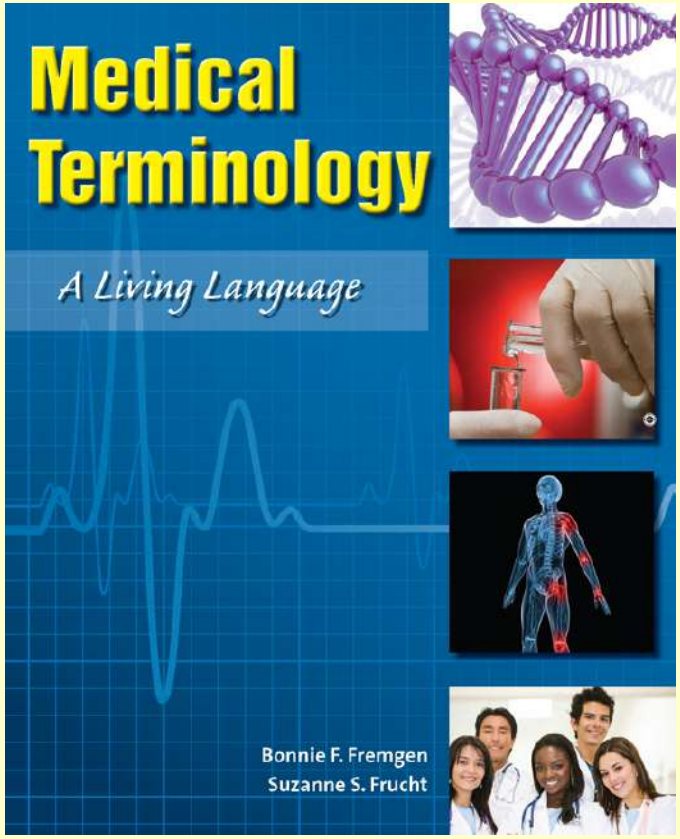
Medical Terminology
A Living Language



Chapter 2

Body Organization

PEARSON Education
Medical Terminology: A Living Language, Fourth Edition
Bonnie F. Fremgen and Suzanne S. Frucht

Multimedia Directory

Body Organization Combining Forms

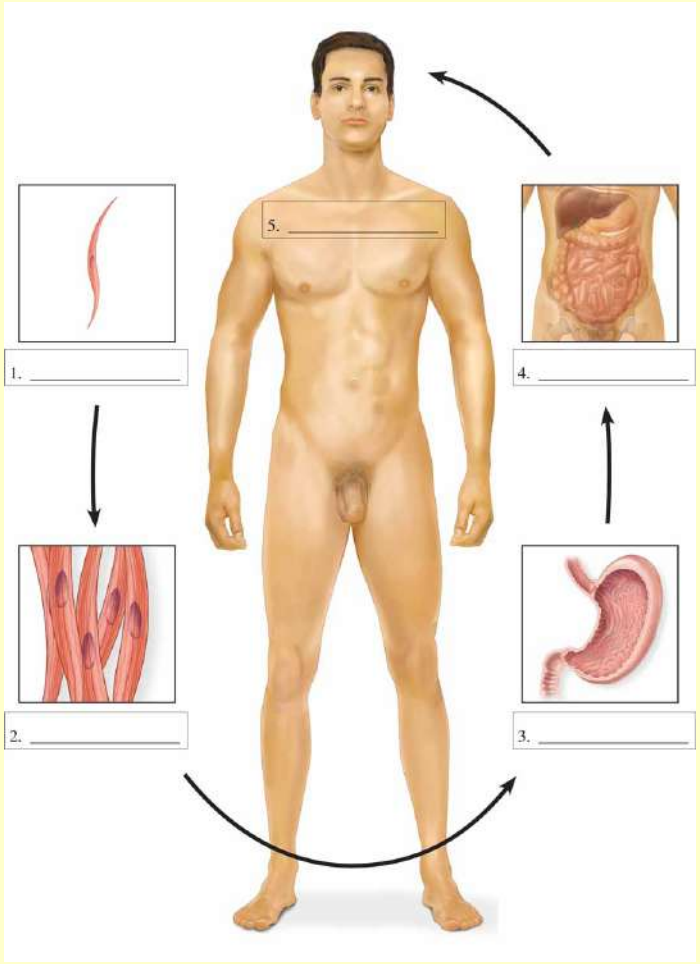
- abdomin/oabdomen
- adip/ofat
- anter/ofront
- brachi/oarm
- caud/otail
- cephal/ohead
- cervic/oneck
- chondr/ocartilage
- crani/oskull
- crur/oleg
- cyt/ocell
- dist/oaway from
- dors/oback of body
- epitheli/oepithelium
- glute/obuttock
- hist/otissue
- infer/obelow
- later/oside

Body Organization Combining Forms

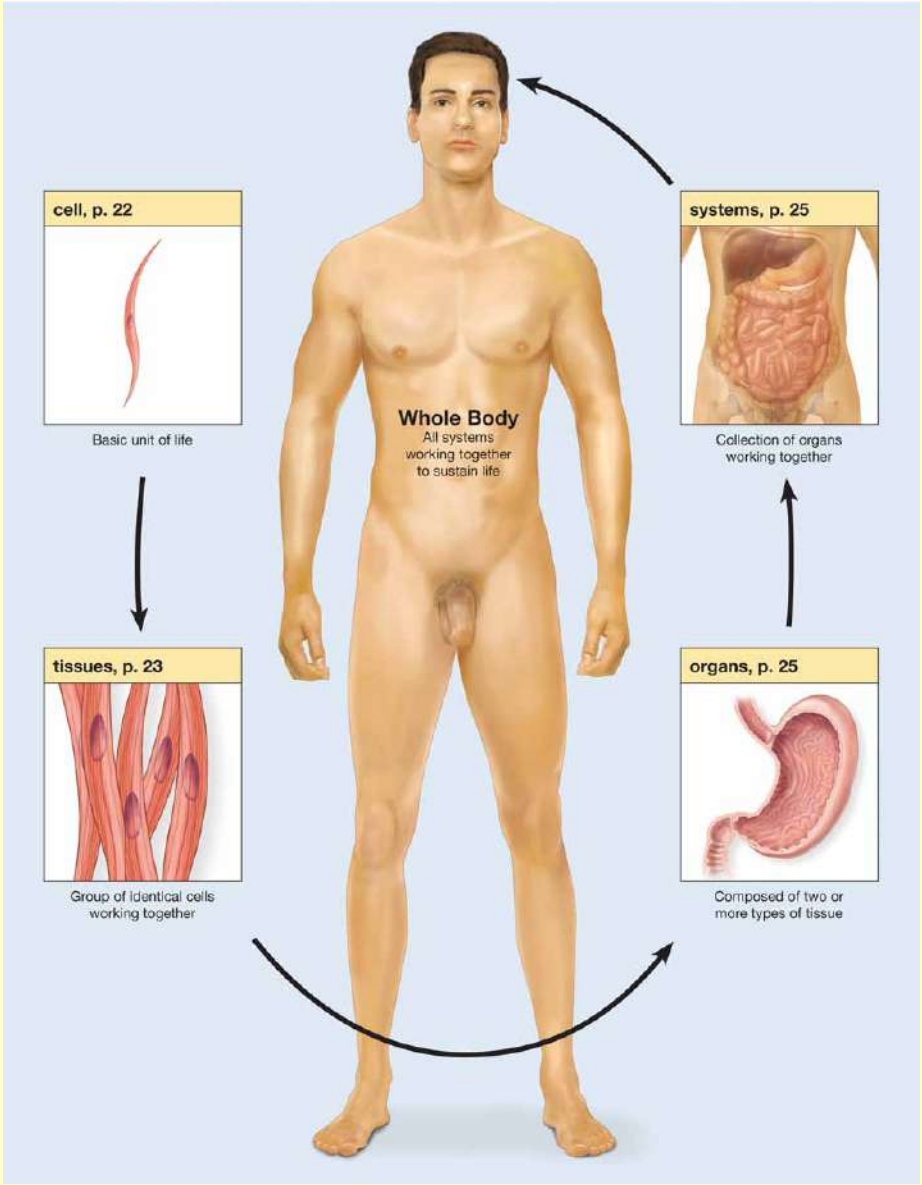
- medi/omiddle
- muscul/omuscle
- neur/onerve
- organ/oorgan
- oste/obone
- pelv/opelvis
- peritone/operitoneum
- pleur/opleura
- poster/oback
- proxim/onear to
- pub/ogenital region
- somat/obody
- spin/ospine
- super/oabove
- system/osystem
- thorac/ochest
- ventr/obelly
- vertebr/overtebra
- viscer/ointernal organ

Levels of Body Organization

- **Cells** form **tissues**
- Tissues form **organs**
- Organs form **systems**
- Systems form whole **body**



Body Organization Illustrated



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Cells

- **Cytology** – study of cells and their function
- Fundamental unit of life
- Has all properties of being alive
  - Responds to stimuli
  - Engages in metabolic activity
  - Reproduces itself
- All tissues and organs in body formed of cells

Cells

- Individual cells perform functions for body
  - Reproduction
  - Hormone secretion
  - Energy production
  - Excretion
- Special cells carry out very specific functions
  - Muscle contraction
  - Electrical impulse transmission

Cells

- Cells come in different sizes and shapes
- But all cells have
  - Nucleus
  - Cytoplasm
  - Cell membrane

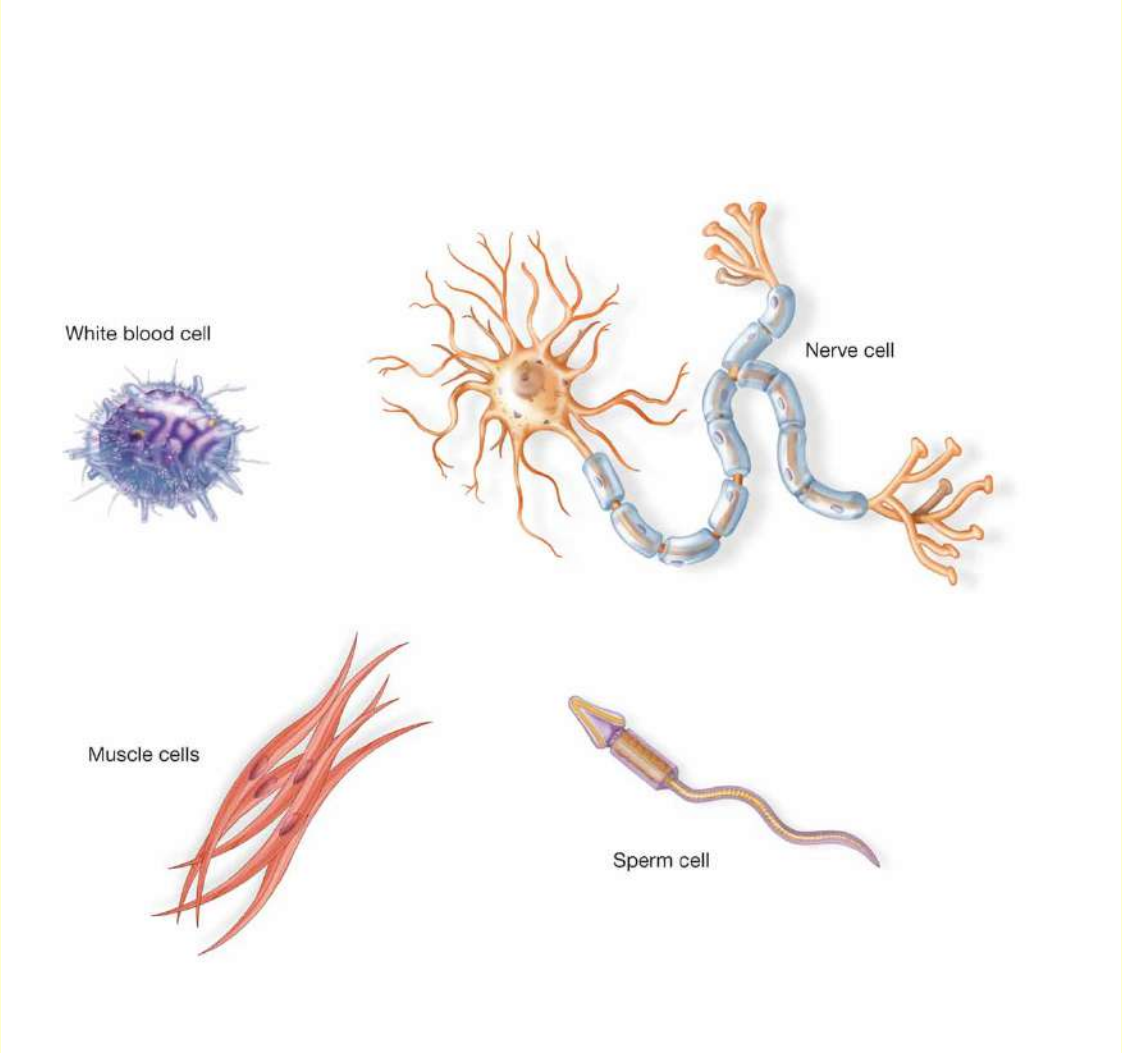


Figure 2.1 – Examples of four different types of cells from the body illustrating the differences in shape.

