

INTRODUCTORY PHYSIOLOGY

Prof. O.I. Ajayi

SERIES 1

PHYSIOLOGY : AN ORIENTATION

OLUTAYO IFEDAYO AJAYI, PhD.

DEPT OF PHYSIOLOGY

UNIVERSITY OF BENIN,

BENIN CITY.

WELCOME

**....TO THE STUDY OF
BODILY FUNCTIONS!**

Physiology.....

- **Understanding physiology also requires a knowledge of physics and chemistry which explains electrical currents, blood pressure, and the way muscle uses bone for movement and their chemical interactions usually at the molecular level.**

- **Physiology – the study of the function of the body's structural machinery**
- **Considers the operation of specific organ systems such as:**
 - **Renal – kidney function**
 - **Neurophysiology – workings of the nervous system**
 - **Cardiovascular – operation of the heart and blood vessels**
- **Focuses on the functions of the body, often at the cellular or molecular level**

Principle of Complementarity

- **Function always reflects structure**
- **What a structure can do depends on its specific form**

Tissues

- **Groups of cells of similar structure**
- **Interaction among cells leads to functions.**
- **Single cells cannot effectively do alone**

Types of Tissues

- **Epithelial tissues**
 - **Form body surfaces**
 - **Barriers**
 - **Secretion**
 - **Absorption**
 - **Some movement (cilia)**

Types of Tissues

- **Connective Tissues**
 - **Very diverse**
 - ***Extracellular matrix***
 - **Incorporate large amounts of extracellular material in tissue structure and function**
 - **Connection, Structure, and Protection**

Types of Tissues

- **Muscle Tissue**
 - **Contraction**
 - **Generates Tension, Movement and Heat**

Types of Tissues

- **Nerve tissue**
 - High speed communication
 - Control/Integration

Organs

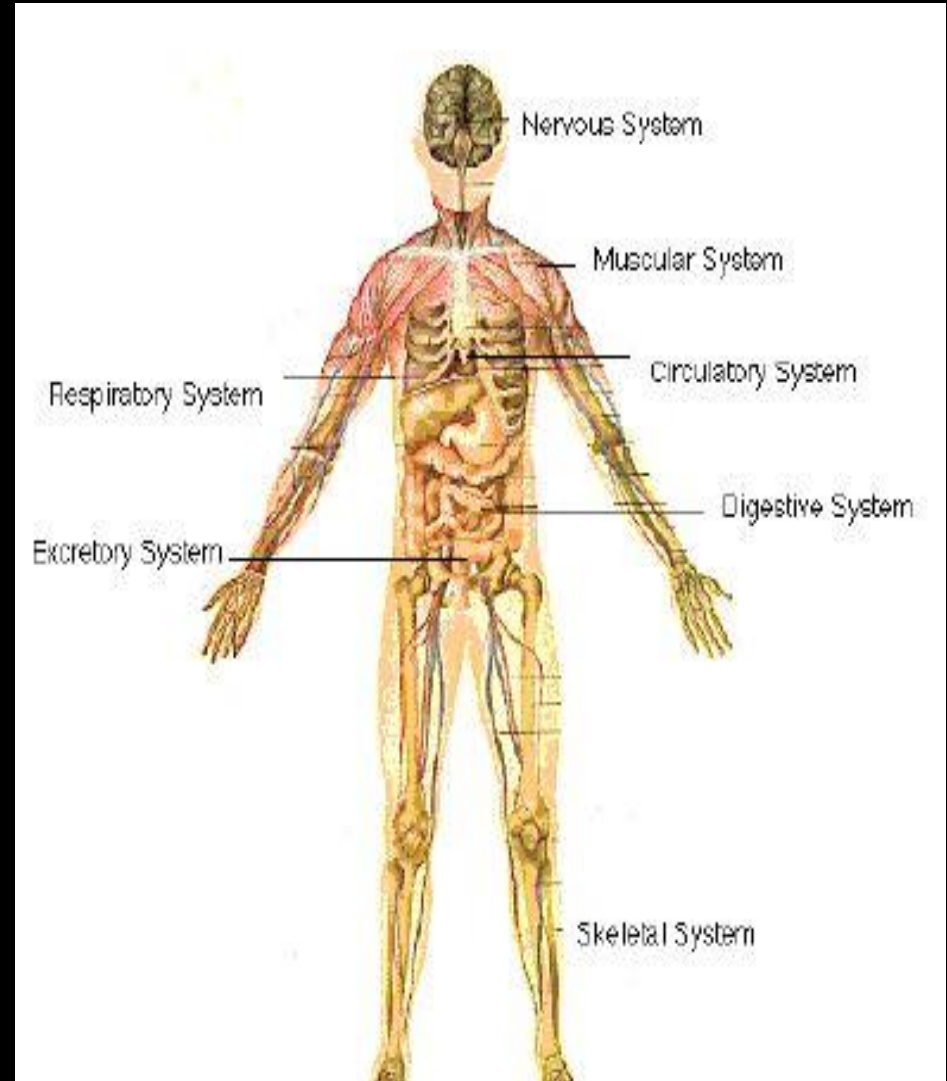
- **structures consisting of at least two tissue types**
- **performs a specific function related to the whole body**

