Anatomy

The scientific study of the **structure and relationships between body parts**.

Physiology

The scientific discipline of how the body and its parts come together to **function**.

Structural and Functional Organization

Chemical Level	Atoms combine to form molecules.
Cell Level	Molecules form organelles, such as the nucleus and mitochondria, which make up cells.
Tissue Level	A group of similar cells and the materials surrounding them.
Organ Level	Two or more tissue types that together perform one or more common functions.
Organ System Level	A group of organs classified as one unit because of a common function/set of functions.
Organism Level	Any living thing considered as a whole.

Chemical → Cell → Tissue → Organ → Organ System → Organism

Characteristics of Life

Organization	The scientific interrelationships among the parts of an organism and how those parts interact to perform specific functions.
Metabolism	The ability to use energy to perform vital functions.
Responsiveness	The ability of an organism to sense changes in the environment and make the adjustments that help maintain its life.
Growth	Refers to an increase in size of all or part of the organism.
Development	Changes an organism undergoes through time.
Reproduction	Formation of new cells or new organisms.

Homeostasis

The ability of all living systems to **maintain stable, internal conditions no matter what changes are occurring outside the body**.

Four interacting components of most homeostatic mechanisms:
Stimulus → Receptor → Control Center → Effector
Stimulus - Indicates that the value of the variable has deviated from the set point/-normal range.
Receptor - Monitors the value and sends data to the control center.
Control Center - Establishes the set point.
Effector - Acts on the signal from the control center to move the variable back to the set point.

Homeostatic Mechanisms

Negative Feedback	**Positive Feedback**
Serves to *reduce an excess response* and keep a variable within the normal range.	Serves to *intensify a response* until endpoint is reached.
The response *stops* the effector.	The response *keeps* the reaction going.
Ex. Temperature & blood pressure regulation	Ex. Childbirth & blood clotting

Body Positions

Anatomical position	A person standing erect with the face directed forward, the upper limbs hanging to the side, and the palms of the hands facing forward.
Supine position	When a person is *lying face upward*
Prone position	When a person is *lying face downward*

Directional Terms

Anterior/Ventral	*Front* of the body
Posterior/Dorsal	*Back* of the body
Superior/Cranial	Towards the *top*

Directional Terms (cont)

Inferior/-Caudal	Towards the *bottom*
Proximal	*Towards* the trunk
Distal	*Further* from the trunk
Medial	Structures *toward the midline*
Lateral	Structures *farther away from the midline*

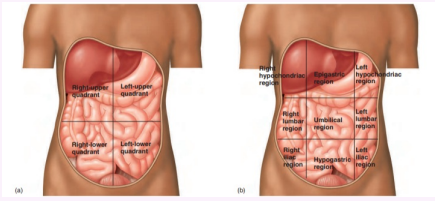
Planes

Sagittal Plane	Divides the body into *left and right sides* (vertically)
Median Plane/-Mid-Sagittal Plane	Passes through the midline of the body; divides the body into *left and right halves*
Parasagittal Plane	*Parallel* to the sagittal plane, but off to one side
Frontal/Coronal Plane	Divides the body into *front and back* (vertically)
Transverse/Horizontal Plane	Divides the body into *top and bottom* (horizontally)

Body Parts and Regions

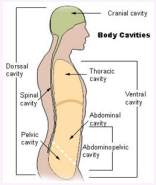
Axial Parts	Head, neck, and trunk
Appendicular Parts	Arms and legs (upper & lower limbs)

The Abdomen



Abdominal quadrants consist of *four subdivisions*.
Abdominal regions consist of *nine subdivisions*.

Body Cavities



The *two main cavities* are called the **ventral and dorsal cavities**.

Ventral Cavity - Consists of the following: the *thoracic cavity*. *abdominal cavity*, and the *pelvic cavity*.

Dorsal Cavity - Contains organs lying more posterior in the body. Can be divided into *two portions*: (1) **the upper portion or the cranial cavity** houses the *brain* (2) **the lower portion or vertebral canal** houses the *spinal cord*.

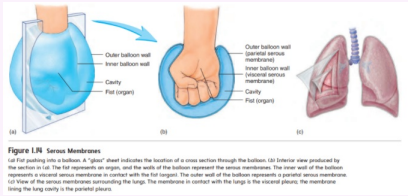
Ventral Cavities

Thoracic cavity	It is surrounded by the rib cage, separated from the abdominal cavity by the diaphragm, and is divided into right and left parts by a median structure called *mediastinum*.
Abdominal cavity	Bounded primarily by the abdominal muscles and contains the stomach, intestines, liver, spleen, pancreas, and the kidneys.
Pelvic cavity	A small space enclosed by the bones of the pelvis and contains the urinary bladder, part of the large intestine, and the internal reproductive organs.

Mediastinum - Is a partition containing the heart, thymus, trachea, esophagus, and others. *Two lungs* are located on each side of the mediastinum.

The abdominal and pelvic cavities are not physically separated and sometimes are called the **abdominopelvic cavity**.

Serous Membranes



Serous membranes - Secrete fluid that fills the space between the parietal and visceral membranes. The serous membranes protect organs from friction.

Serous membranes lining the thoracic cavity:
Heart: Pericardial cavity - visceral & parietal pericardium - pericardial fluid
Lungs: Pleural cavity - visceral & parietal pleura - pleural fluid

Serous membranes lining the abdominopelvic cavity:
Peritoneal cavity - visceral & parietal peritoneum - peritoneal fluid

Mesenteries & Retroperitoneal Organs

Mesenteries - Are parts of the peritoneum that hold the abdominal organs in place and provide a passageway for blood vessels and nerves to organs.
Retroperitoneal organs - Are found *behind the parietal peritoneum* and consists of the *kidneys*, *adrenal glands*, *pancreas*, *parts of the intestines*, and the *urinary bladder*.

11 Major Organ Systems

1. Integumentary
2. Skeletal
3. Muscular
4. Lymphatic
5. Respiratory
6. Digestive
7. Nervous
8. Endocrine
9. Cardiovascular
10. Urinary
11. Reproductive

Major Organs of the Body