Tissues

- **Histology** – the study of tissue
- Formed when like cells are grouped together to perform an activity
- Four types of tissue
  - **Muscle tissue**
  - **Epithelial tissue**
  - **Connective tissue**
  - **Nervous tissue**

Muscle Tissue

- Produces movement in body by contracting
- Composed of individual muscle cells called **muscle fibers**
- Three basic types of muscles
  - **Skeletal muscle** – attached to bones
  - **Smooth muscle** – internal organs like intestine and uterus
  - **Cardiac muscle** – only in the heart

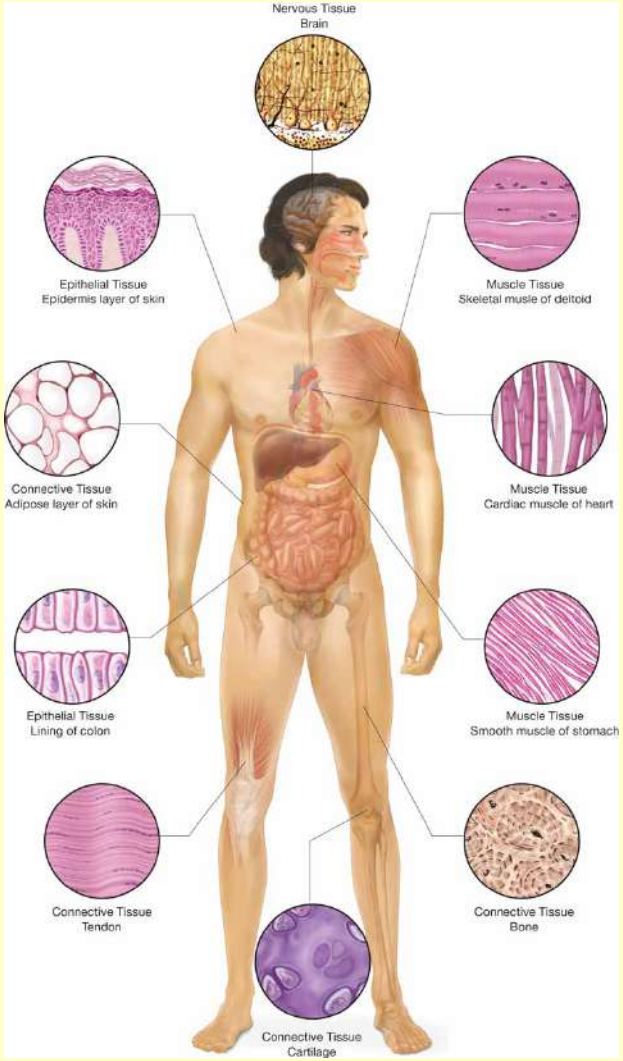


Figure 2.2 – This figure shows the appearance of different types of tissues and their location within the body.

Epithelial Tissue

- Known as **epithelium**
- Found as lining for internal organs and covering for the skin
- Close-packed cells that function to
  - Form a protective barrier – skin
  - Absorb – lining of intestine
  - Secrete – sweat glands
  - Excrete wastes – kidney tubules

Connective Tissue

- Supports and protects
- Function depends on location
- Many different forms
  - Adipose
  - Bone
  - Cartilage
  - Tendons

Nervous Tissue

- Composed of cells called **neurons**
- Forms the brain, spinal cord, and nerves
- Allows for conduction of electrical impulses between brain and rest of the body

Organs

- Composed of several types of tissue
- Work together as a unit
- Perform special functions
- Example: stomach contains
  - Muscle fibers
  - Nerve tissues
  - Epithelial tissue

Systems

- Composed of several organs working together in coordinated manner
- Perform complex functions
- Example: stomach plus other digestive organs including mouth, esophagus, liver, pancreas, small intestines, and colon work together to break down, digest, and absorb food

Integumentary System

- Two-way barrier and temperature regulation
- Organs
  - Skin
  - Hair
  - Nails
  - Sweat glands
  - Sebaceous glands

Musculoskeletal System – Skeleton

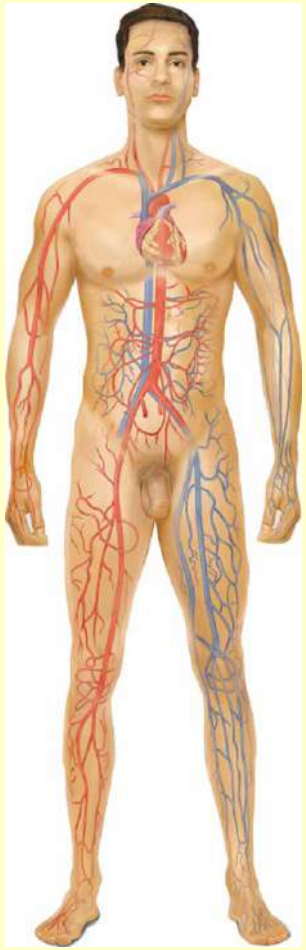
- Supports and protects body, forms blood cells, stores minerals
- Organs
  - Bones
  - Joints

Musculoskeletal System – Muscles

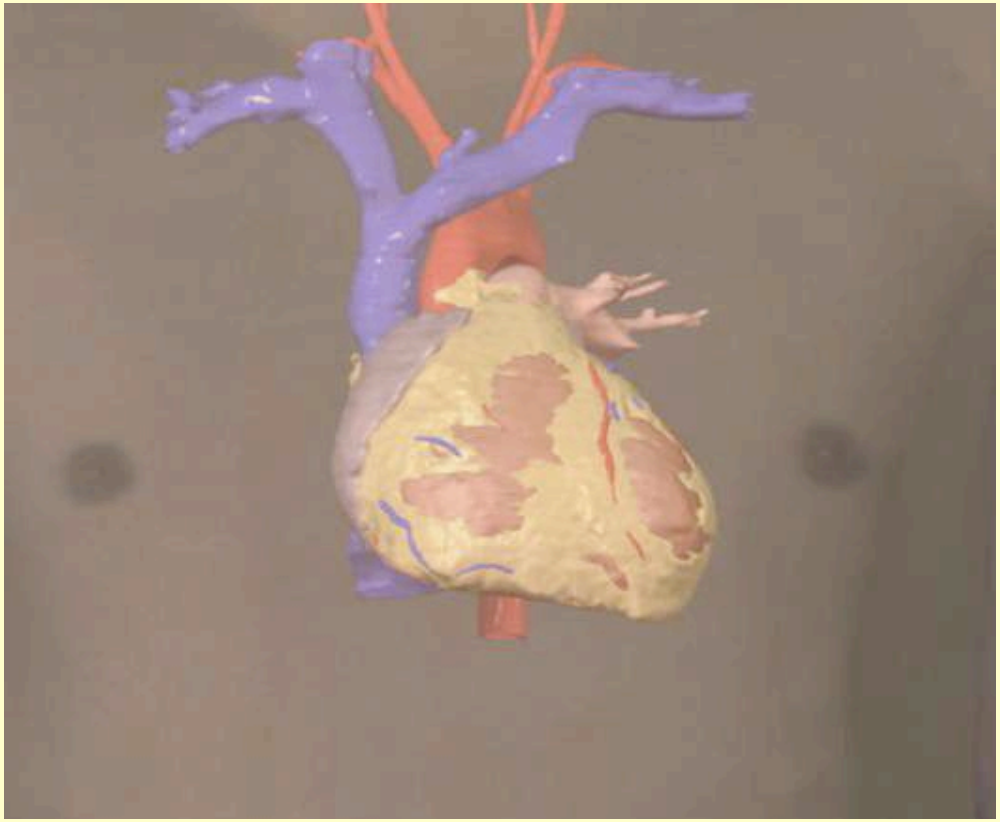
- Produce movement
- Organs
  - Muscles

Cardiovascular System

- Pumps blood to transport nutrients, oxygen, and wastes
- Organs
  - Heart
  - Arteries
  - Veins



Cardiovascular System Animation



Click here to view an animation of the cardiovascular system.

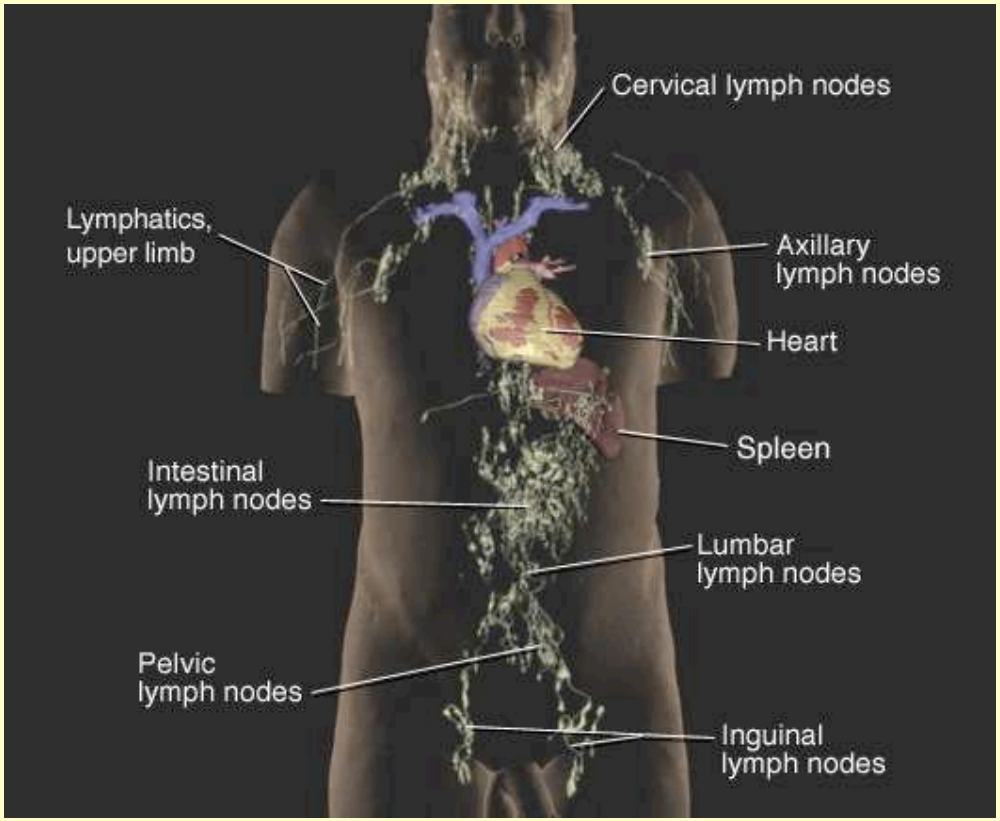
Blood (Hematic System)

- Transports oxygen, protects, and controls bleeding
- Organs
  - Plasma
  - Erythrocytes
  - Leukocytes
  - Platelets

Lymphatic System

- Protects body
- Organs
  - Lymph nodes
  - Lymphatic vessels
  - Spleen
  - Thymus gland
  - Tonsils

Lymphatic System Animation

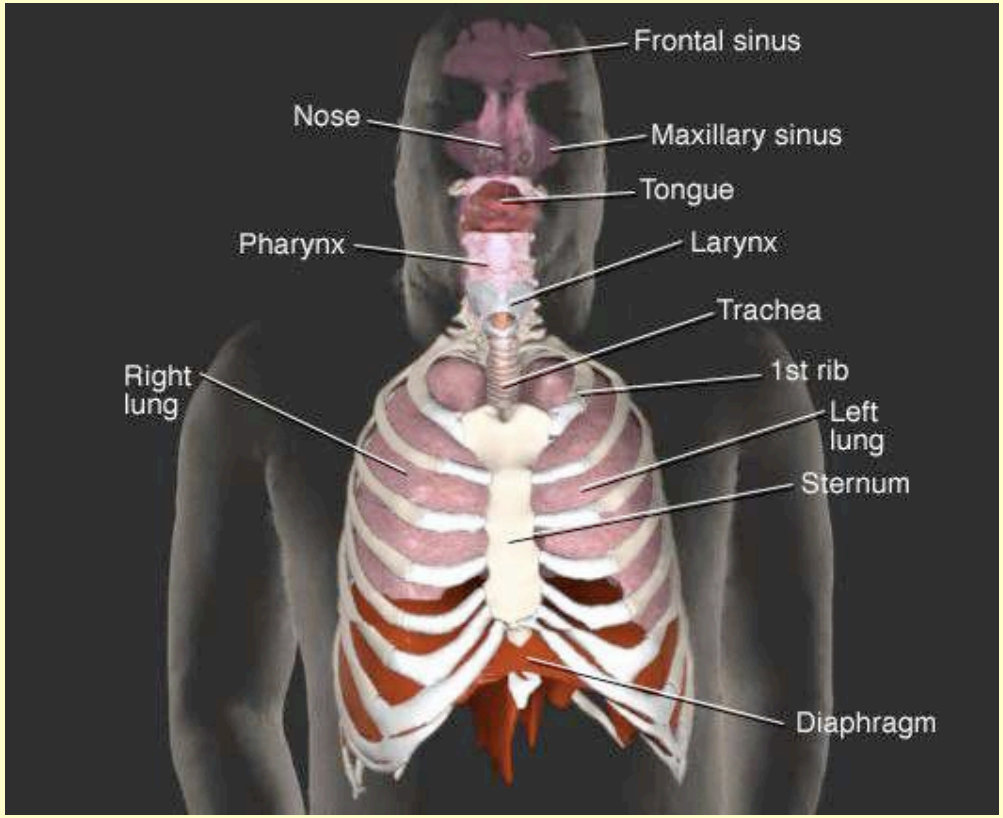


Click here to view an animation of the lymphatic system.

