Directional Terms

Term	Definition	Illustration	Example
Superior (cranial or cephalad)	Toward the head end or upper part of a structure or the body; above		The forehead is superior to the nose.
Inferior (caudal)†	Away from the head end or toward the lower part of a structure or the body; below		The navel is inferior to the breastbone.
Anterior (ventral)*	Toward or at the front of the body; in front of		The breastbone is anterior to the spine.
Posterior (dorsal)*	Toward or at the backside of the body; behind		The heart is posterior to the breastbone.

†The term *caudal*, literally "toward the tail," is synonymous with *inferior* only to the inferior end of the spine.

**Ventral* and *anterior* are synonymous in humans; this is not the case in four-legged animals. *Ventral* refers to the "belly" of an 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* refers to an animal's back. Thus, the dorsal surface of four-legged animals is their superior surface.

Table 1.1

Orientation and Directional Terms

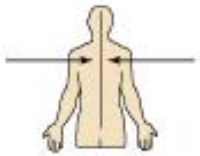
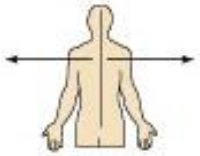
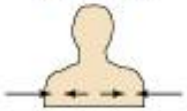
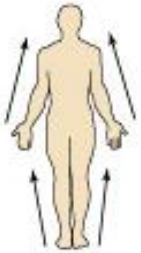
Term	Definition	Illustration	Example
Medial	Toward or at the midline of the body; on the inner side of		The heart is medial to the arm.
Lateral	Away from the midline of the body; on the outer side of		The arms are lateral to the chest.
Intermediate	Between a more medial and a more lateral structure		The armpit is intermediate between the breastbone and shoulder.
Proximal	Close 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 (meaning that the elbow is closer to the shoulder or attachment point of the arm than the wrist is).

Table 1.1 (cont)

