An Introduction to Human Body

Anatomy and Physiology

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1 Introduction

Physiology is the study of how the body works, while anatomy studies how those parts relate to one another. Dissection is the method of carefully separating body parts to examine the relationships between them. Hetology, gross anatomy, systemic anatomy, regional anatomy, surface anatomy, radiographic anatomy, and pathological anatomy are a few fields of anatomy. Other branches include developmental biology, cell biology, embryology, and developmental biology. Molecular physiology, neurophysiology, endocrinology, cardiovascular physiology, immunology, respiratory physiology, renal physiology, exercise physiology, and pathophysiology are a few examples of the fields of physiology.

There are six structural layers in the human body: chemical, cellular, tissue, organ, system, and organismal. The smallest living entities in the human body, cells serve as an organism's fundamental structural and functional building blocks. Groups of cells and the substances that surround them constitute tissues, which collaborate to carry out certain tasks. Organs have distinct functions, are made up of two or more different tissue types, and typically have distinctive shapes. Systems are made up of connected organs with a single purpose. Any living thing is an organism.

2 Homeostasis

As a result of the interaction of all of the body's regulatory functions, homeostasis is the preservation of essentially stable circumstances inside the body. Homeostasis can be upset by both internal and external stimuli as well as psychological stress. When homeostasis is briefly and mildly disturbed, bodily responses swiftly bring the internal environment back into equilibrium. Extreme disturbance may result in a failure of homeostasis regulation. Homeostasis is often regulated by the neurological and endocrine systems working together or separately. In regulated environments, the nervous system recognises when the body is changing and sends nerve impulses to reverse those changes. Hormones secreted by the endocrine system control homeostasis.

Feedback systems consist of three parts: (1) Receptors convey information to a control centre in response to changes in a regulated environment (afferent pathway). (2) The control centre establishes the value (set point) that should be used to maintain a controlled condition, assesses the information it gets from receptors (efferent pathway), and creates output commands as required. (3) Effectors create a response (effect) that modifies the controlled situation after receiving output from the control centre.

Homeostatic imbalances, or disturbances of homeostasis, can cause problems, diseases, and even death. All abnormalities of structure or function are collectively referred to as disorders. An ailment having a specific set of symptoms is referred to as a disease. While indicators are objective changes that can be seen and recorded, symptoms are subjective alterations in a person's bodily functions.

The system is said to operate via negative feedback if a response changes the original stimulus. The mechanism is operating through positive feedback if the reaction improves upon the first stimulus.

The control of blood pressure is one instance of adverse feedback. The baroreceptors (pressure-sensitive nerve cells, the receptors) in blood arteries send impulses (input) to the brain if a stimulus causes blood pressure to rise (controlled condition) (control center). The heart receives signals from the brain as an output (effector). Heart rate slows as a result, and blood pressure returns to normal (restoration of homeostasis). The birth of a child is one instance of positive feedback. Stretch-sensitive nerve cells in the cervix act as receptors to transmit nerve signals to the brain as labour progresses. When the cervix of the uterus is stretched (stimulated), labour begins (control center). The uterus

(effector), when stimulated by the brain's release of oxytocin (output), contracts more vigorously (response).

3 Basic Anatomical Terminology

When describing any part of the body, it is assumed that the person is standing straight in front of the observer, with the head level and the eyes looking directly ahead. This is the anatomical position. The upper limbs are at the sides with the palms facing forward, while the feet are flat on the ground and pointed forward. A face-down body is prone, whereas a face-up body is supine. Specific body regions are referred to by their regional names. The head, neck, trunk, upper limbs, and lower limbs are the main regions. Specific body components within the regions have anatomical names and matching common names. Thoracic (chest), nasal (nose), and carpal are some examples (wrist).

In order to visualise internal structures, planes—imaginary flat surfaces—are employed to divide the body or organs. The body or an organ is divided into equal right and left sides by a midsagittal plane. The body or an organ is divided into unequal right and left sides by a parasagittal plane. The anterior and posterior halves of the body or an organ are separated by a frontal plane. The body or an organ is divided into superior and inferior sections by a transverse plane. The body or an organ is traversed by an oblique plane at an oblique angle. Sections are horizontal cuts made through the body or its organs. Transverse, frontal, and sagittal sections are among them. They are named based on the plane along which the cut is made.

A pericardial cavity, which houses the heart, and two pleural cavities, each of which houses a lung, make up the three smaller cavities that make up the thoracic cavity. The mediastinum is an anatomical area that is located in the middle of the thoracic cavity. It runs from the sternum to the spinal column and from the first rib to the diaphragm, and it is situated between the pleural cavities. Except for the lungs, it contains all of the thoracic viscera. A superior abdominal cavity and an inferior pelvic cavity make up the abdominopelvic cavity. The stomach, spleen, liver, gallbladder, small intestine, and the majority of the large intestine are all considered viscera of the abdominal cavity. The urine bladder, a section of the large intestine, and reproductive system internal organs are all considered viscera of the pelvic cavity.

The walls of the thoracic and abdominal cavities are lined with serous membranes, which also cover the organs inside. These include the pericardium, which is connected to the heart, the peritoneum, which is connected to the abdominal cavity, and the pleura, which is connected to the lungs.

The right hypochondriac, epigastric, left hypochondriac, right lumbar, umbilical, left lumbar, right inguinal (iliac), hypogastric (pubic), and left inguinal areas of the abdominopelvic cavity are used to describe the position of organs (iliac). The abdominopelvic cavity is split into four quadrants: the right upper quadrant (RUQ), left upper quadrant (LUQ), right lower quadrant (RLQ), and left lower quadrant in clinical research to identify the location of an abdominopelvic abnormality (LLQ).

4 Aging and Homeostasis

Aging increases sensitivity to stress and disease and results in visible changes in structure and function. All bodily systems experience aging-related changes. Techniques and processes used to produce images of the human body are referred to as medical imaging. They enable the imaging of interior structures for the diagnosis of aberrant anatomy and physiologic abnormalities.

References