Respiratory System

- Obtains oxygen and removes carbon dioxide
- Organs
  - Nasal cavity
  - Pharynx
  - Larynx
  - Trachea
  - Bronchial tubes
  - Lungs

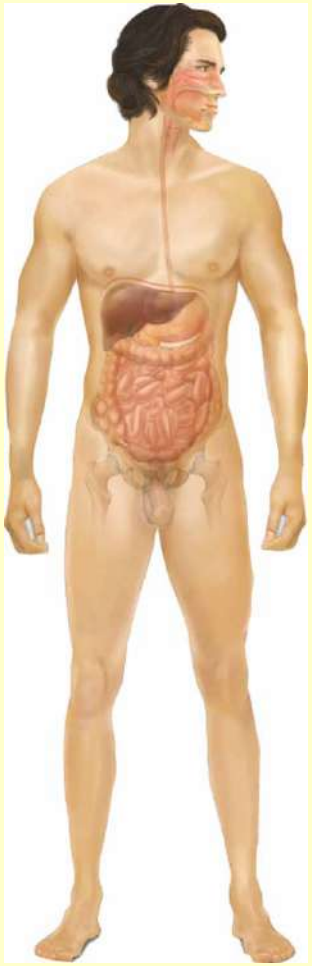
Respiratory System Animation



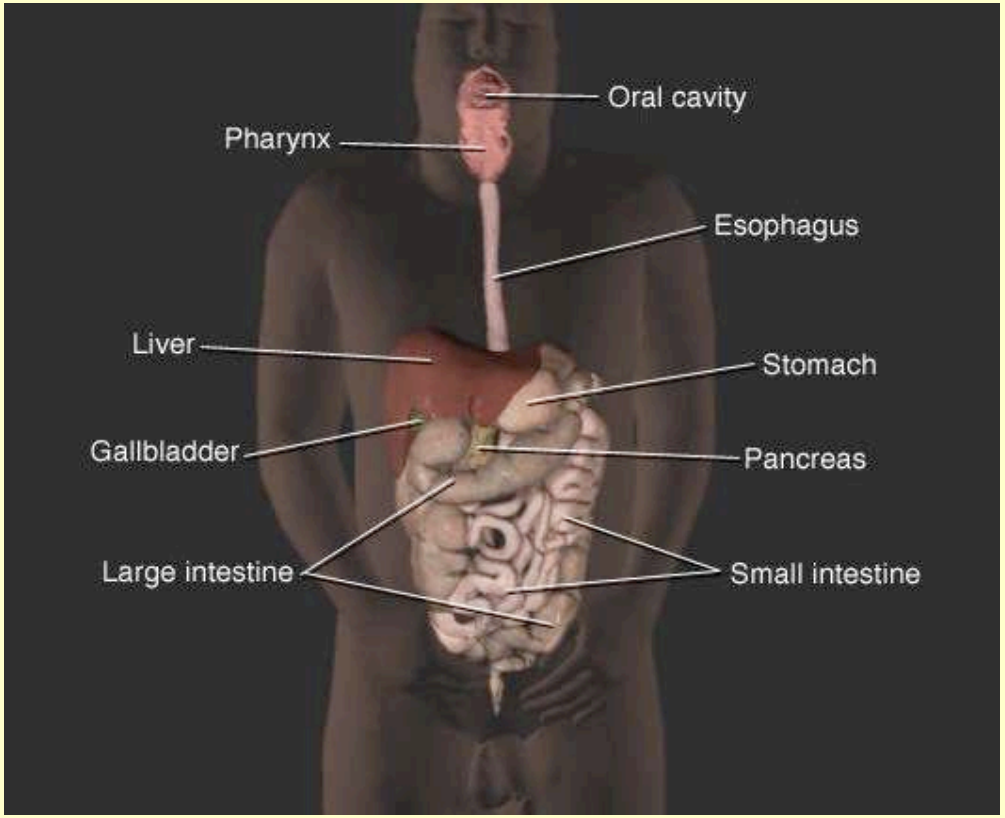
Click here to view an animation of the respiratory system.

Gastrointestinal System

- Ingest, digest, and absorb nutrients
- Organs
  - Oral cavity
  - Pharynx
  - Esophagus
  - Stomach
  - Small intestine
  - Colon
  - Liver & gallbladder
  - Pancreas



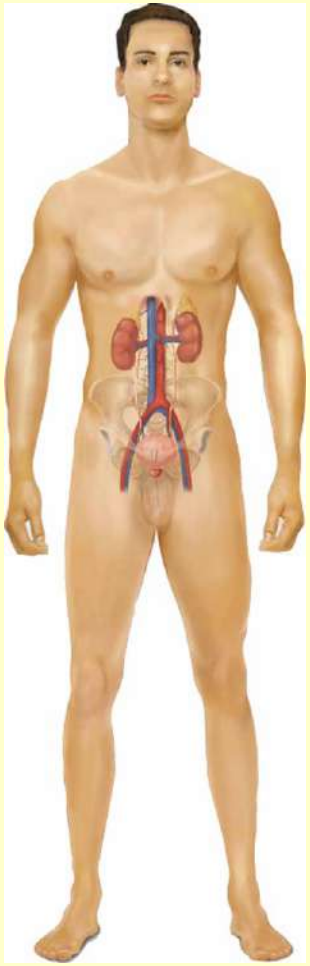
Digestive System Animation



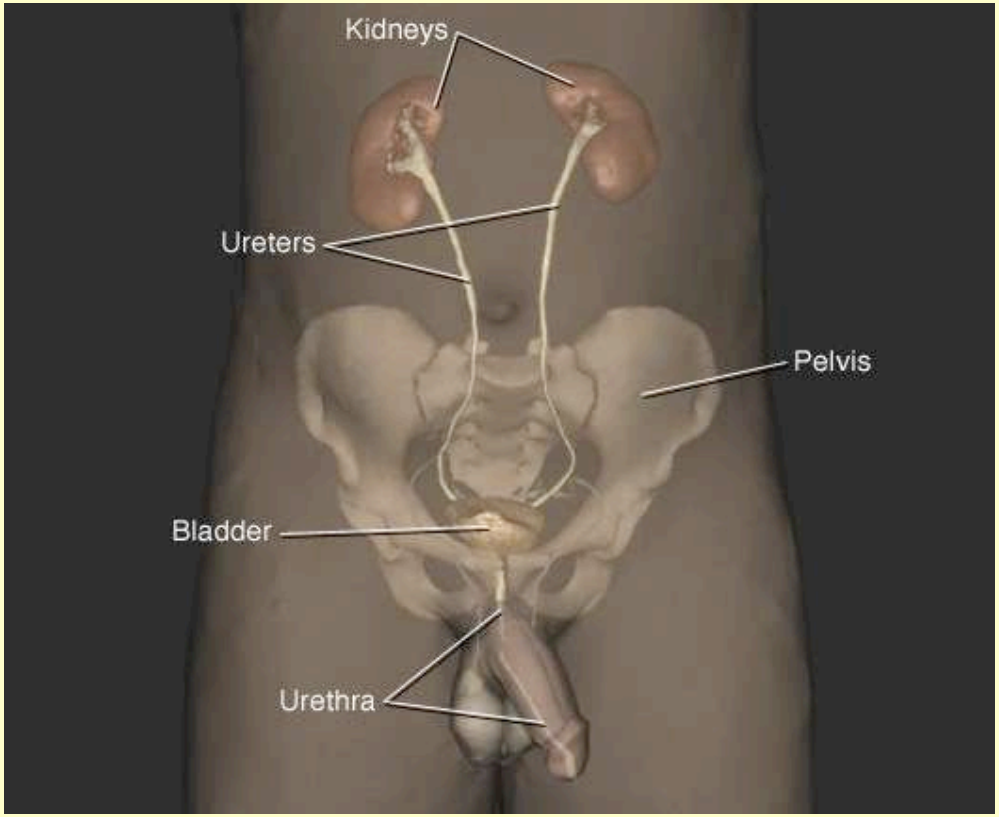
Click here to view an animation of the digestive system.

Urinary System

- Filters waste and removes from body
- Organs
  - Kidneys
  - Ureters
  - Urinary bladder
  - Urethra



Urinary System Animation

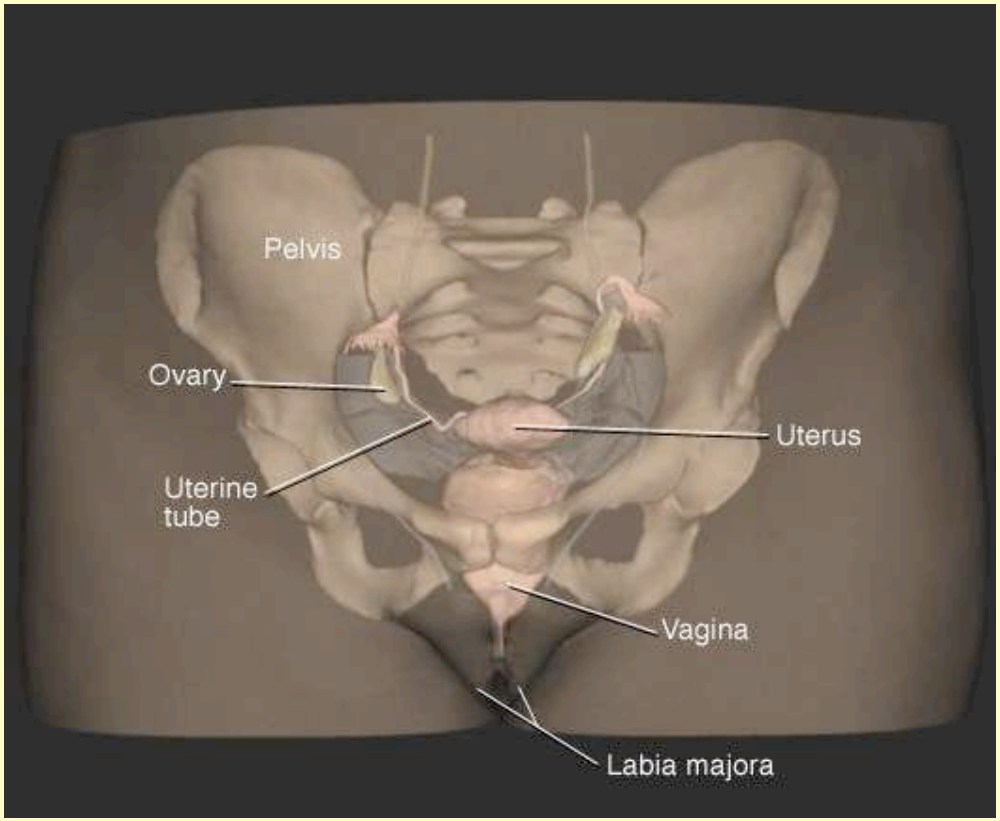


Click here to view an animation of the urinary system.

Female Reproductive System

- Produces eggs and provides place for baby
- Organs
  - Ovaries
  - Fallopian tubes
  - Uterus
  - Vagina
  - Vulva
  - Breast

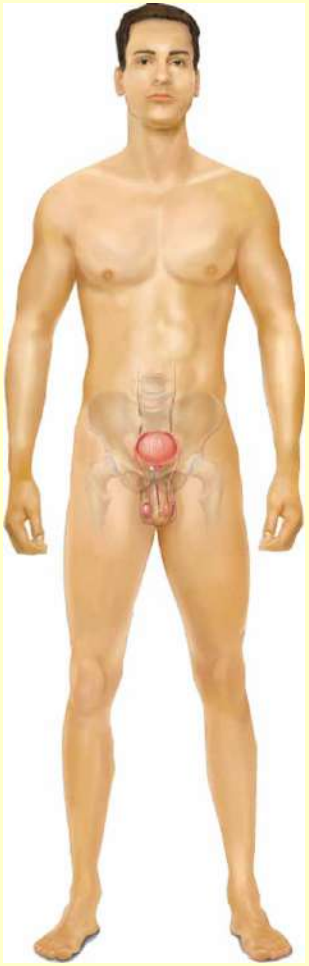
Female Reproductive System Animation



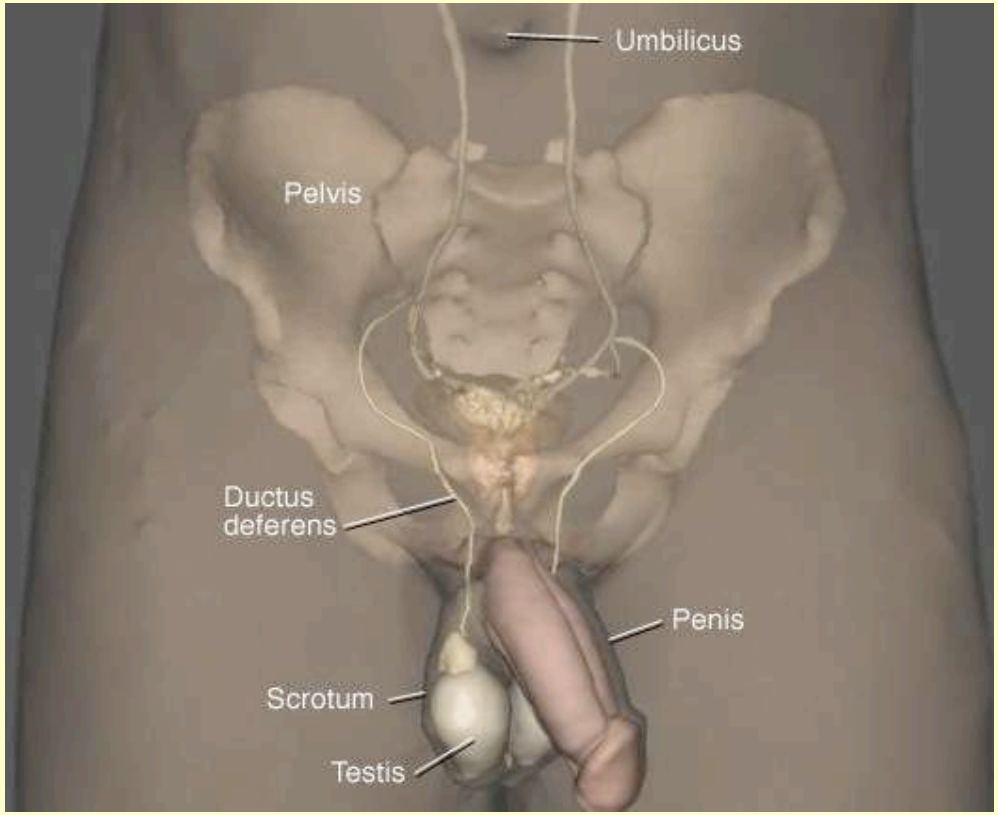
Click here to view an animation of the female reproductive system.