Organ Systems

- **groups of organs performing related functions**
- **Enable basic functions needed to maintain overall homeostasis**

WHAT IS THE HUMAN BODY LIKE?

- 3 Basic parts:
- the head
- the main trunk
- the limbs.



BODY SYSTEMS

- **The body is a collection of interacting systems, each with its own combination of functions and purposes**
- **A system is a group of organs that work together to perform a major function, all body systems are specialized and their functions are coordinated to produce a dynamic and efficient organism.**

These systems include:

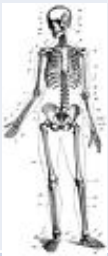
- Musculoskeletal,
- Nervous,
- Endocrine,
- Cardiovascular,
- Respiratory,
- Digestive,
- Urinary,
- Reproductive,
- Integumentary.

ORGAN

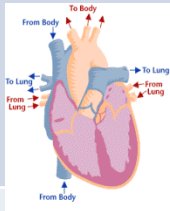
FUNCTION



The brain is the organ of thought, emotion, and sensory processing, and serves many aspects of communication and control of various other systems and functions.



It gives the body basic structure and the ability for movement.

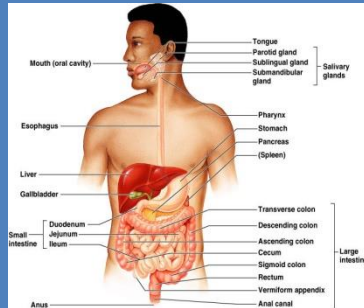


The heart propels the circulation of the blood, which serves as a "transportation system" to transfer oxygen, fuel, nutrients, waste products, immune cells, and signalling molecules (i.e., hormones).



The respiratory system consists of the nose, nasopharynx, trachea, and lungs. It brings oxygen from the air and excretes CO₂ and

The GASTROINTESTINAL TRACT

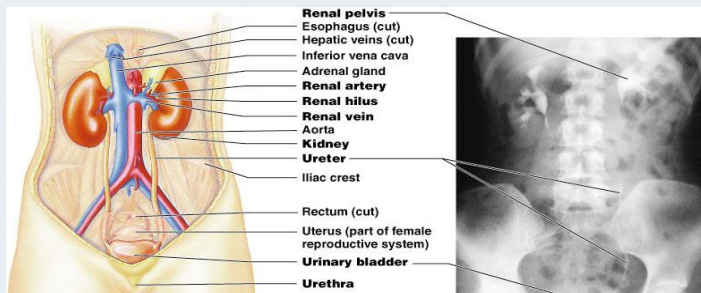


It converts food into small, nutritional, non-toxic molecules for distribution by the circulation to all tissues of the body, and excretes the unused residue.

THE INTEGUMENTARY SYSTEM

consists of the covering of the body (the skin), including hair and nails. The skin provides containment, structure, and protection for other organs, but it also serves as a major sensory interface with the outside world.

THE URINARY SYSTEM



It removes water from the blood to produce urine, which carries a variety of waste molecules and excess ions and water out of the body.

