

An Introduction To Human Body

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1 Anatomy and Physiology

Anatomy (a-NAT-o-mē; ana- = up; -tomy = process of cutting) is the science of body structures and the relationships among them. Whereas anatomy deals with structures of the body, physiology (fiz- ē-OL-o-jē; physio- = nature; -logy = study of) is the science of body functions—how the body parts.

1.1 Levels of Structural Organization and Body Systems

There are six levels of structural organization and 11 systems of human body. Chemical, Cellular, Tissue, Organ, system, organismal level and integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, reproductive systems.

1.1.1 Basic Life Processes

Metabolism, Responsiveness, Movement, Growth, Differentiation, Reproduction.

2 Homeostasis

Homeostasis (ho-mē-o-STA - -sis; homeo- = sameness; -stasis = standing still) is the maintenance of relatively stable conditions in the body's internal environment. It occurs because of the ceaseless interplay of the body's many regulatory systems. Homeostasis is a dynamic condition. In response to changing conditions, the body's parameters can shift among points in a narrow range that is compatible with maintaining life. For example, the level of glucose in blood normally stays between 70 and 110 milligrams of glucose per 100 milliliters of blood. An important aspect of homeostasis is maintaining the volume and composition of body fluids, dilute, watery solutions containing dissolved chemicals that are found inside cells as well as surrounding them.

2.1 Control of Homeostasis

In most cases the disruption of homeostasis is mild and temporary, and the responses of body cells quickly restore balance in the internal

environment. However, in some cases the disruption of homeostasis may be intense and prolonged, as in poisoning, overexposure to temperature extremes, severe infection, or major surgery. In most cases the disruption of homeostasis is mild and temporary, and the responses of body cells quickly restore balance in the internal environment. However, in some cases the disruption of homeostasis may be intense and prolonged, as in poisoning, overexposure to temperature extremes, severe infection, or major surgery.

FEEDBACK SYSTEMS Receptor is a body structure that monitors changes in a controlled condition and sends input to a control center. Control centre evaluates the input it receives from receptors, and generates output commands when they are needed. Output from the control center typically occurs as nerve impulses, or hormones. Effector is a body structure that receives output from the control center and produces a response or effect that changes the controlled condition.

NEGATIVE FEEDBACK SYSTEMS A negative feedback system reverses a change in a controlled condition. **POSITIVE FEEDBACK SYSTEMS** Unlike a negative feedback system, a positive feedback system tends to strengthen or reinforce a change in one of the body's controlled conditions.

3 Body Cavities

Body cavities are spaces that enclose internal organs. Bones, muscles, ligaments, and other structures separate the various body cavities from one another.

- 1) Cranial cavity-Formed by cranial bones and contains brain.
- 2) Vertebral canal-Formed by vertebral column and contains spinal cord and the beginnings of spinal nerves.
- 3) Thoracic cavity-Chest cavity; contains pleural and pericardial cavities and the mediastinum.
- 4) Pleural cavity-A potential space between the layers of the pleura that surrounds a lung.
- 5) Pericardial cavity-A potential space between the layers of the pericardium that surrounds the heart.
- 6) Mediastinum-Central portion of thoracic cavity between the lungs; extends from sternum to vertebral column and from first rib to diaphragm; contains heart, thymus, esophagus, trachea, and several large blood vessels.
- 7) Abdominal cavity-Contains stomach, spleen, liver, gallbladder, small intestine, and most of large intestine; the

serous membrane of the abdominal cavity is the peritoneum.8)Pelvic cavity-Contains urinary bladder, portions of large intestine, and internal organs of reproduction.

3.0.1 Aging and Homeostasis

Aging is a normal process characterized by a progressive decline in the body's ability to restore homeostasis. Aging produces observable changes in structure and function and increases vulnerability to stress and disease.

4 Medical Imaging

Medical imaging refers to techniques and procedures used to create images of the human body. Various types of medical imaging allow visualization of structures inside our bodies and are increasingly helpful for precise diagnosis of a wide range of anatomical and physiological disorders. eg- 1)Radiography-Relatively inexpensive, quick, and simple to perform; usually provides sufficient information for diagnosis. X-rays do not easily pass through dense structures, so bones appear white. Hollow structures, such as the lungs, appear black. Structures of intermediate density, such as skin, fat, and muscle, appear as varying shades of gray. At low doses, x-rays are useful for examining soft tissues such as the breast.

2)MAGNETIC RESONANCE IMAGING (MRI)-The body is exposed to a high-energy magnetic field, which causes protons (small positive particles within atoms, such as hydrogen) in body fluids and tissues to arrange themselves in relation to the field. Relatively safe but cannot be used on patients with metal in their bodies. Shows fine details for soft tissues but not for bones. Most useful for differentiating between normal and abnormal tissues.

3)COMPUTED TOMOGRAPHY (CT)-an x-ray beam traces an arc at multiple angles around a section of the body.Visualizes soft tissues and organs with much more detail than conventional radiographs. Differing tissue densities show up as various shades of gray.

4)ULTRASOUND SCANNING-High-frequency sound waves produced by a handheld wand reflect off body tissues and are detected by the same instrument.

5)CORONARY (CARDIAC) COMPUTED TOMOGRAPHY ANGIOGRAPHY (CCTA) SCAN-An iodine containing contrast medium is injected into a vein and a beta blocker is given to decrease heart rate. Then, numerous x-ray beams trace an arc around the heart and a scanner detects the x-ray beams and transmits them to a computer.Used primarily to determine if there are any coronary artery blockages.

6)POSITRON EMISSION TOMOGRAPHY (PET)- A substance that emits positrons (positively charged particles) is injected into the body, where it is taken up by tissues. The collision of positrons with negatively charged electrons in body tissues produces gamma rays (similar to x-rays) that are detected by gamma cameras.Used to study the physiology of body structures, such as metabolism in the brain or heart.

7)ENDOSCOPY-Endoscopy involves the visual examination of the inside of body organs or cavities using a lighted instrument with lenses called an endoscope.

8)RADIONUCLIDE SCANNING-A radionuclide (radioactive substance) is introduced intravenously into the body and carried by the blood to the tissue to be imaged. Gamma rays emitted by the radionuclide are detected by a gamma camera outside the subject, and the data are fed into a computer.Used to study activity of a tissue or organ, such as searching for malignant tumors in body tissue or scars that may interfere with heart muscle activity.