Male Reproductive System

- Produces sperm
- Organs
  - Testes
  - Epididymis
  - Vas deferens
  - Penis
  - Seminal vesicles
  - Prostate glans
  - Bulbourethral glands



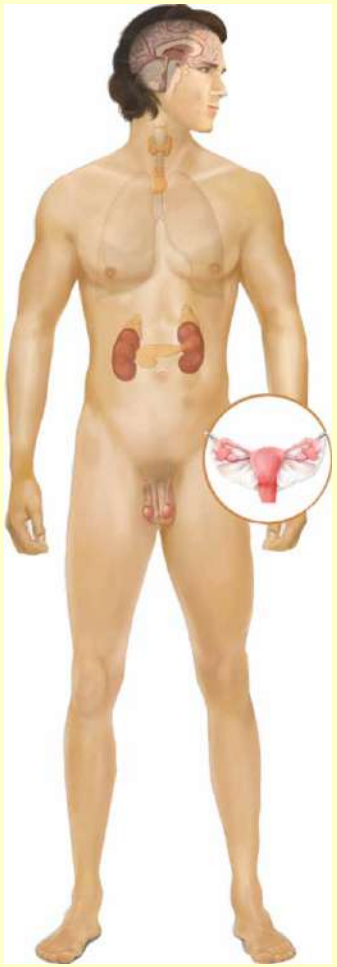
Male Reproductive System Animation



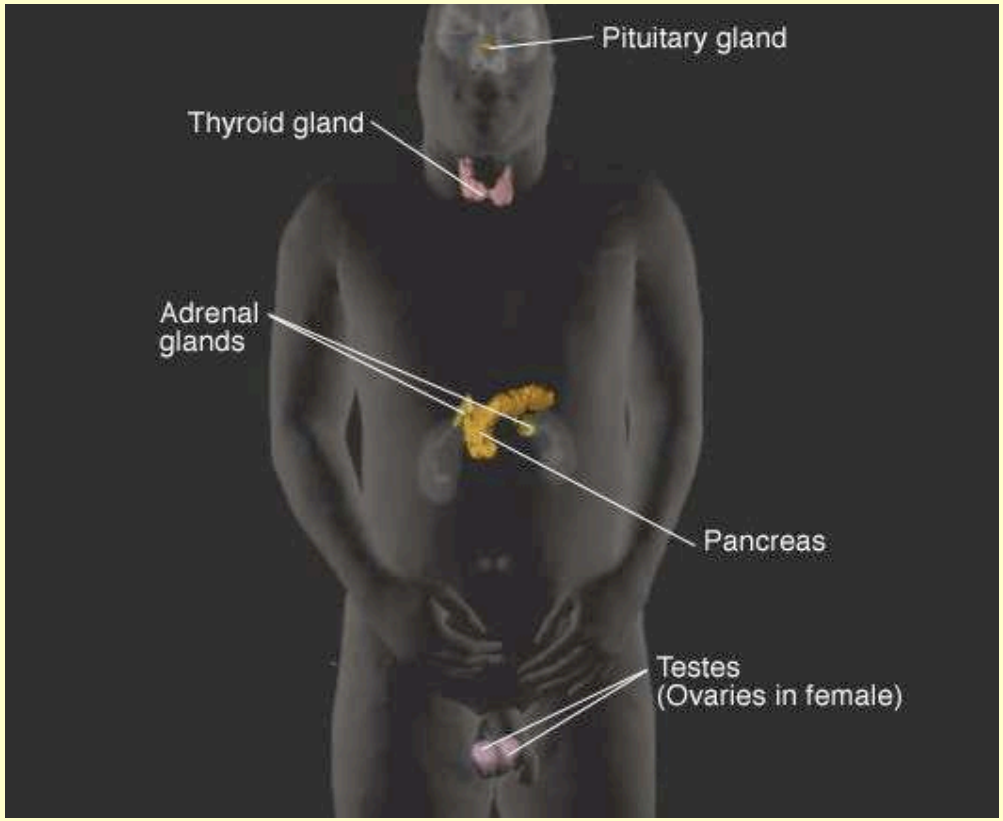
Click here to view an animation of the male reproductive system.

Endocrine System

- Regulates metabolic activity
- Organs
  - Pituitary gland
  - Pineal gland
  - Thyroid gland
  - Parathyroid glands
  - Thymus gland
  - Pancreas
  - Adrenal glands
  - Ovaries & testes



Endocrine System Animation

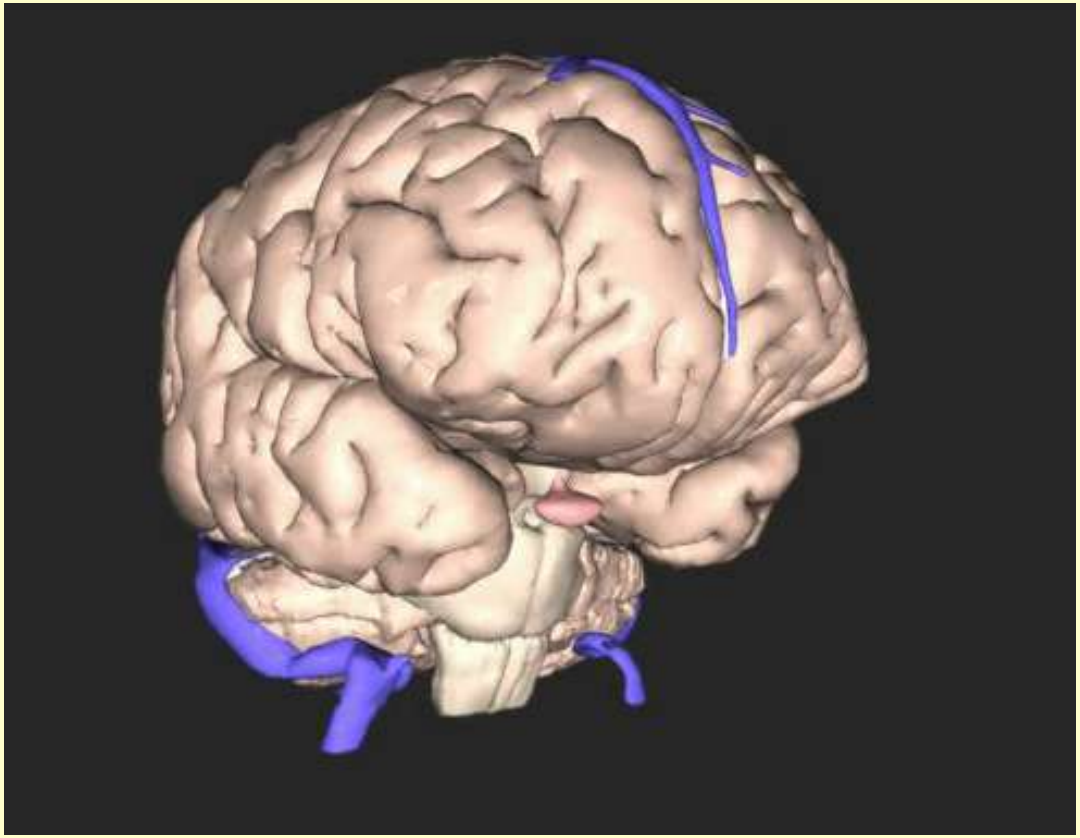


Click here to view an animation of the endocrine system.

Nervous System

- Receives sensory information and coordinates response
- Organs
  - Brain
  - Spinal cord
  - Nerves

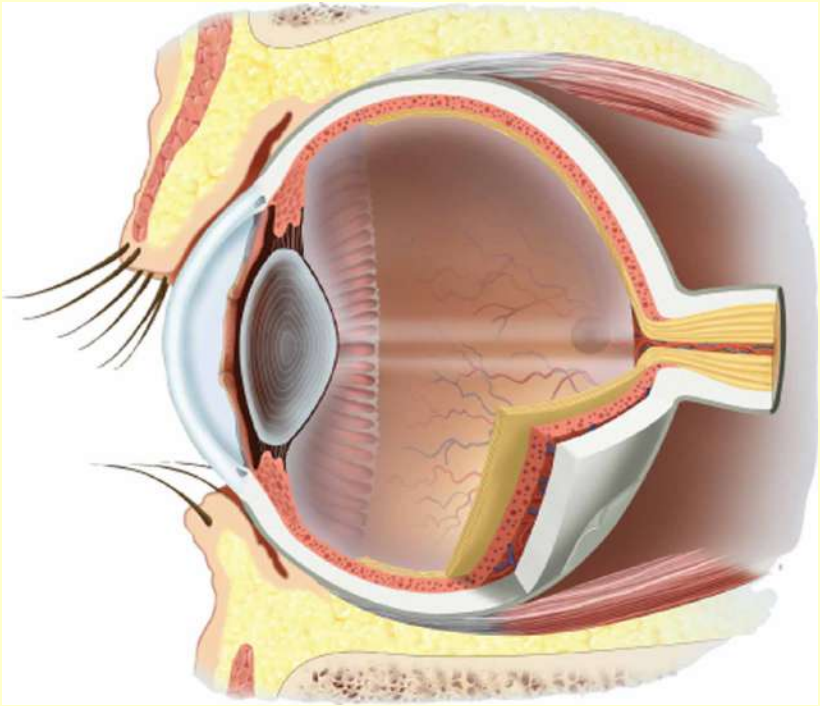
Nervous System Animation



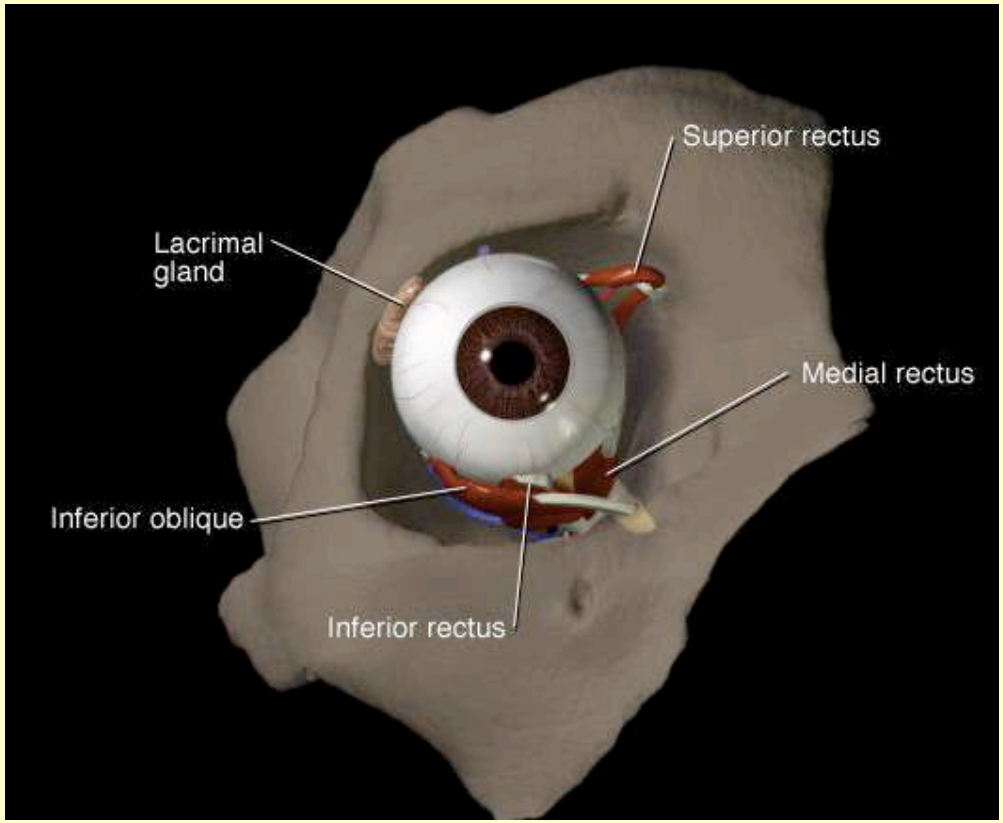
Click here to view an animation of the nervous system.