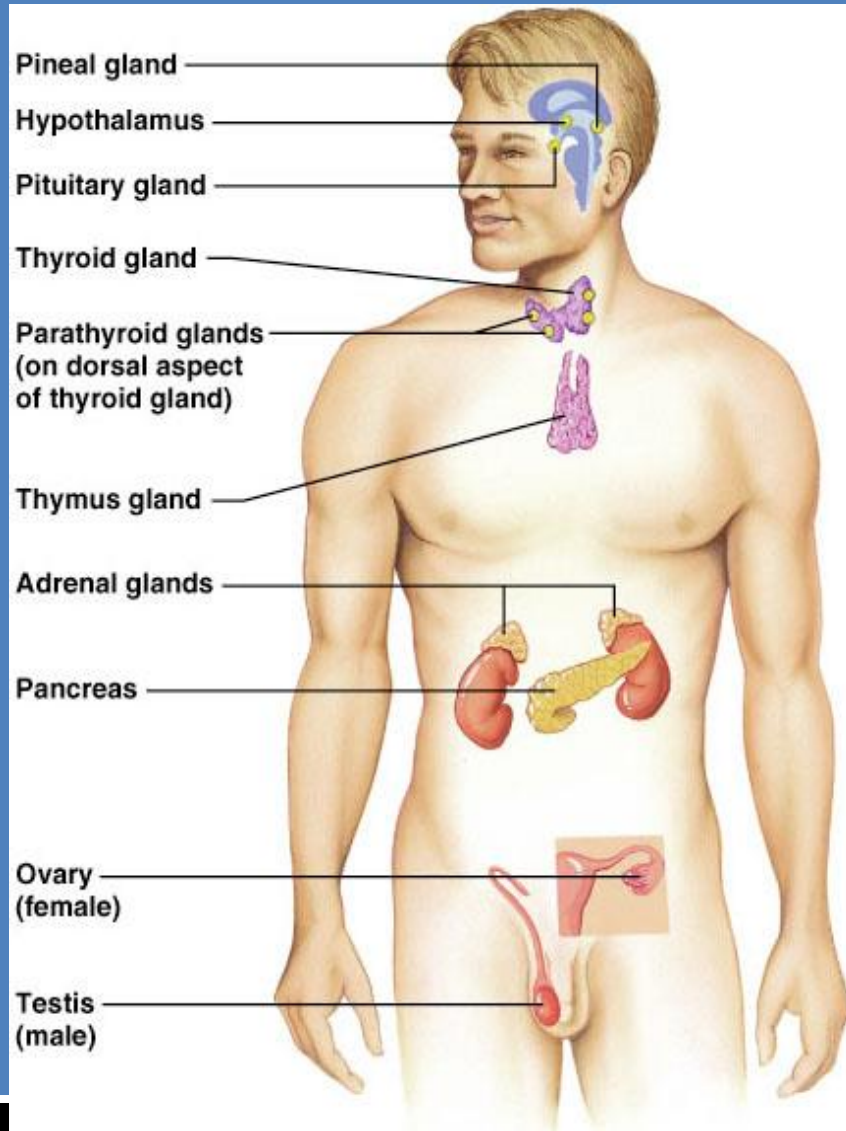
THE REPRODUCTIVE SYSTEM

The reproductive system consists of the gonads and the internal and external sex organs.

THE IMMUNE SYSTEM

The immune system provides a mechanism for the body to distinguish its own cells and tissues from alien cells and substances and to neutralize or destroy the latter by using specialized proteins such as antibodies and cytokines among many others

THE ENDOCRINE SYSTEM



Consists of the principal endocrine glands: the pituitary, thyroid, adrenals, pancreas, parathyroids, and gonads, but nearly all organs and tissues produce specific endocrine hormones as well. The endocrine hormones serve as signals from one body system to another regarding an enormous array of conditions, and resulting in variety of changes of function.

Levels of Structural Organization

- Chemical – atoms combined to form molecules**
- Cellular – cells are made of molecules**
- Tissue – consists of similar types of cells**
- Organ – made up of different types of tissues**
- Organ system – consists of different organs that work closely together**
- Organismal – made up of the organ systems**

