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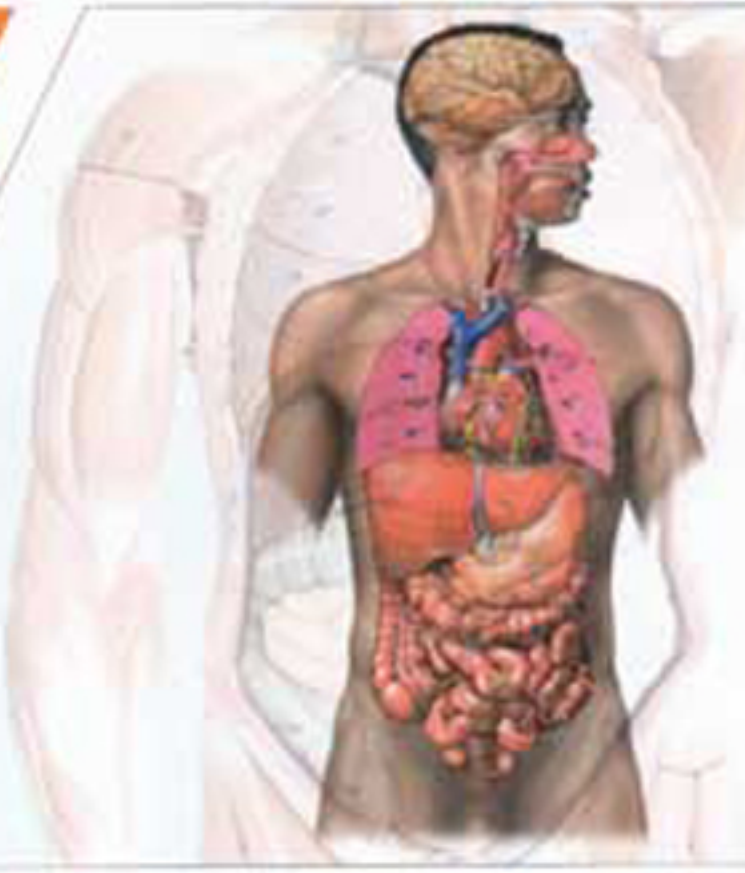
FIRST YEAR B. PHARM | SEMESTER-I

HUMAN ANATOMY AND PHYSIOLOGY-I

DEEPA K. INGAWALE SATISH K. MANDLIK



NIRALI PRAKASHAN
ADVANCEMENT OF KNOWLEDGE

A Text Book Of

HUMAN ANATOMY AND PHYSIOLOGY - I

As Per PCI Regulations

FIRST YEAR B. PHARM.

Semester I

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Deepa K. Ingawale

Satish K. Mandlik

Preface

It gives us immense pleasure to introduce the book **"Textbook of Human Anatomy and Physiology - I"**.

Human anatomy gives knowledge regarding scientific study of morphology of the human body. Human physiology deals with functioning of body organs.

This book includes 11 chapters on human anatomy and physiology. The book is written in a simple and easy language along with schematics diagrams and tables. At the start of chapter learning objectives are mentioned and at the end of chapter small answer and long answer questions are given.

We hope that students will appreciate this book as each chapter is represented in notes format which will be beneficial for students and teachers from examination point of view.

We will be grateful to all the readers who finally judge the quality of this book and suggestions for the same will be highly appreciated and incorporated in the next edition.

Ms. Deepa K. Ingawale
Mr. Satish K. Mandlik

Syllabus

Unit 1 **10 Hours**

- **Introduction to Human Body**
  Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.
- **Cellular Level of Organization**
  Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling:
  (a) Contact-dependent, (b) Paracrine, (c) Synaptic, (d) Endocrine
- **Tissue Level of Organization**
  Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Unit II **10 Hours**

- **Integumentary System**
  Structure and functions of skin.
- **Skeletal System**
  Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system
  Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction.
- **Joints**
  Structural and functional classification, types of joint movements and its articulation

Unit III **10 Hours**

- **Body Fluids and Blood**
  Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.
- **Lymphatic System**
  Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV **08 Hours**

- **Peripheral Nervous System**
  Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.
  Origin and functions of spinal and cranial nerves.
- **Special Senses**
  Structure and functions of eye, ear, nose and tongue and their disorders.