Special Senses – Eye

- Vision
- Organs
  - Eyes



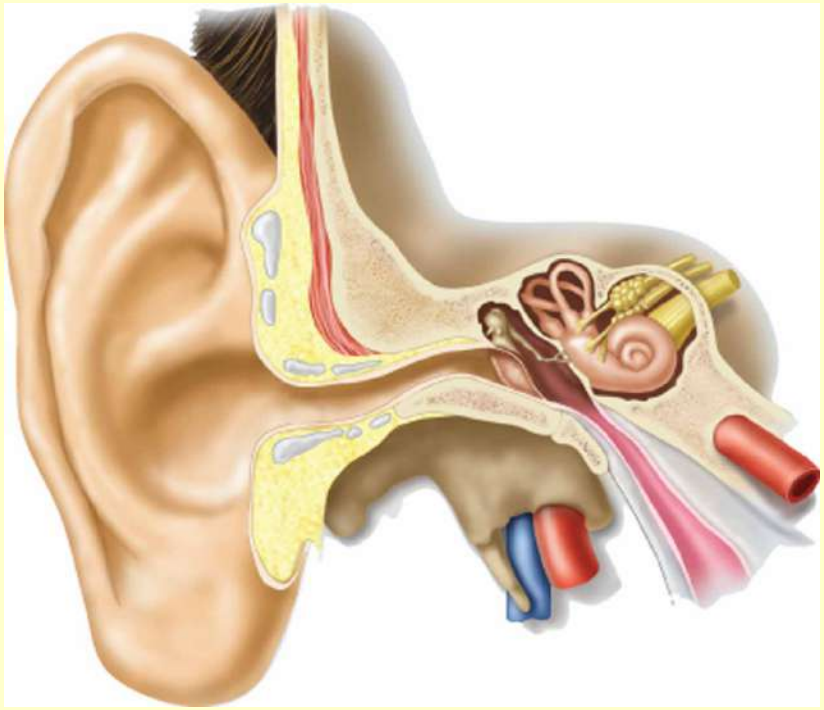
Eye Anatomy Animation



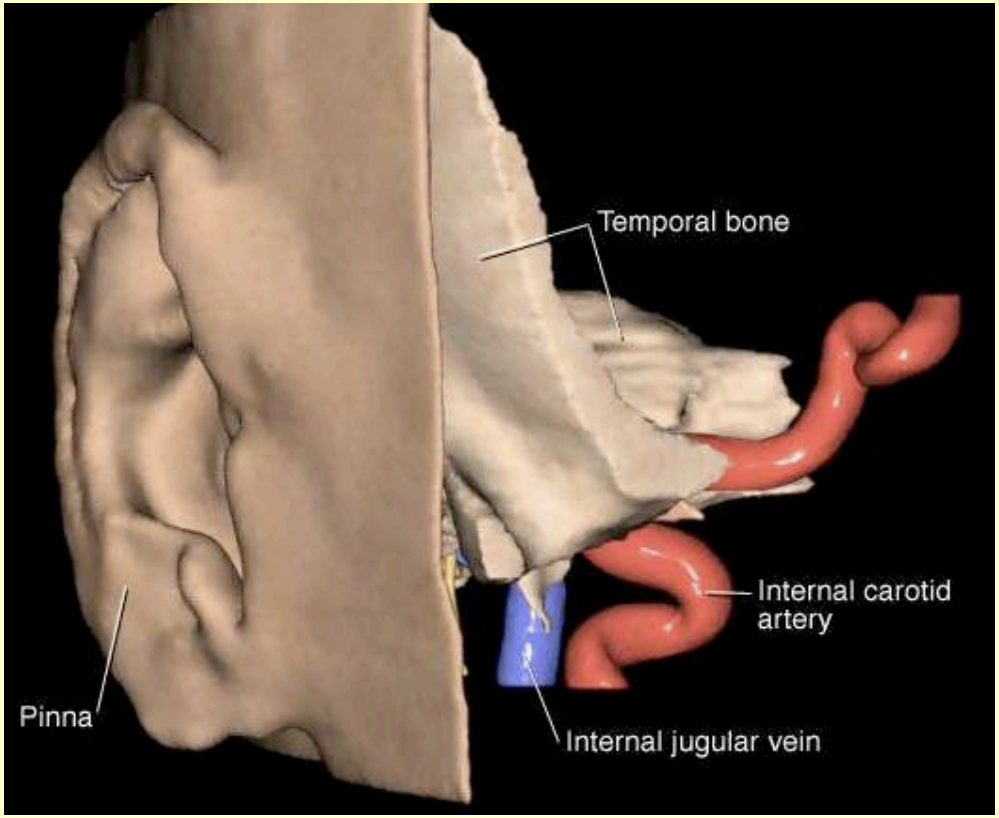
Click here to view an animation of the eye.

Special Senses – Ear

- Hearing and balance
- Organs
  - Ears



Ear Anatomy Animation



Click here to view an animation of the ear.

Medical Specialties by System

- IntegumentaryDermatology
- Musculoskeletal Orthopedics,

Orthopedic Surgery

- EndocrineEndocrinology
- CardiovascularCardiology
- BloodHematology
- Lymphatic Immunology
- Respiratory Otorhinolaryngology, Pulmonology, Thoracic Surgery

Medical Specialties by System

- Digestive Gastroenterology, Proctology
- UrinaryUrology
- Female Gynecology, Obstetrics

Reproductive

- Male ReproductiveUrology
- NervousNeurology, Neurosurgery
- Eye Ophthalmology
- Ear Otorhinolaryngology

Anatomical Position

- Used when describing positions & relationships of structures in body
- Assume person is in anatomical position even if body or parts of the body are in other positions

Anatomical Position

- Standing erect
- Arms at side of body
- Palms facing forward
- Eyes straight forward
- Legs are parallel
- Feet and toes pointing forward

Figure 2.3 – The anatomical position: standing erect, arms down at sides, palms facing forward, fingers extended, eyes looking straight ahead, legs together, and toes pointing forward.

Body Planes

- Used to assist in describing the body and its parts
- Three planes:
  - **Sagittal plane**
  - **Frontal plane**
  - **Transverse plane**

Sagittal Plane

- Also called **median plane**
- Vertical plane
- Runs lengthwise from front to back
- Divides body into left and right portions
- Cut along sagittal plane yields a **sagittal section**

Frontal Plane

- Also called **coronal plane**
- Vertical plane
- Runs lengthwise from side to side
- Divides body into front and back positions
- Cut along frontal plane yields a **frontal section** or **coronal section**

Transverse Plane

- Also called **horizontal plane**
- Crosswise plane that runs parallel to the ground
- Divides body into upper and lower portions
- Cut along transverse plane yields a **transverse section**

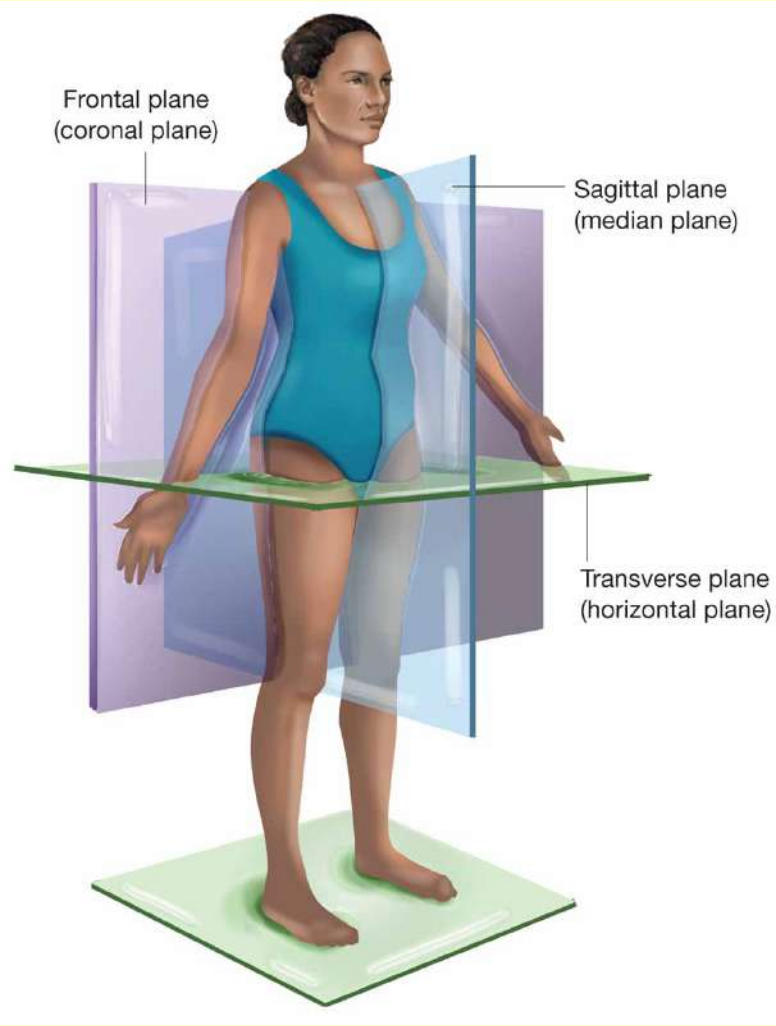


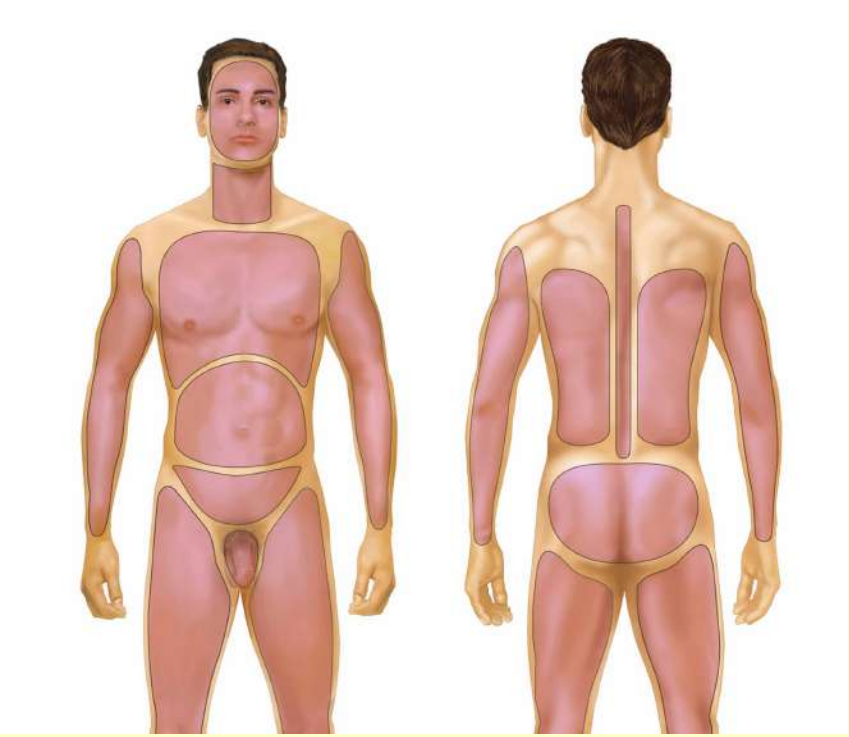
Figure 2.4 – The planes of the body: sagittal plane, frontal plane, and transverse plane.

Additional Sections

- **Cross-section**
  - Produced by slice perpendicular to long axis of structure
- **Longitudinal section**
  - Produced by lengthwise slice along long axis of structure

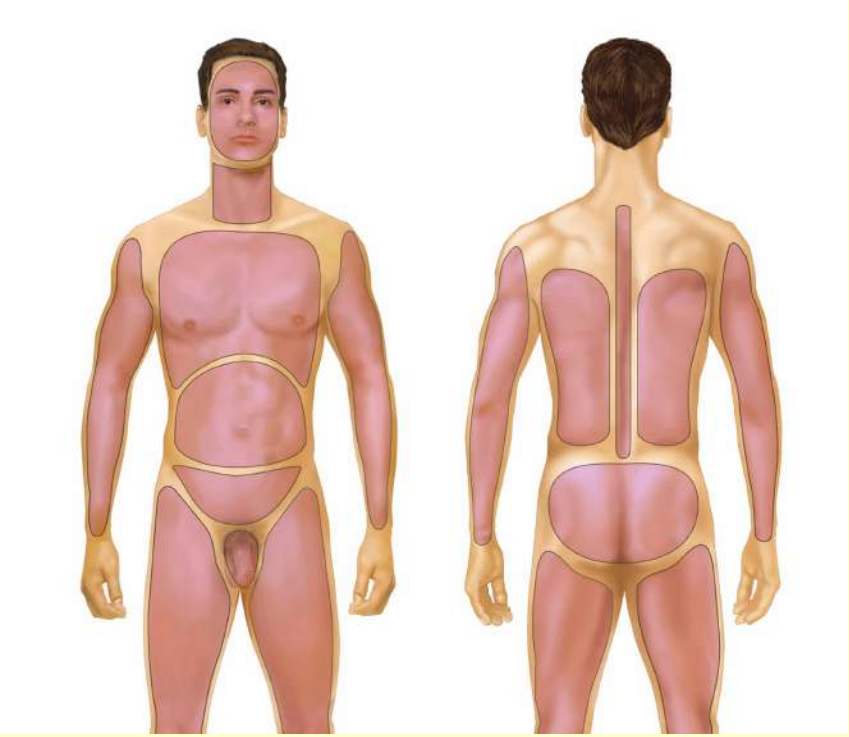
Body Regions

- **Cephalic** – head
- **Cervical** – neck
- **Brachial** – arm
- **Crural** – leg