Levels of Structural Organization

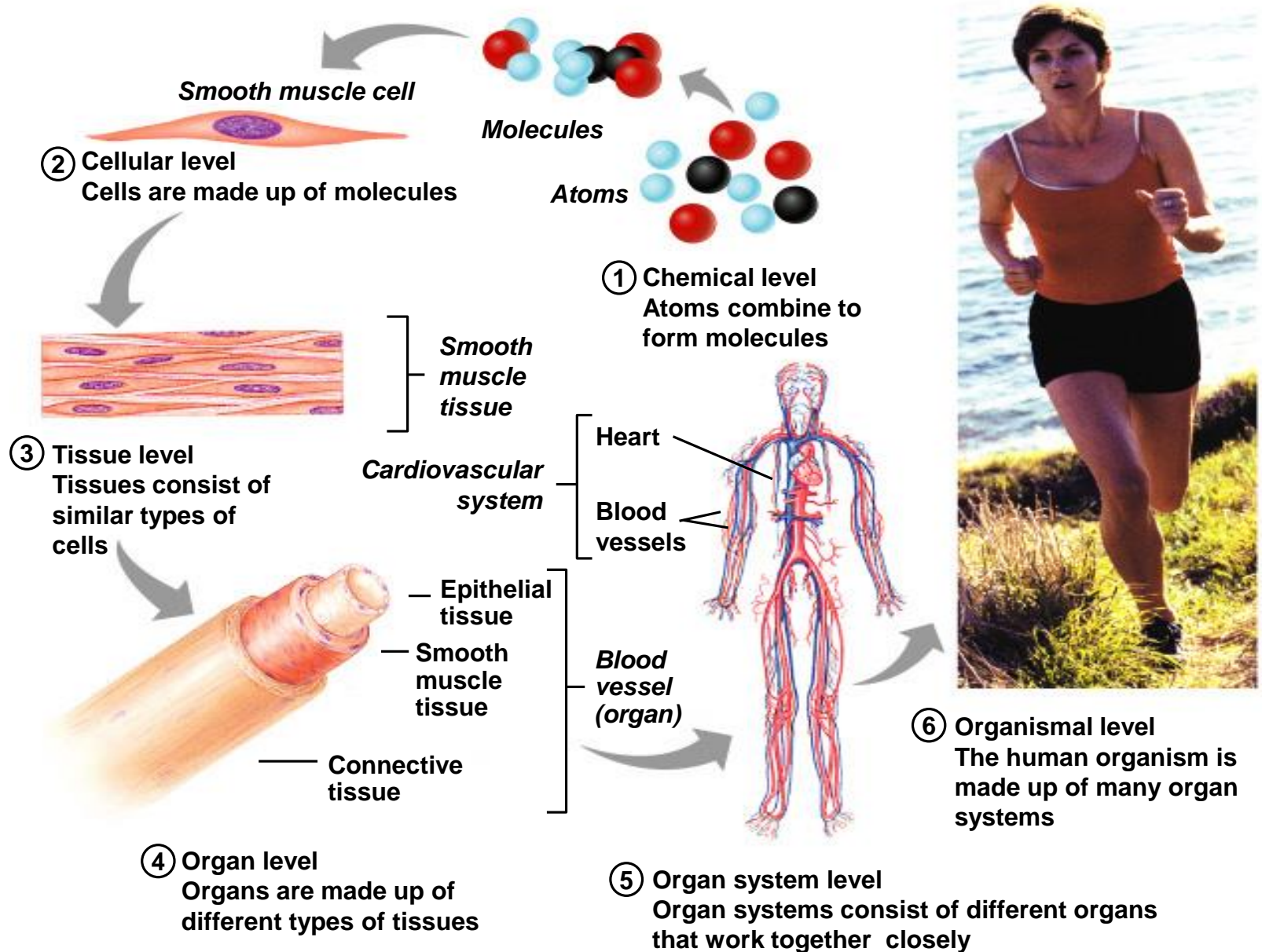


Figure 1.1

Organ Systems of the Body

- **Lymphatic system**

- **Composed of red bone marrow, thymus, spleen, lymph nodes, and lymphatic vessels**
- **Picks up fluid leaked from blood vessels and returns it to blood**
- **Disposes of debris in the lymphatic stream**
- **Houses white blood cells involved with immunity**

Organ Systems of the Body

- **Male reproductive system**
 - **Composed of prostate gland, penis, testes, scrotum, and ductus deferens**
 - **Main function is the production of offspring**
 - **Testes produce sperm and male sex hormones**
 - **Ducts and glands act as accessories to deliver sperm cells to the female reproductive tract**