Body Landmarks

- Anterior

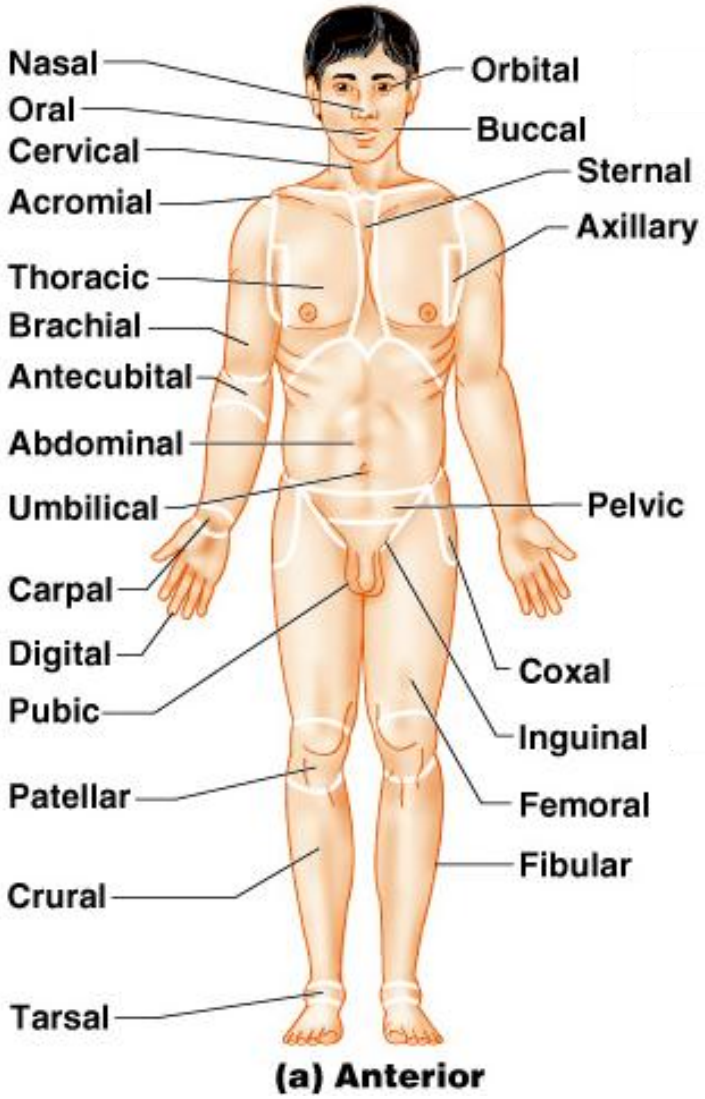


Figure 1.5a

Body Landmarks

- Posterior

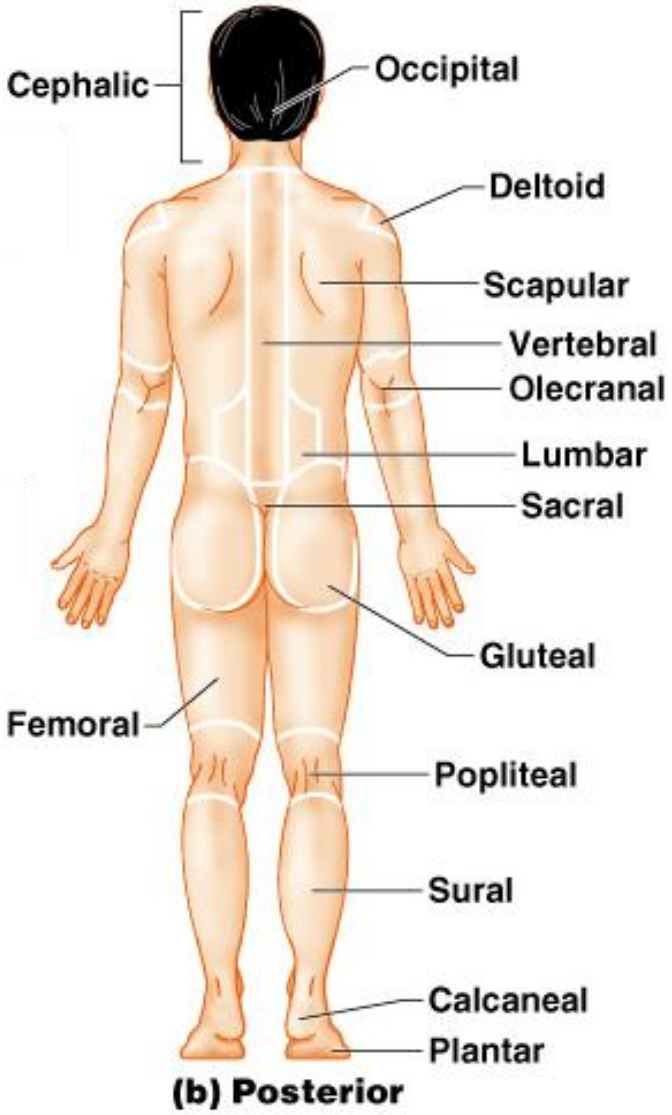


Figure 1.5b

Body Planes

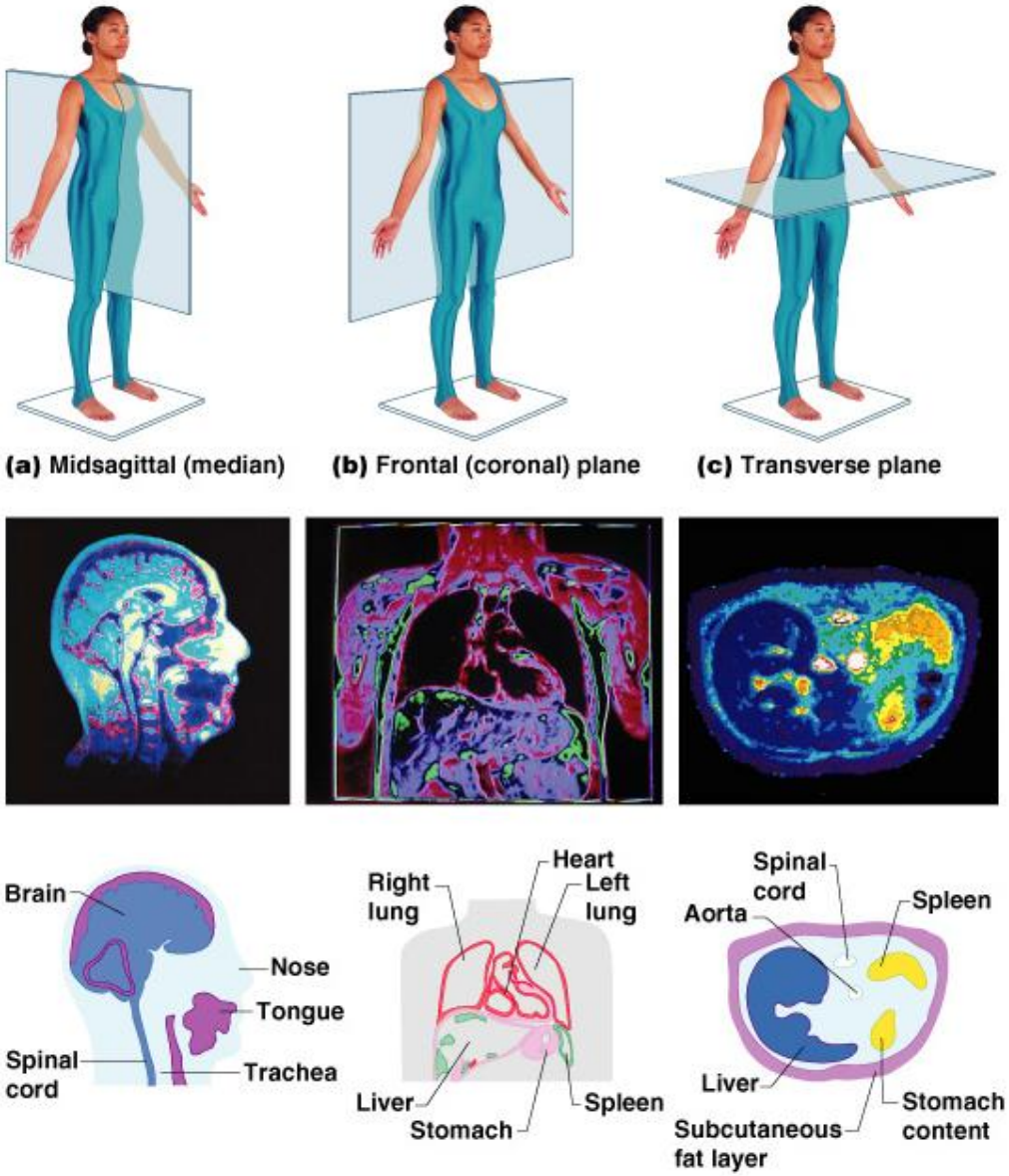


Figure 1.6

Body Cavities

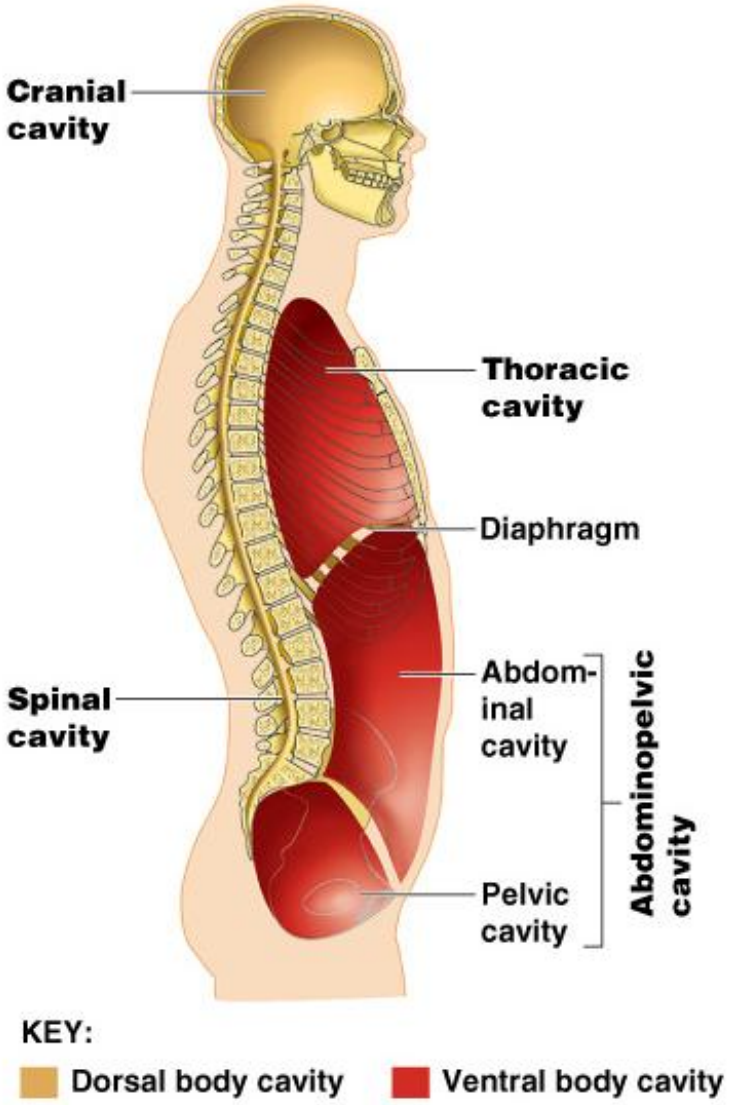


Figure 1.7

Abdominopelvic Quadrants

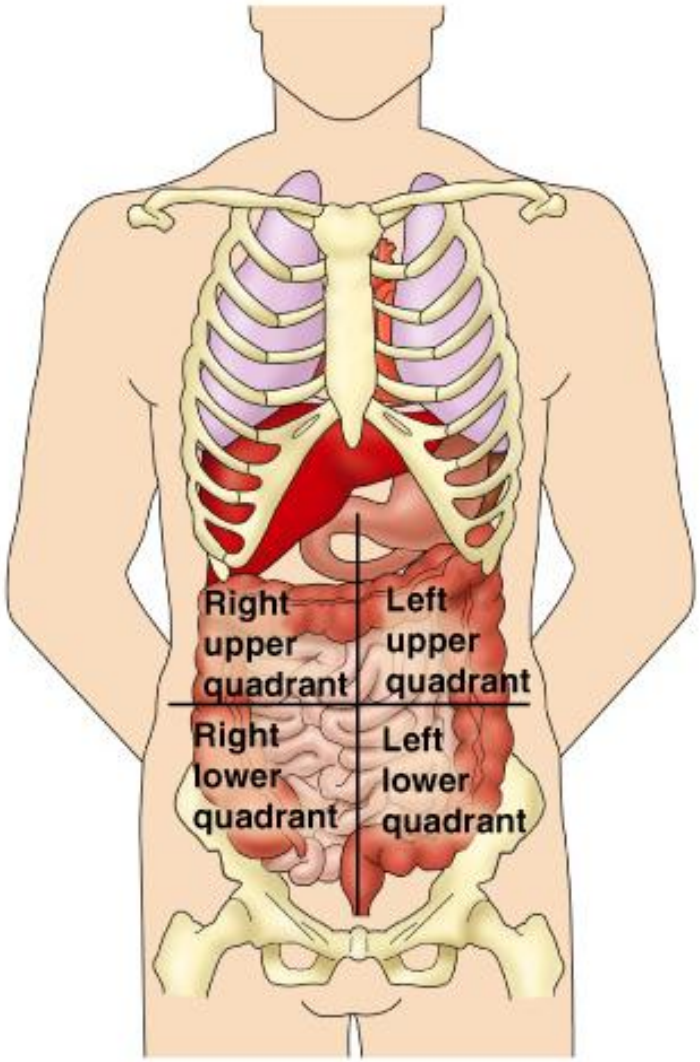