Regions of the Trunk (torso)

- Anterior trunk
  - **Thoracic** – chest
  - **Abdominal**
  - **Pelvic**
  - **Pubic** – genitals
- Posterior trunk
  - **Dorsum** – back
  - **Vertebral**
  - **Gluteal** – buttocks



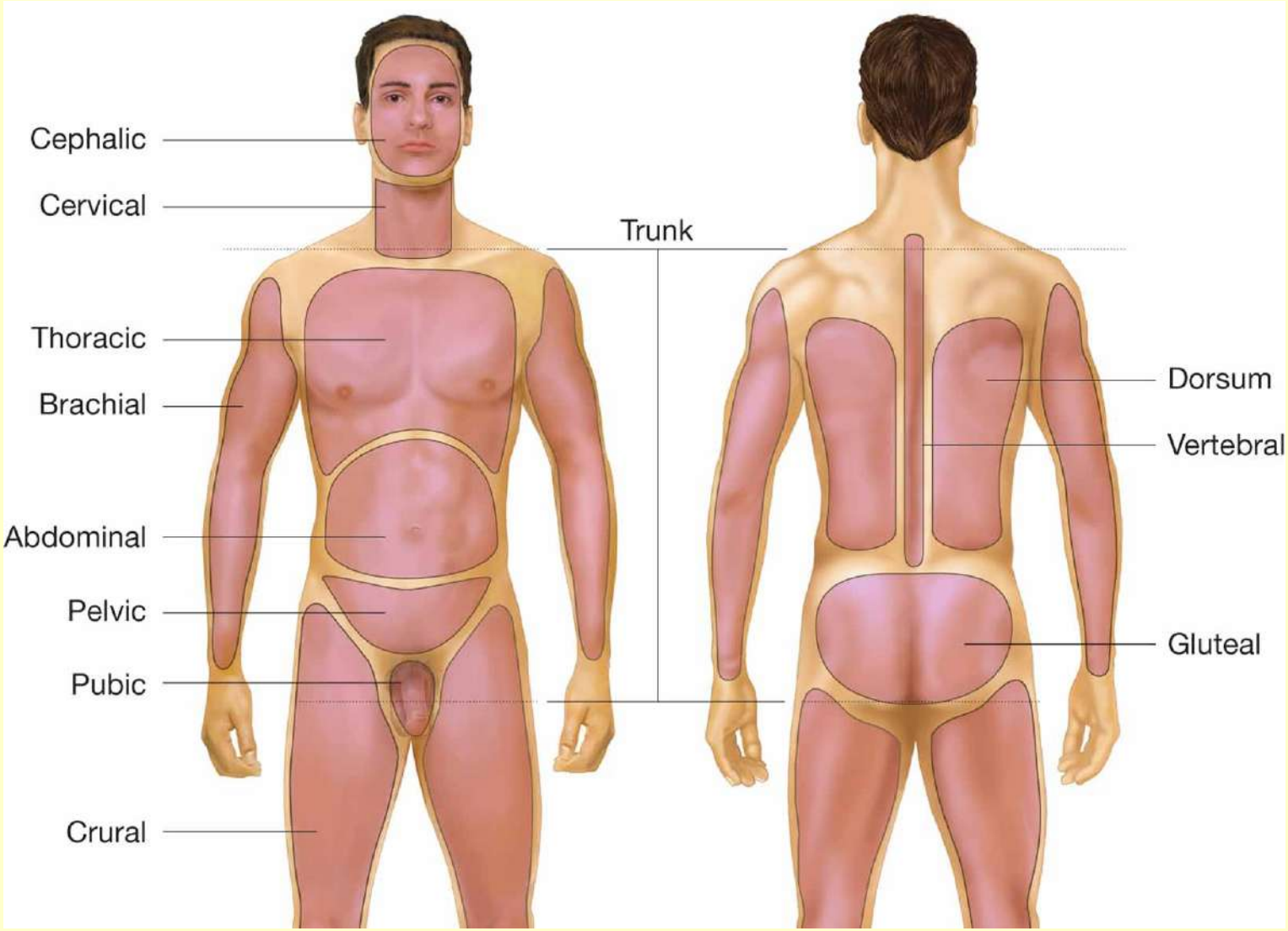


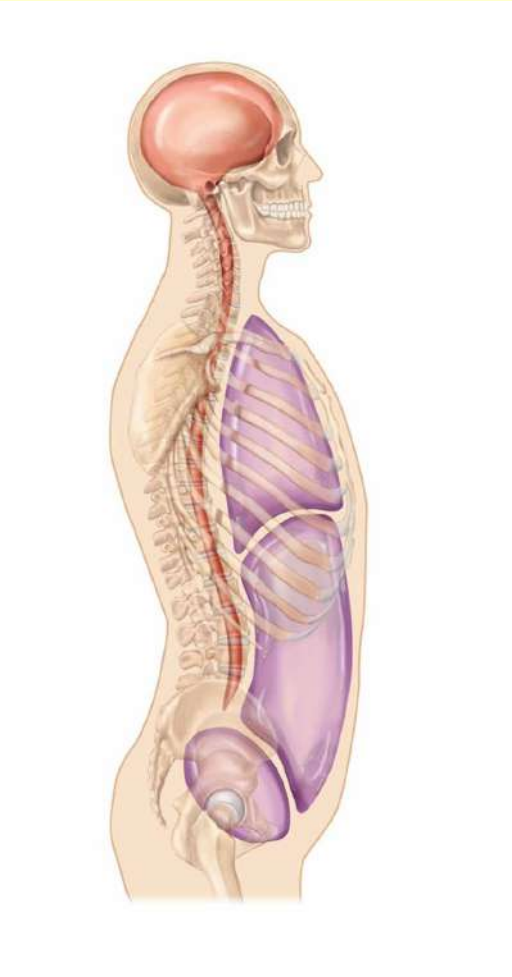
Figure 2.5 – Anterior and posterior regions of the body.

Body Cavities

- Body is not solid structure; has many open spaces or cavities
- Two dorsal cavities
  - **Cranial cavity**
  - **Spinal cavity**
- Two ventral cavities
  - **Thoracic cavity**
  - **Abdominopelvic cavity**

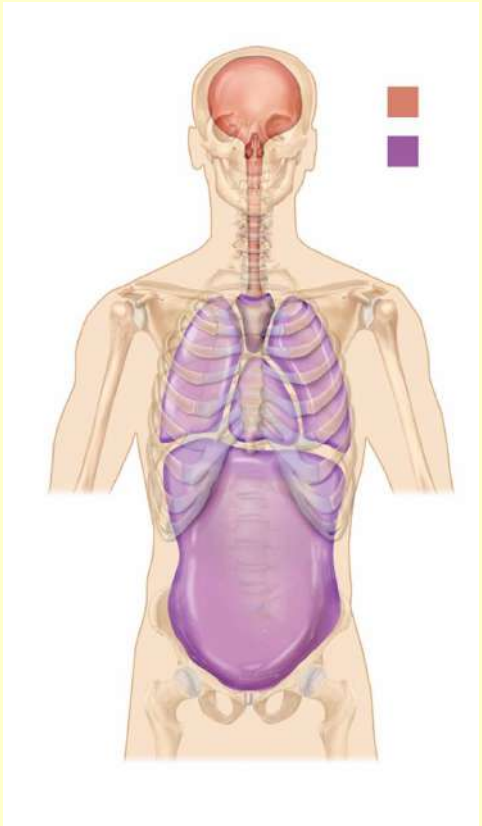
Dorsal Cavities

- Cranial cavity
  - Contains brain
- Spinal cavity
  - Contains spinal cord



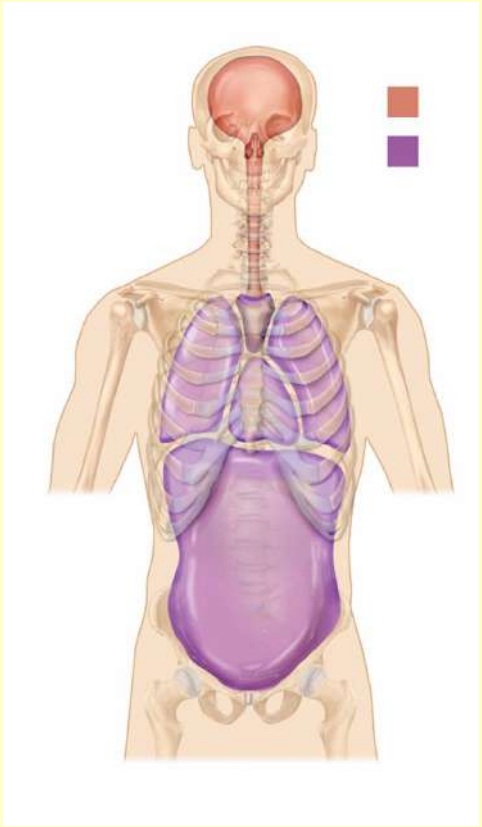
Thoracic Cavity

- Contains
  - Two lungs
  - Central **mediastinum**
- Mediastinum contains
  - Heart
  - Aorta
  - Esophagus
  - Trachea
  - Thymus gland



Abdominopelvic Cavity

- Separated from thoracic cavity by **diaphragm**
- Superior **abdominal cavity** and inferior **pelvic cavity**
- Contain digestive, excretory, and reproductive organs



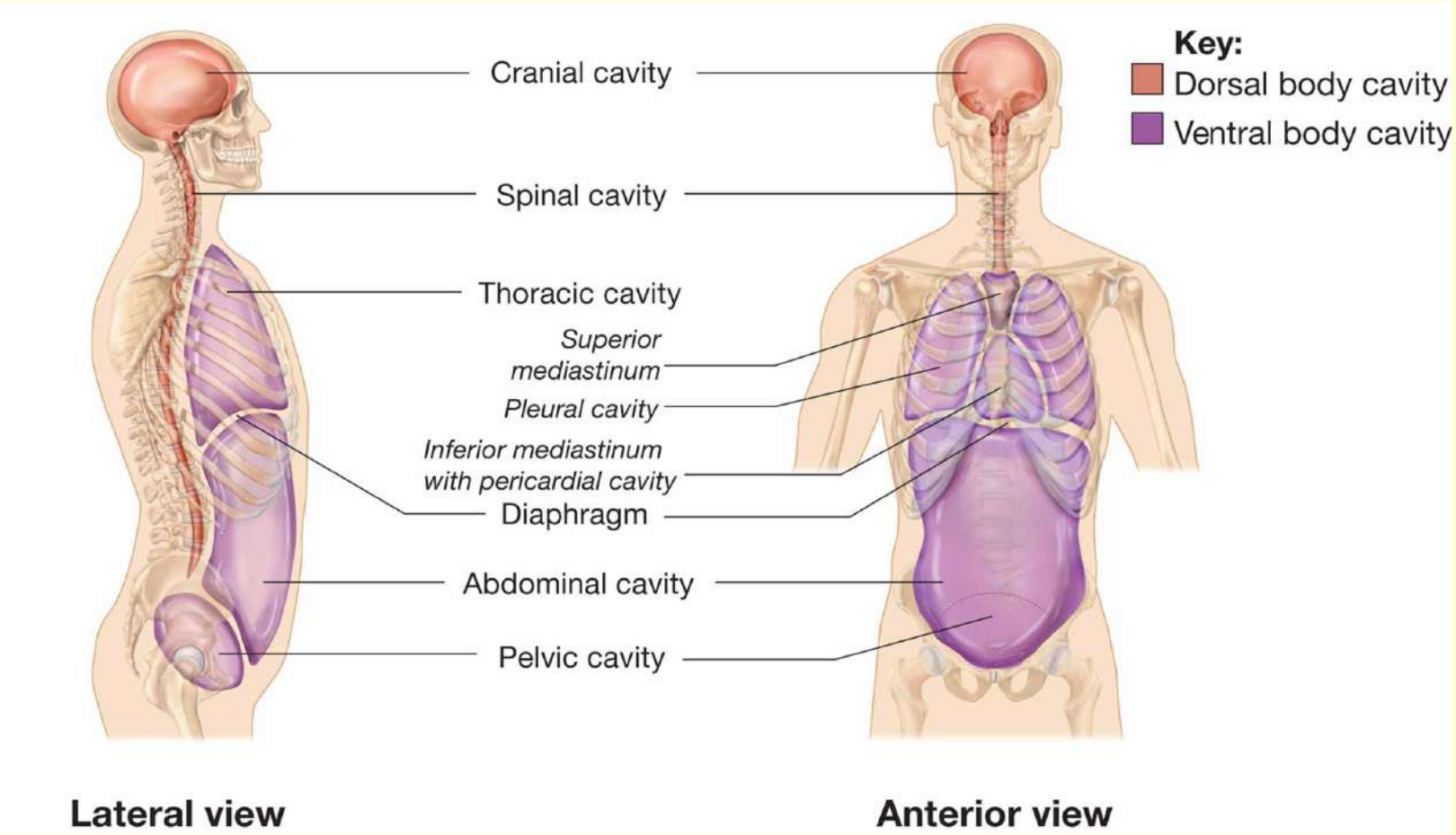
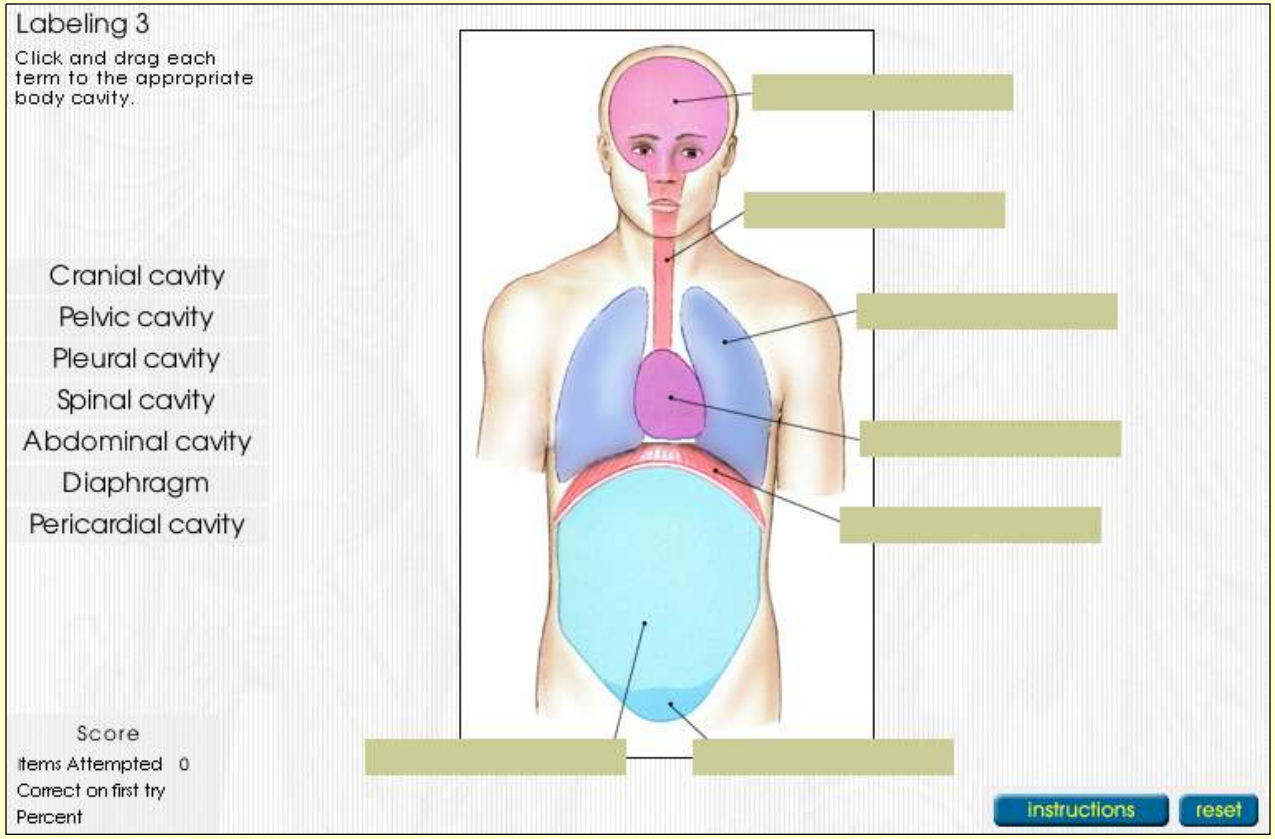