Organ Systems of the Body

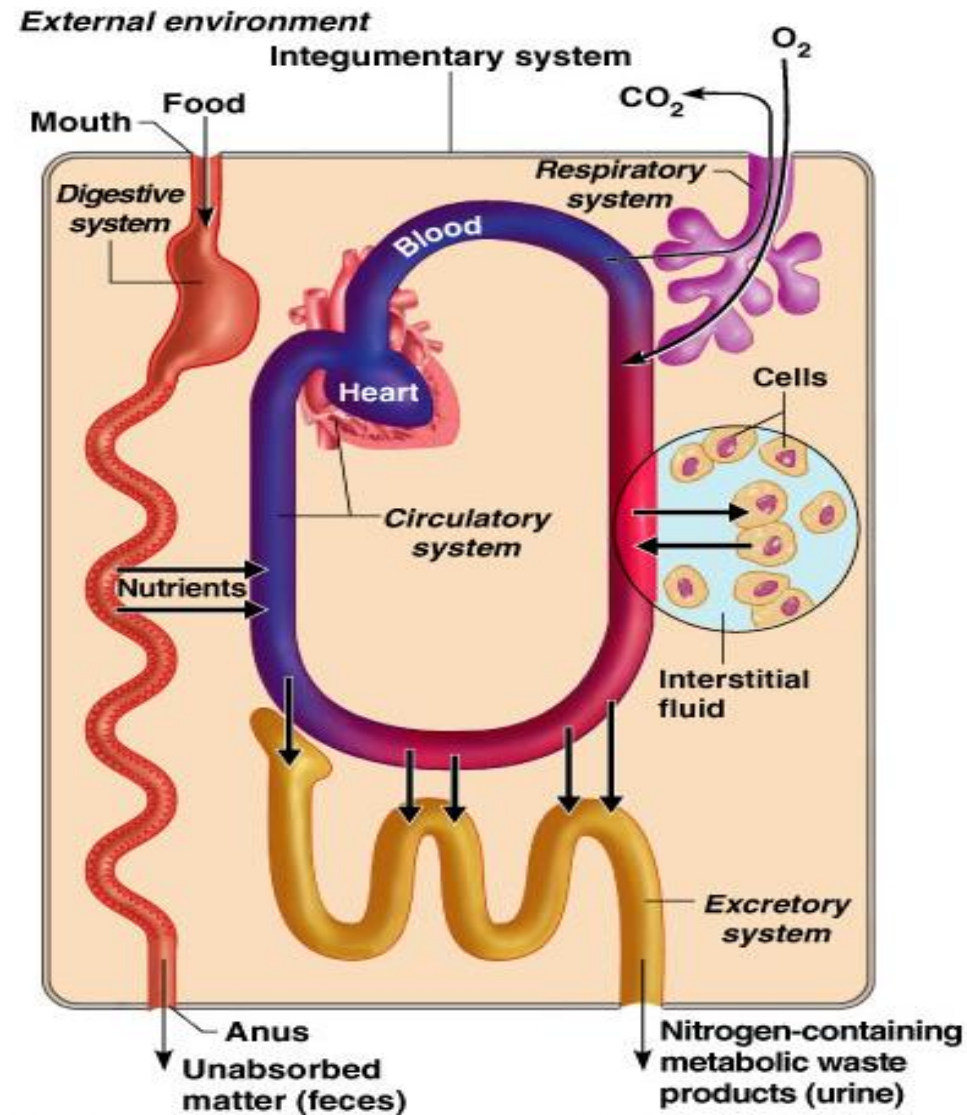
- **Female reproductive system**
 - **Composed of mammary glands, ovaries, uterine tubes, uterus, and vagina**
 - **Main function is the production of offspring**
 - **Ovaries produce eggs and female sex hormones**
 - **Remaining structures serve as sites for fertilization and development of the fetus**
 - **Mammary glands produce milk to nourish the newborn**

Organ Systems Interrelationships

- **The integumentary system protects the body from the external environment**
- **Digestive and respiratory systems, in contact with the external environment, take in nutrients and oxygen**

Organ Systems Interrelationships

- Nutrients and oxygen are distributed by the blood
- Metabolic wastes are eliminated by the urinary and respiratory systems



Necessary Life Functions I

- **Maintaining boundaries – the internal environment remains distinct from the external**
 - **Cellular level – accomplished by plasma membranes**
 - **Organismal level – accomplished by the skin**
- **Movement – locomotion, propulsion (peristalsis), and contractility**
- **Responsiveness – ability to sense changes in the environment and respond to them**
- **Digestion – breakdown of ingested foodstuffs**

Necessary Life Functions II

- **Metabolism – all the chemical reactions that occur in the body**
- **Excretion – removal of wastes from the body**
- **Reproduction – cellular and organismal levels**
 - **Cellular – an original cell divides and produces two identical daughter cells**
 - **Organismal – sperm and egg unite to make a whole new person**
- **Growth – increase in size of a body part or of the organism**

Survival Needs

- **Nutrients – chemical substances used for energy and cell building**
- **Oxygen – needed for metabolic reactions**
- **Water – provides the necessary environment for chemical reactions**
- **Maintaining normal body temperature – necessary for chemical reactions to occur at life-sustaining rates**
- **Atmospheric pressure – required for proper breathing and gas exchange in the lungs**