INTRODUCTION TO ANATOMY
Anatomy – the study of the structure and shape of the body and body parts & their relationships to one another (function is the physiology)

Two main attributes

- **Gross anatomy** – “Macrosopic” The study of large, easily observable structures
- **Microscopic anatomy** – the study of very small structures, where a magnifying glass or microscope is needed
The Language of Anatomy

Descriptive Terms Used in Superficial Anatomy
Anatomical Position

- Standing

Anatomical position — body is erect with the feet parallel and the arms hanging at the sides with the palms facing forward.
Directional terms

- **Superior (cranial or cephalad)** – toward the head end or upper part of a structure or body; above
- **Inferior (caudal)** – away from the head end or toward the lower part of a structure or body; below
- **Anterior (ventral)** – toward or at the front of the body; in front of
- **Posterior (dorsal)** – toward or at the backside of the body; behind
- **Medial** – toward or at the midline of the body; on the inner side of
- **Lateral** – away from the midline of the body; on the outer side of
- **Intermediate** – between a more medial or more lateral structure
Directional terms

- **Proximal** – close to the origin of the body part or the point of attachment of a limb to the body trunk
- **Distal** – farther from the origin of a body or the point of attachment of a limb to the body trunk
- **Superficial (external)** – toward or at the body surface
- **Deep (internal)** – away from the body surface; more internal
Examples:

- The heart is **posterior** to the breastbone
- The arms are **lateral** to the chest
- The elbow is **proximal** to the wrist
- The skin is **superficial** to the skeleton
- The forehead is **superior** to the nose
- The breastbone is **anterior** to the spine
- The heart is **medial** to the arm
- The armpit is **intermediate** between the breastbone and the shoulder
- The knee is **distal** to the thigh
- The lungs are **deep** to the rib cage
Body planes and sections – a section is a cut made along a plane

- **Sagittal** – cut made along the lengthwise or longitudinal plane of the body dividing it into left and right parts
- **Midsagittal (median) plane** – right and left parts are of equal size
- **Frontal (coronal) plane** – cut made along a lengthwise plane that divides the body into anterior and posterior parts
- **Transverse plane (cross section)** – cut made along a horizontal plane dividing the body or organ into superior and inferior parts
Planes

- Sagittal Plane – divides body into right and left
Planes

- Frontal plane – divides body into anterior and posterior sections
**Planes**

- Transverse plane – divides into upper and lower sections
Levels of Organization

- **Chemical** – study of atoms and molecules such as water, sugar, & proteins
- **Cellular** – study of the smallest units of life
- **Tissue** – study of groups of similar cells that have a common function
- **Organ** – study of structures composed of 2 or more tissue types that performs a specific function for the body
- **System** – study of groups of organs that cooperate to accomplish a common purpose (each organ has its own job to do)
- **Organismal** – highest level of structural organization (11 organ systems total)
Systemic versus Regional Anatomy
Regional Anatomy

(a) Anterior

Nasal
Oral
Cervical
Acromial
Thoracic
Brachial
Antecubital
Abdominal
Umbilical
Carpal
Digital
Pubic
Patellar
Crural
Tarsal

Orbital
Buccal
Sternal
Axillary

Cephalic
Occipital

(b) Posterior

Deltoid
Scapular
Vertebral
Olecranial
Lumbar
Sacral
Gluteal
Popliteal
Sural
Calcaneal
Plantar
Abdominopelvic Quadrants

Right Upper Quadrant (RUQ):
- Right lobe of liver, gallbladder, right kidney, portions of stomach, small and large intestine

Left Upper Quadrant (LUQ):
- Left lobe of liver, stomach, pancreas, left kidney, spleen, portions of large intestine

Right Lower Quadrant (RLQ):
- Cecum, vermiform appendix, portions of small intestine, reproductive organs (right ovary in female and right spermatic cord in male), right ureter

Left Lower Quadrant (LLQ):
- Most of small intestine, portions of large intestine, left ureter, reproductive organs (left ovary in female and left spermatic cord in male)
Abdominopelvic Regions

- Right hypochondriac region
- Right lumbar region
- Right inguinal region
- Epigastric region
- Umbilical region
- Hypogastric region
- Left hypochondriac region
- Left lumbar region
- Left inguinal region
Body cavities

Cranial cavity

Thoracic cavity

Diaphragm

Spinal cavity

Abdominal cavity

Pelvic cavity

KEY:
- Dorsal body cavity
- Ventral body cavity

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Serous Membranes

- Line thoracic and abdominopelvic cavities
  - Line body wall and fold back over organs
  - Secrete water, salts; slippery
  - Parietal, visceral layers

- Thoracic membranes
  - Pleural membranes with space, fluid between layers
  - Pericardial membranes with space, fluid between layers

- Abdominal membranes
  - Peritoneal membranes with space (peritoneal cavity between layers)
Pleural Membranes
Peritoneal Membranes
Systemic Anatomy
INTEGUMENTARY

ORGANS

- Skin

FUNCTIONS

- Waterproofs, cushions, protects deeper tissue
- Excretes salts & urea; pain, pressure
- Regulates body temp; synthesize vitamin D
SKELETAL

ORGANS
- Bones, cartilages, ligaments, joints

FUNCTIONS
- Protects & supports body organs
- Framework for muscles & movement
- Hematopoiesis; store minerals
MUSCULAR

ORGANS
- Skeletal muscle (attached to bone)

FUNCTIONS
- Contraction & mobility (locomotion)
- Facial expression, posture
- Produce body heat
NERVOUS

ORGANS

- Brain, spinal cord, nerves, & sensory receptors

FUNCTIONS

- Fast-acting central control system
- Responds to external/internal stimuli via nerve impulses (electrical messages)
CIRCULATORY (CARDIOVASCULAR)

ORGANS
- Heart, blood vessels, blood

FUNCTIONS
- Carries $O_2$, nutrients, hormones, & other substances to and from tissue cells
- White blood cells protect against bacteria, toxins, tumors
LYMPHATIC ORGANS

- Lymphatic vessels, lymph nodes, spleen, tonsils

FUNCTIONS

- Complements circulatory system by returning leaked fluid back to blood vessels
- Cleanses the blood; involved in immunity
RESPIRATORY

ORGANS

- Nasal cavity, pharynx, larynx, trachea, bronchi, & lungs

FUNCTIONS

- Keeps blood supplied with \(O_2\) & removes \(CO_2\)
- Carries out gas exchanges through air sacs in lungs
DIGESTIVE

ORGANS

- Oral cavity, esophagus, stomach, small intestine, large intestine, rectum, anus (liver & pancreas)

FUNCTIONS

- Breaks food down into absorbable units that enter the blood; indigestible food eliminated as feces
URINARY (EXCRETORY)

ORGANS
- Kidney, ureter, urinary bladder, urethra

FUNCTIONS
- Eliminates nitrogenous waste from the body (urea & uric acid)
- Regulates water, electrolytes, & acid-base balance of the blood
ENDOCRINE

ORGANS
- Pituitary, thyroid, parathyroids, adrenals, thymus, pancreas, pineal, ovaries, testes

FUNCTIONS
- Slower-acting control system
- Glands produce hormones that regulate growth, reproduction, metabolism, etc.
REPRODUCTIVE ORGANS

- Male
  - Seminal vesicles, prostate, penis, vas deferens, testis, scrotum

- Female
  - Ovaries, mammary glands, uterus, vagina, uterine tube

FUNCTIONS

- Primary function for both sexes is to produce offspring
- Male – testes produce sperm & male sex hormones
- Female – ovaries produce eggs & female sex hormones; mammary glands for nourishment