Figure 2.6 – The dorsal (red) and ventral (blue) body cavities.

Body Cavity Exercise



Click here to view an interactive exercise on body cavity terminology.

Viscera Encased in Sac

- Double layered membranous sac
  - **Parietal layer** – outer layer that lines cavities
  - **Visceral layer** – inner layer that contacts viscera
- Called **pleura** in thoracic cavity
- Called **peritoneum** in abdominopelvic cavity

Subdivisions of Pleura

- **Pleural cavity**
  - Contains the lungs
- **Pericardial cavity**
  - Contains the heart

Anatomical Divisions of the Abdomen

- Upper row:
  - Right and left **hypochondriac regions**
  - Center **epigastric region**
- Middle row:
  - Right and left **lumbar regions**
  - Center **umbilical region**
- Lower row:
  - Right and left **inguinal regions**
  - Center **hypogastric region**

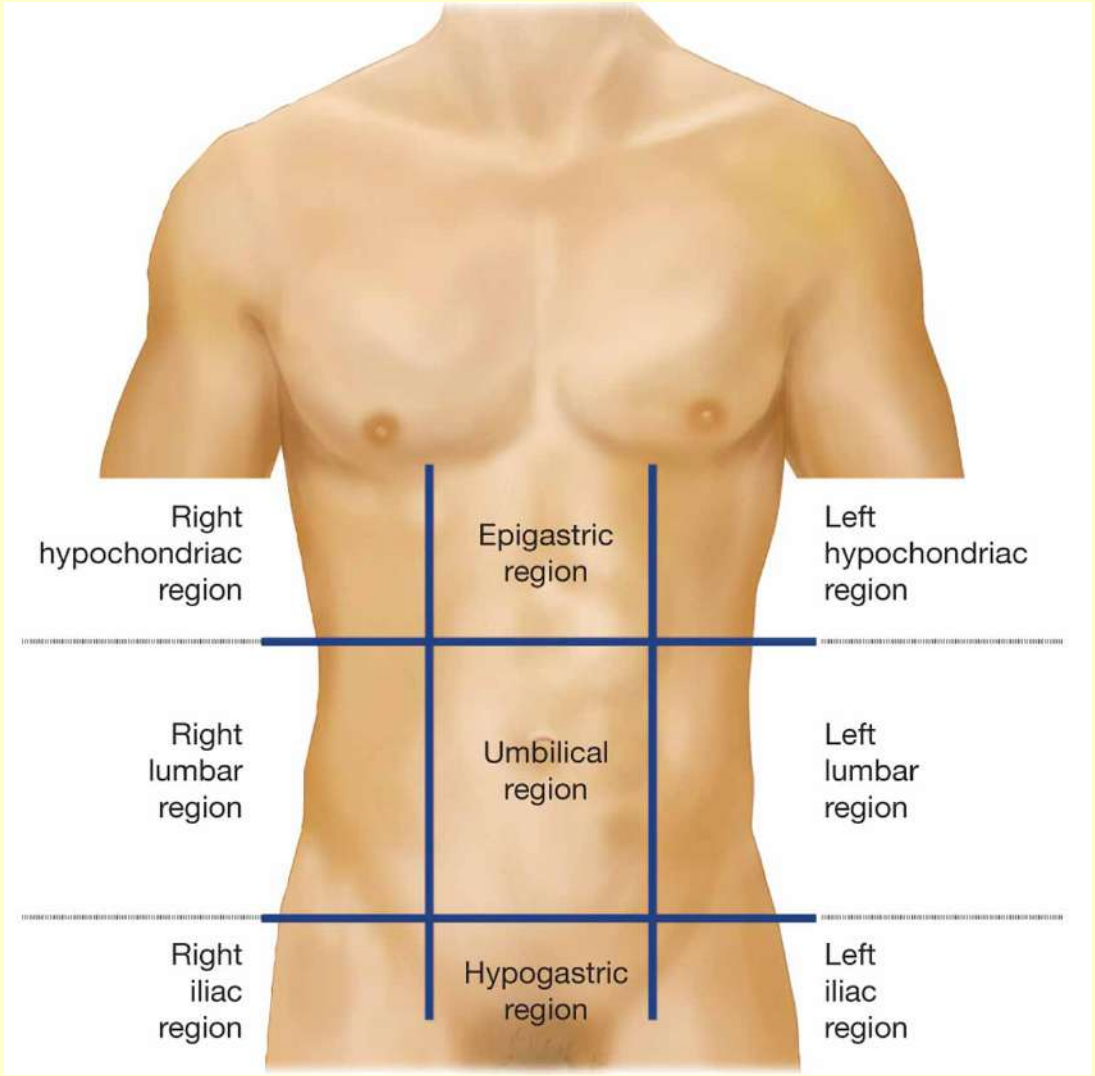


Table 2.3, Figure A – The anatomical divisions of the abdomen.

Clinical Divisions of Abdomen

- **Right upper quadrant** (RUQ)
  - Majority of liver
  - Gallbladder
  - Small portion of pancreas
  - Small intestine
  - Colon
- **Right lower quadrant** (RLQ)
  - Small intestine
  - Colon
  - Right ovary
  - Right fallopian tube
  - Appendix
  - Right ureter

Clinical Divisions of Abdomen

- **Left upper quadrant** (LUQ)
  - Small portion of liver
  - Spleen
  - Stomach
  - Majority of pancreas
  - Small intestine
  - Colon
- **Left lower quadrant** (LLQ)
  - Small intestine
  - Colon
  - Left ovary
  - Left fallopian tube
  - Left ureter

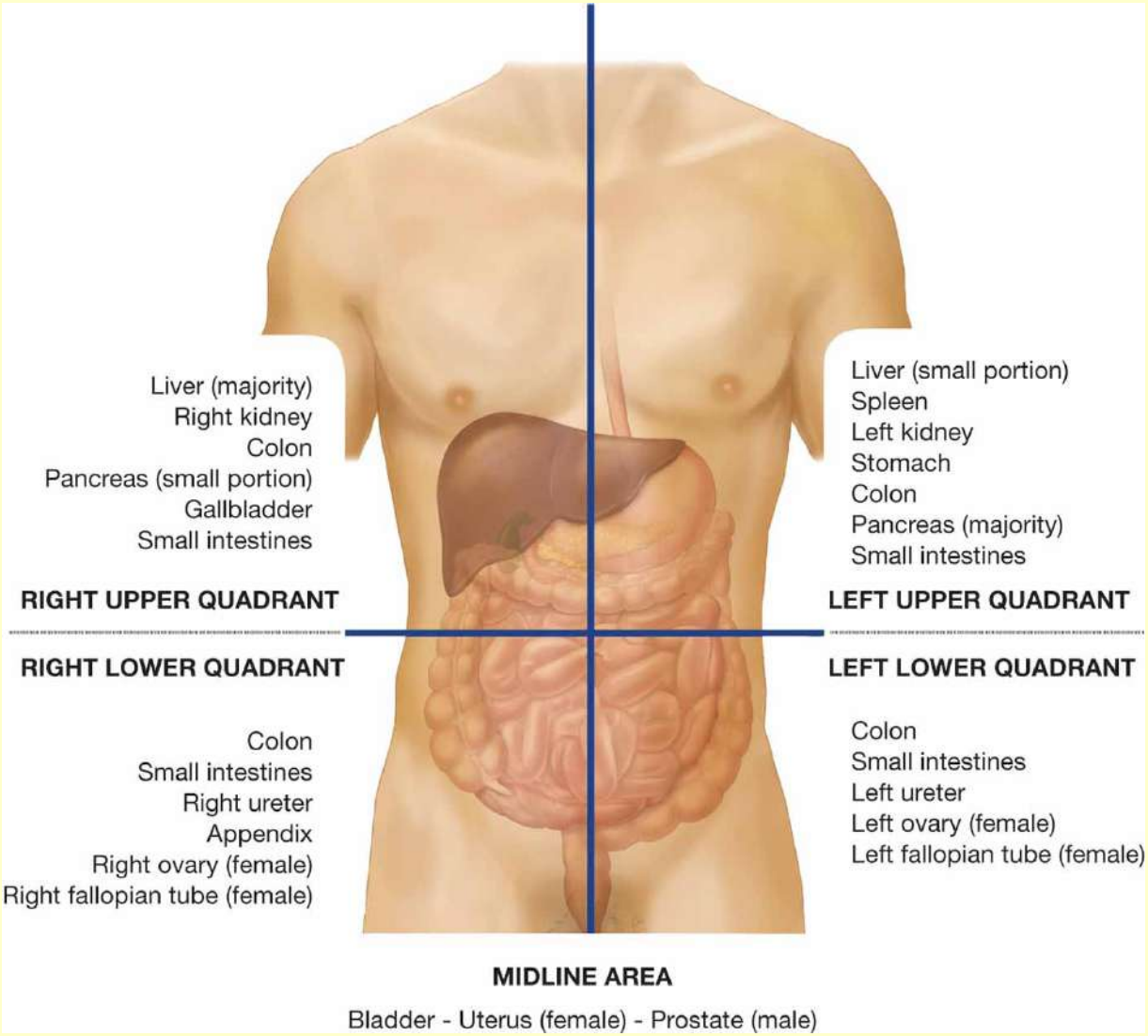


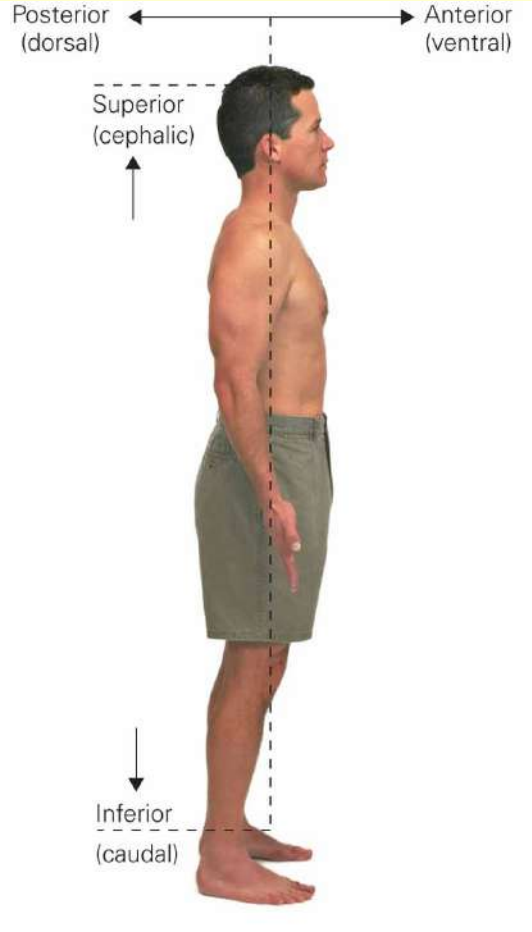
Table 2.3, Figure B – The clinical divisions of the abdomen.

