

HBS109 – Human Structure and Function.

Week 1 – Introduction to Anatomy and Physiology.

Anatomy: The study of the STRUCTURE and shape of the body and its parts and their relationship to one another

Physiology: the study of how the body and its parts FUNCTION.

Major levels of organisation of the human body.

6 levels of organisation

1. Atoms

- Chemical level: atoms combined to form molecules e.g. water molecules

2. Cellular level

- Cells are made up of molecules e.g. smooth muscle cells

3. Tissue level

- Tissue consists of similar types of cells e.g. smooth muscle tissues

4. Organ level

- Organs are made up of different types of tissue e.g. blood vessels, heart

5. Organ system level

- Organ system consists of different organs that work closely together. E.g. cardiovascular system = heart and blood vessels.

6. Organismal level

- Human organisms are made up of many organ systems

Organ systems in the body. (11 systems)

1. Integumentary system

- Structure:

- Nails
- Hair
- Skin
- Sweat glands

- Function:

- Protect against environmental hazards
- Regulate body temperature e.g. sweat
- Provides sensory information

2. Skeletal system

- Structure:

- Bones
- Cartilage
- Ligaments
- Bone marrow

- Function:

- Support and protect other tissues e.g. rib cage
- Stores calcium and other minerals
- Formation of blood cells

3. Muscular system

- Structure:

- Skeletal muscles
- tendons
 - Function:
- Movement
- Protection and support
- Generate heat
- 4. Nervous system**
 - Structure:
 - Brain
 - Spinal cord
 - Peripheral nerves
 - Sense organs
 - Function:
 - Directs immediate response to stimuli
 - Coordinates activities of other organs
 - Provides and interprets sensory information about external conditions e.g. hot? Cold?
- 5. Endocrine system**
 - Structure:
 - Pituitary gland
 - Thyroid gland
 - Pancreas
 - Testes and ovaries
 - Function:
 - Directs long term changes in activities in other systems
 - Adjust metabolic activity and energy use
 - Controls structural and functional changes during development
- 6. Cardiovascular system**
 - Structure:
 - Heart
 - Blood
 - Blood vessels
 - Function:
 - Distributes blood cells, water, nutrients, waste products, oxygen and carbon dioxide
 - Distributes heat and assists in control of body temperature
- 7. Lymphatic system**
 - Structure:
 - Spleen
 - Lymphatic vessels
 - Tonsils
 - Lymph nodes
 - Thymus
 - Function:
 - Defend against infection and disease
 - Returns tissue fluid to the bloodstream
- 8. Respiratory system**
 - Structure:
 - Nasal cavity

- Larynx
- Trachea
- Bronchi
- Alveoli
 - Function:
- Deliver air to alveoli
- Provides oxygen to bloodstream
- Removes carbon dioxide from blood stream
- Produces sound

9. Digestive system

- Structure:
- Teeth
- Stomach
- Salivary glands
- Pharynx
- Pancreas
- Gallbladder
- Oesophagus
- Small and large intestine
- Liver
- Function:
- Processes and digest food
- Absorb and conserves water
- Absorb nutrients
- Stores energy reserves

10. Urinary system

- Structure:
- Kidneys
- Ureters
- Urinary bladder
- Urethra
- Function:
- Excretes water products from the blood
- Controls water balance by regulating volume of urine produced
- Stores urine prior to excretion
- Regulates blood ion concentration and pH

11. Skeletal system

- Structure:
- Gonads
- Reproductive glands
- Mammary glands
- Function:
- Produce sex cells (sperm and oocytes)
- Produce hormones
- Support developing embryo (female)
- Provided milk for newborn (female)

Anatomical terminology.

<i>Term</i>	<i>Definition</i>
Superior (cranial)	Toward the head
Inferior (caudal)	Toward the bottom (tail)
Anterior (ventral)	Toward the front
Posterior (dorsal)	Toward the back
Medial	Toward the midline of the body
Lateral	Toward the side of the body
Internal (deep)	Away from the surface of the body
External (superficial)	Toward the surface of the body
Proximal	Toward the main mass of the body
Distal	Away from the main mass of the body

Homeostasis: is the body's ability to maintain a constant internal environment.

- A stable environment
- body temperature (approx. 37 degree)
- body fluid volume
- waste product concentration
- blood pressure
- body fluid composition → nutrient and oxygen and carbon dioxide levels
- Homeostatic regulation
- Physiological systems work together to preserve stable environment
- Constant adjustment of physiological systems
- What happens if homeostasis is disturbed?
- Most disruptions are resolved through homeostatic mechanisms
- Severe injury, infection, stress or genetic abnormality can overwhelm homeostatic mechanisms
- This can result in malfunction of organ systems and disease/illness can occur (often chronic)

Two body system responsible for ensuring a coordinated response to changes in internal and external environments:

- Nervous system
- Endocrine system

Mechanisms used for homeostatic regulation.

- 1. Autoregulation** (intrinsic regulation)
 - Local level
 - Change occurs automatically within the cell, tissue, organ or organ system
 - E.g. chemical makeup of membrane
- 2. Extrinsic system**
 - Systemic level
 - Change involves nervous system and/or endocrine system