Figure 1.8a

Abdominopelvic Regions

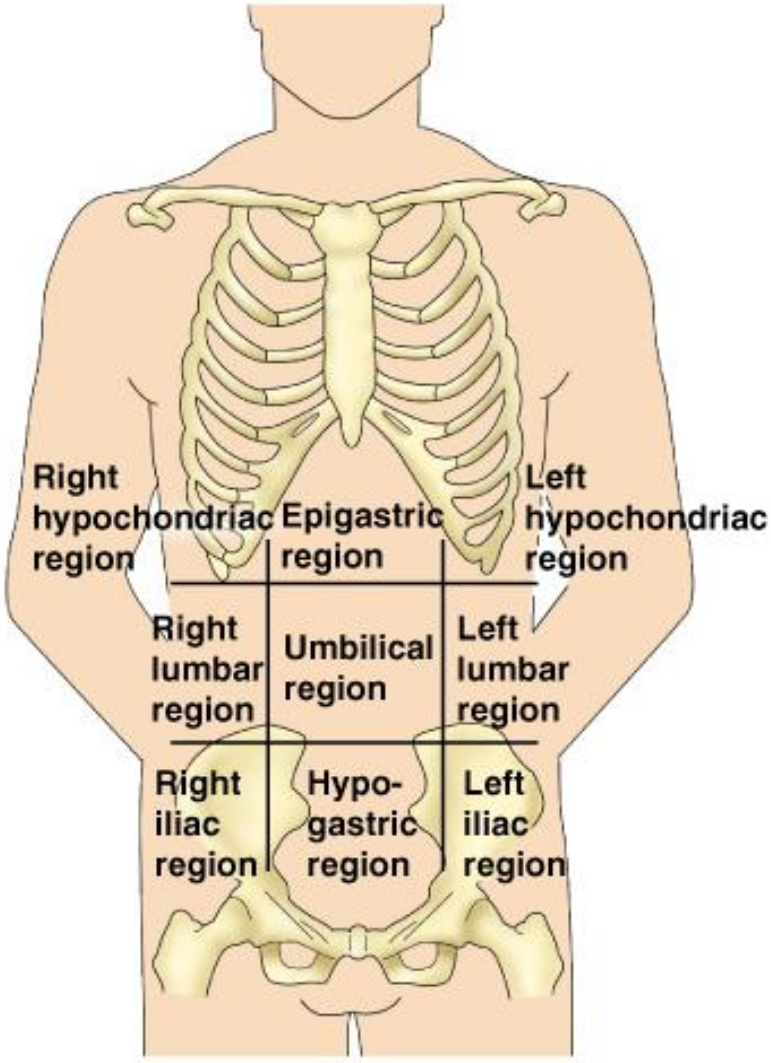


Figure 1.8b

Abdominopelvic Major Organs

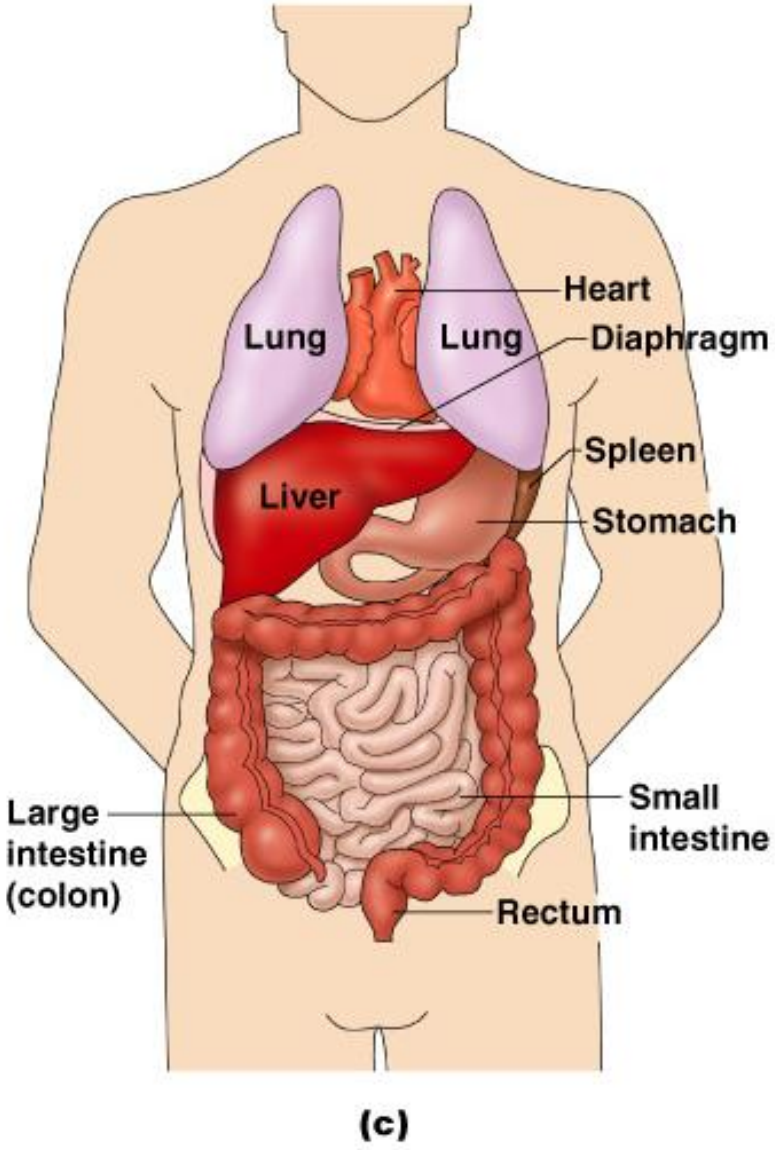


Figure 1.8c

Characteristics of Life

- Made of cells
- Grows and develops
- Obtains and uses energy
- Responds to environment
- Able to reproduce

Necessary Life Functions

- Maintain Boundaries
- Movement
  - Locomotion
  - Movement of substances
- Responsiveness
  - Ability to sense changes and react
- Digestion
  - Break-down and delivery of nutrients

Necessary Life Functions

- Metabolism – chemical reactions within the body
  - Production of energy - use of food & secretions
  - Making body structures – growth & repair
  - Anabolism vs. Catabolism
- Excretion
  - Elimination of waste from metabolic reactions

Necessary Life Functions

- Reproduction
  - Production of future generation
- Growth
  - Increasing of cell size and number

Survival Needs

- Nutrients
  - Chemicals for energy and cell building
  - Includes carbohydrates, proteins, lipids, vitamins, and minerals
- Oxygen
  - Required for chemical reactions

Survival Needs

- Water
  - 60–80% of body weight
  - Provides for metabolic reaction
- Stable body temperature
- Atmospheric pressure must be appropriate

Homeostasis

- Maintenance of a stable internal environment = a dynamic state of equilibrium
- Homeostasis must be maintained for normal body functioning and to sustain life
- Homeostatic imbalance – a disturbance in homeostasis resulting in disease