Directional Terms

- Assist medical personnel in position or location of patient's complaint
- Help to describe one process, organ, or system as it relates to another
- They are listed in pairs that have opposite meanings in following table

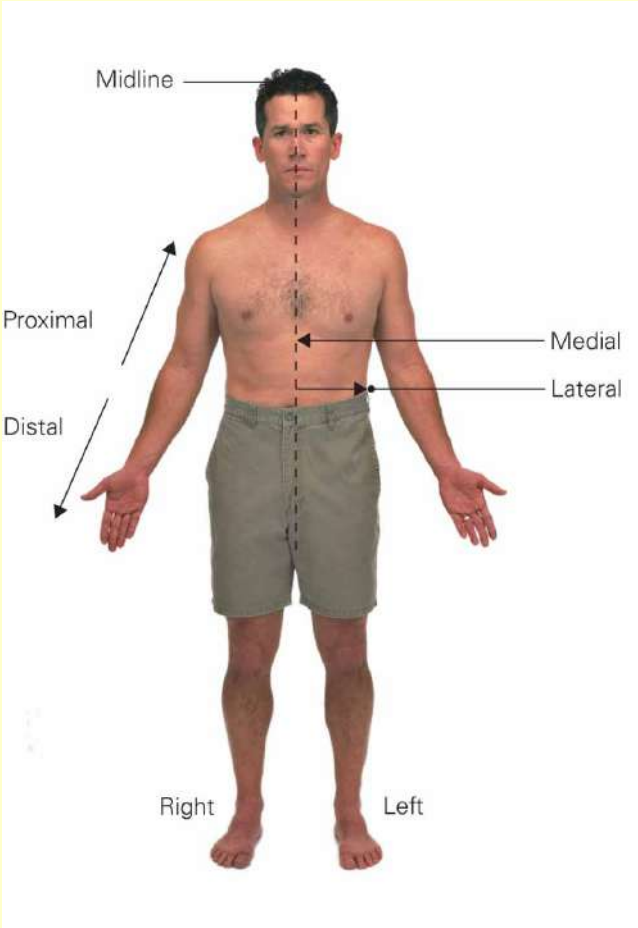
Directional Terms

- **Superior** or **cephalic**
  - More towards head
- **Inferior** or **caudal**
  - More towards feet
- **Anterior** or **ventral**
  - More towards front or belly-side of body
- **Posterior** or **dorsal**
  - More towards back or spinal cord side of body



Directional Terms

- **Medial**
  - More towards middle
- **Lateral**
  - More towards side
- **Proximal**
  - Nearer to the point of attachment to body
- **Distal**
  - Farther away from point of attachment to body



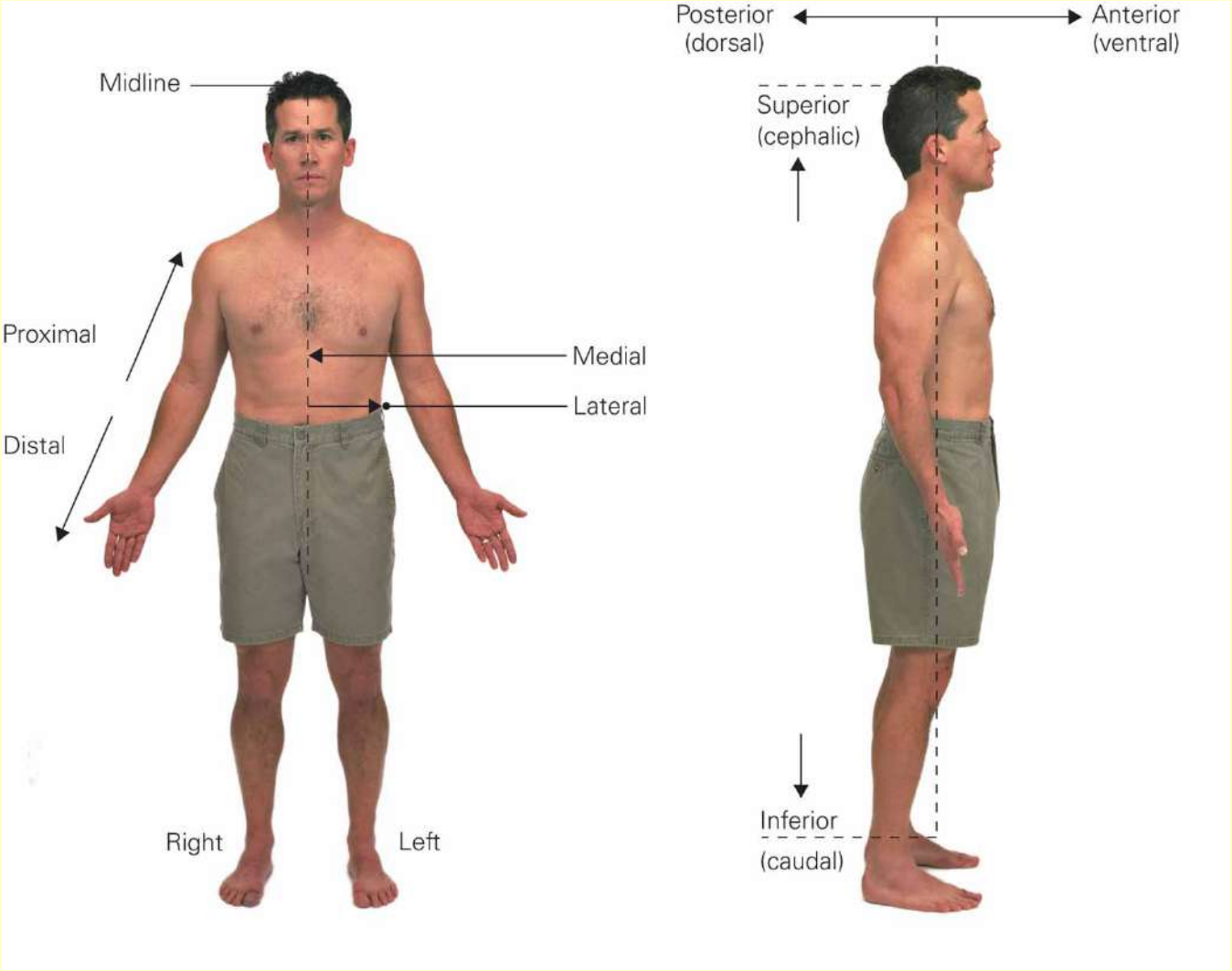


Figure 2.7 – Anterior and lateral views of the body illustrating directional terms.

Directional Terms

- **Apex**
  - Tip or summit of organ
- **Base**
  - Bottom or lower part of an organ
- **Superficial**
  - More towards surface of body
- **Deep**
  - Further away from surface of body

Supine

- **Supine** – lying horizontally facing upward

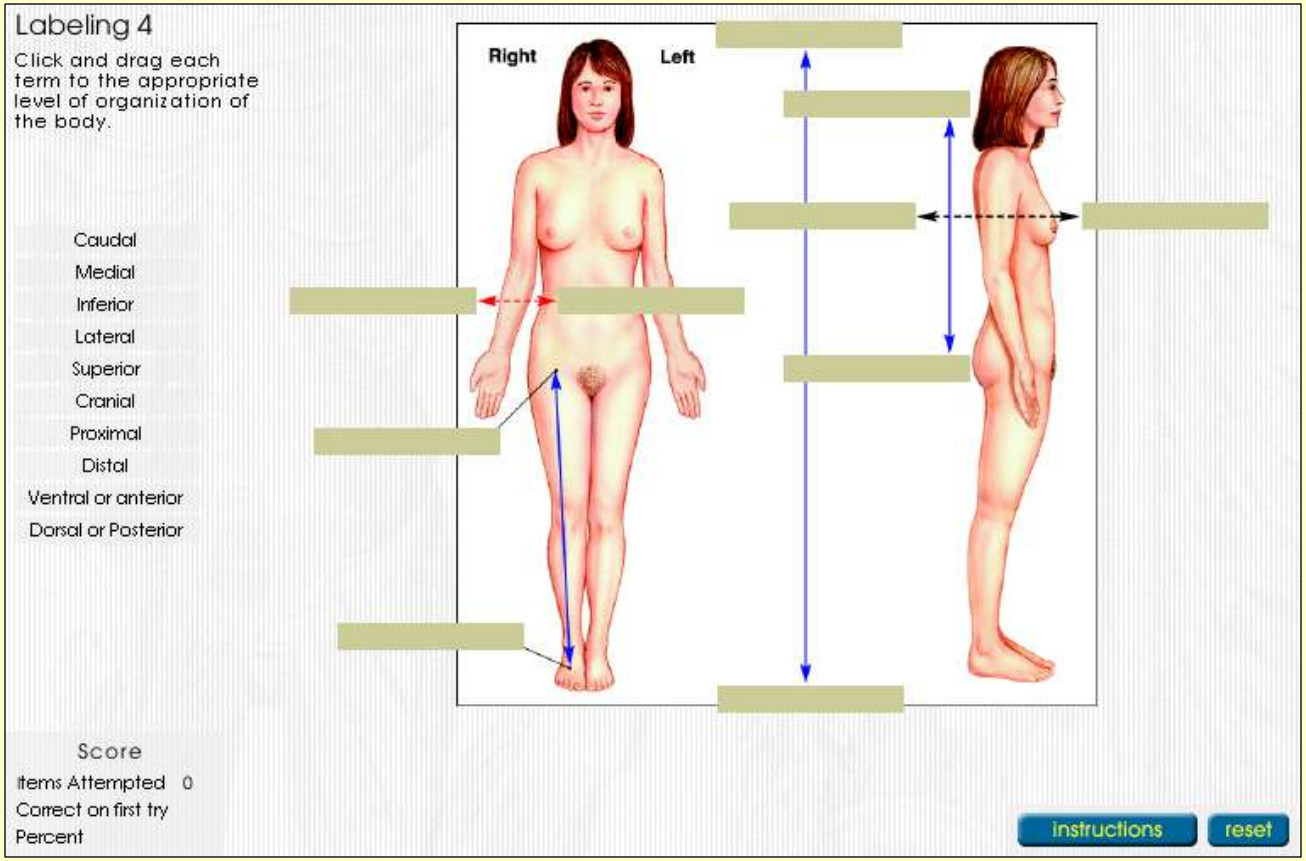
Figure 2.8A – The supine position.

Prone

- **Prone** – lying horizontally facing downward

Figure 2.8B – The prone position.

Body Areas Exercise



Click here to view an interactive exercise on body area terminology.

Body Structure Word Building

abdomin/o + –al	abdominal	pertaining to abdomen
anter/o + –ior	anterior	pertaining to front
brachi/o + –al	brachial	pertaining to arm
caud/o + –al	caudal	pertaining to tail
cephal/o + –ic	cephalic	pertaining to head
cervic/o + –al	cervical	pertaining to neck
crani/o + –al	cranial	pertaining to skull
crur/o + –al	crural	pertaining to leg

Body Structure Word Building

dist/o + –al	distal	pertaining to away
dors/o + –al	dorsal	pertaining to back of body
epitheli/o + –al	epithelial	pertaining to epithelium
glute/o + –al	gluteal	pertaining to buttocks
infer/o + –ior	inferior	pertaining to below
later/o + –al	lateral	pertaining to side
medi/o + –al	medial	pertaining to middle
muscul/o + –ar	muscular	pertaining to muscles

Body Structure Word Building

neur/o + –al	neural	pertaining to nerves
organ/o + –ic	organic	pertaining to organs
pelv/o + –ic	pelvic	pertaining to pelvis
peritone/o + –al	peritoneal	pertaining to peritoneum
pleur/o + –al	pleural	pertaining to pleura
poster/o + –ior	posterior	pertaining to back
proxim/o + –al	proximal	pertaining to near
pub/o + –ic	pubic	pertaining to genitals

Body Structure Word Building

somat/o + –ic	somatic	pertaining to body
spin/o + –al	spinal	pertaining to spine
super/o + –ior	superior	pertaining to above
system/o + –ic	systemic	pertaining to systems
thorac/o + –ic	thoracic	pertaining to chest
ventr/o + –al	ventral	pertaining to belly
vertebr/o + –al	vertebral	pertaining to vertebrae
viscer/o + –al	visceral	pertaining to internal organs

Body Organization Abbreviations

AP	anteroposterior
CV	cardiovascular
ENT	ear, nose, and throat
GI	gastrointestinal
GYN	gynecology
lat	lateral
LE	lower extremity (leg)

Body Organization Abbreviations

LLQ	left lower quadrant
LUQ	left upper quadrant
MS	musculoskeletal
OB	obstetrics
PA	posteroanterior
RLQ	right lower quadrant
RUQ	right upper quadrant
UE	upper extremity (arm)