Levels of Structural Organization

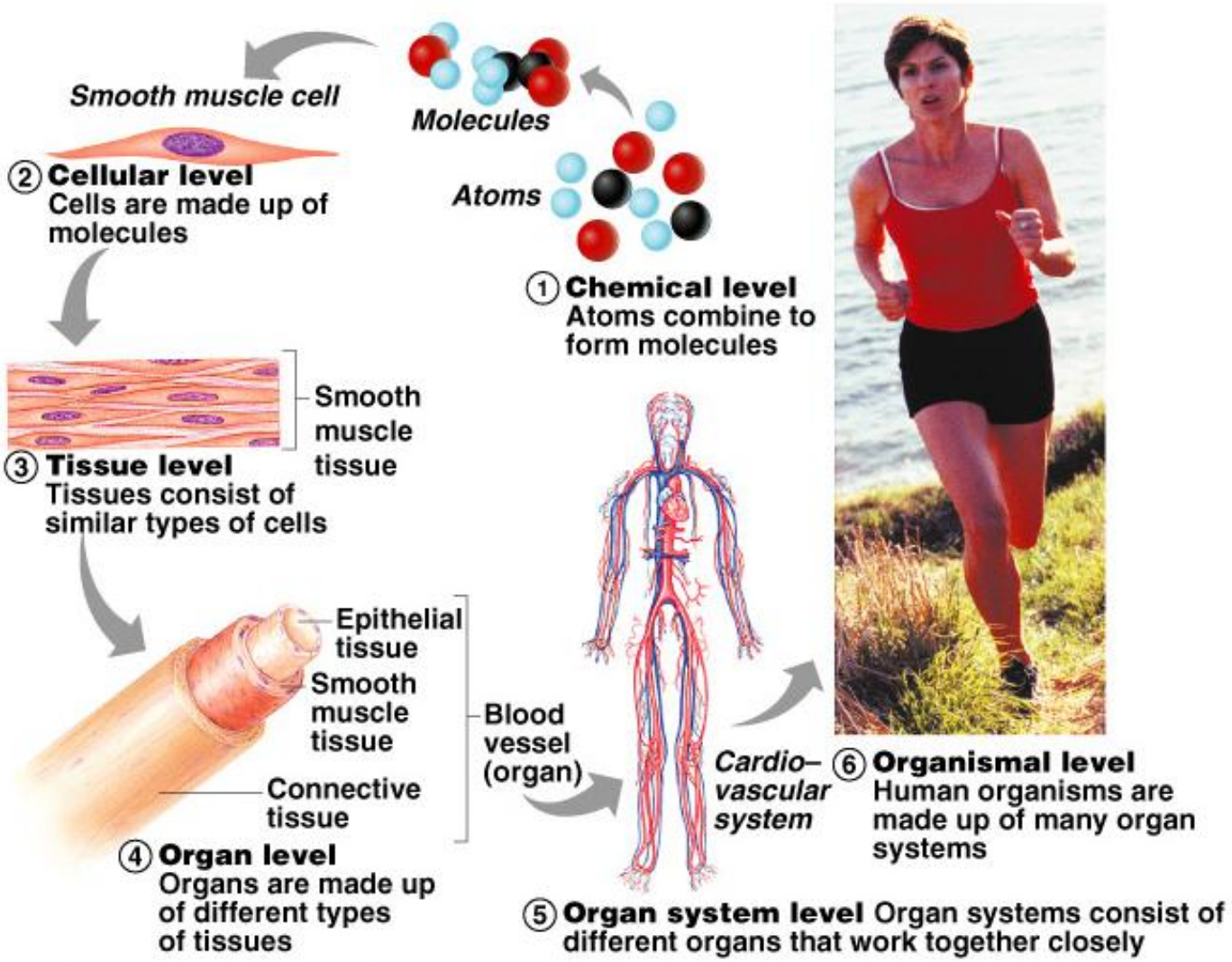


Figure 1.1