Unit V **07 Hours**

- **Cardiovascular System**
  Heart: Anatomy of heart, blood circulation, blood vessels structure and functions of artery, vein and capillaries, elements of conduction system of heat and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

***

Contents

UNIT I

UNIT II

UNIT III

***

UNIT I

Chapter ... 1

INTRODUCTION TO HUMAN BODY

♦ **LEARNING OBJECTIVES** ♦

- *To define the term anatomy and physiology.*
- *To describe the levels of structural organization of human body.*
- *To enlist the twelve systems of human body with their organs and functions.*
- *To enlist the basic human life processes.*
- *To define homeostasis.*
- *To define the anatomical planes, sections, directional terms and body cavities used to illustrate the human body.*

INTRODUCTION

Human beings are the most complex living organisms. The human body is made up of many smaller parts/organs that work in an organized manner to ensure that the body is always working. The study of human body involves two major principles - Anatomy and Physiology. They provide us the basic knowledge of structure, size, shape, location and functioning of various organs all of which are very important to understand human body.

1.1 BRANCHES OF SCIENCE

There are two branches of science.

- ✓ Anatomy
- ✓ Physiology

Anatomy and Physiology provides the information about different body parts and their functions.

Anatomy:

It is the branch of science that deals with the study of structures of different organs of human body.

Subdivisions of Anatomy:

- **Developmental biology:** It is concerned with the study of complete development of an individual from fertilization of an egg to death.

- **Cell biology:** It is concerned with the study of cellular structure and functions.
- **Histology:** It is concerned with the study of microscopic structure of tissues.
- **Gross anatomy:** It is concerned with the study of examination of structures without using a microscope.
- **Systemic anatomy:** It is concerned with the study of structure of specific systems of the body. For example, Nervous or Respiratory systems.
- **Regional anatomy:** It is concerned with the study of specific regions of body. For example, Head or Chest.
- **Radiographic anatomy:** It is concerned with the study of body structures that can be examined with X-rays.
- **Pathological anatomy:** It is concerned with the study of structural changes (from gross to microscopic) associated with disease.
- **Embryology:** It is concerned with the study of first eight weeks of human development.

Physiology:

It is the branch of science that deals with the normal functions of living organisms and their parts.

Subdivisions of Physiology:

- **Respiratory physiology:** It is concerned with the study of the functioning of lungs and air passageways.
- **Renal physiology:** It is concerned with the study of functioning of the kidneys.
- **Immunology:** It is concerned with the study of defense mechanism of body against disease causing agents.
- **Exercise physiology:** It is concerned with the study of functioning of the changes in cell and organ functions as a result of muscular activity.
- **Neurophysiology:** It is concerned with the study of functioning of the nervous system.
- **Pathophysiology:** It is concerned with the study of functional changes associated with disease and aging.
- **Cardiovascular physiology:** It is concerned with the study of functioning of heart and blood vessels.
- **Endocrinology:** It is concerned with the study of hormones and how they control body functions.

1.2 LEVELS OF STRUCTURAL ORGANIZATIONS

The vital processes of human body are controlled and maintained by different levels of structural organisations. These levels of structural organisations show an increase in structural complexity and function.

There are six fundamental levels of organisations:

- Chemical level
- Cellular level
- Tissue level

- Organ level
- System level
- Organism level

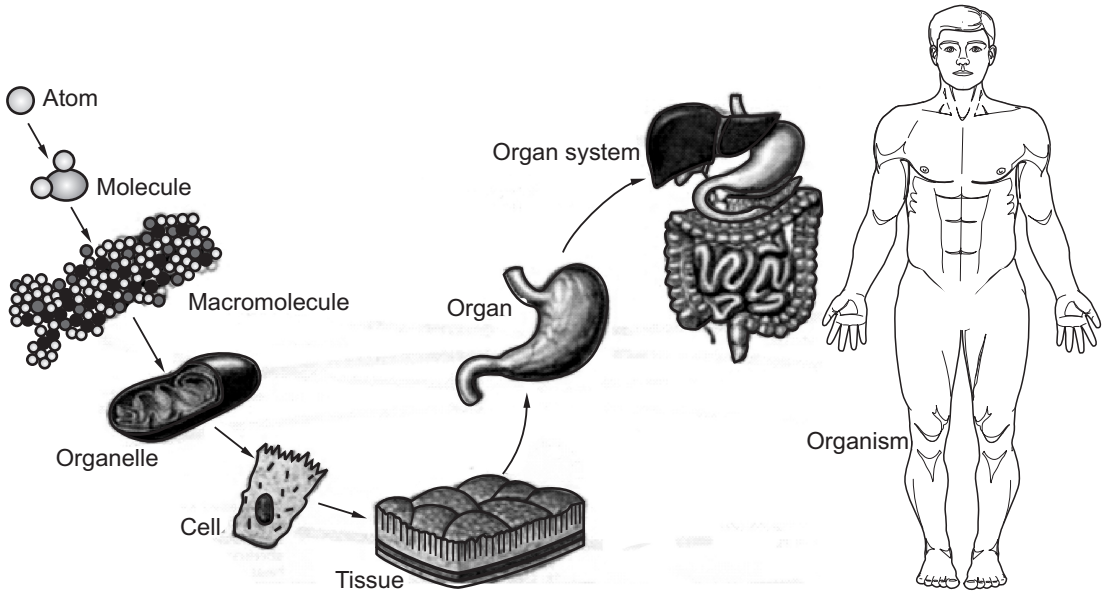


Fig. 1.1: Levels of structural organisations of digestive system in human body

Chemical Level:

- It is the most basic level of organization.
- It includes atoms; the smallest unit of matter that participates in chemical reactions.
- Two or more atoms join together to form molecules.
- Certain atoms like, carbon (C), hydrogen (H), oxygen (O), nitrogen (N), phosphorus (P), calcium (Ca) and sulfur (S) are crucial for maintaining life.

Cellular Level:

- The cell constitute of most basic structural and functional unit of human body.
- The different molecules combine together to form cells.
- Human body contains muscle cells, nerve cells and epithelial cells.
- Each cell varies greatly in structure and function.
- Each type of cell performs a specific task.

Tissue Level:

- Tissues are the groups of cells that works together to perform a particular function.
- Human body contains four basic types of tissue: epithelial tissue, connective tissue, muscular tissue and nervous tissue.

Organ Level:

- Different types of tissue combines together to form organ.
- Organs are composed of two or more different types of tissues having specific functions and recognizable shapes.
- Examples of organs are the stomach, skin, bones, heart, liver, lungs and brain.

System Level:

- A group of organs combines together to form a system.
- The organs of a system work together to perform a major physiological function of the body.
- Organs of digestive system are mouth, salivary glands, pharynx (throat), esophagus, stomach, small intestine, large intestine, rectum (necessary digestive organs), liver, gall bladder and pancreas (accessory digestive organs).
- The human body comprises of eleven organs system such as Integumentary system, Skeletal system, Lymphatic system, Digestive system, Respiratory system, Muscular system, Nervous system, Endocrine system, Cardiovascular system, Urinary system, Reproductive system (Male and Female) and Special sensory organs.

Organism Level:

- It is the highest level of structural organization.
- All the parts of human body functioning together and constitute the total organism i.e. human body.
- An organism is capable of independently performing vital functions necessary for life.

1.3 SYSTEMS OF THE HUMAN BODY

Human beings are contiguous living systems. The different systems are interconnected and dependant on each other. They cannot function separately. An organs system is composed of groups of structures that work together to perform common task or specific functions.

Nervous system:

Organs: Brain, spinal cord and nerves

Functions:

- It coordinates voluntary and involuntary actions and transmits signals between different parts of body.
- It maintains homeostasis.

Cardiovascular System:

Organs: Blood, heart, and blood vessels.

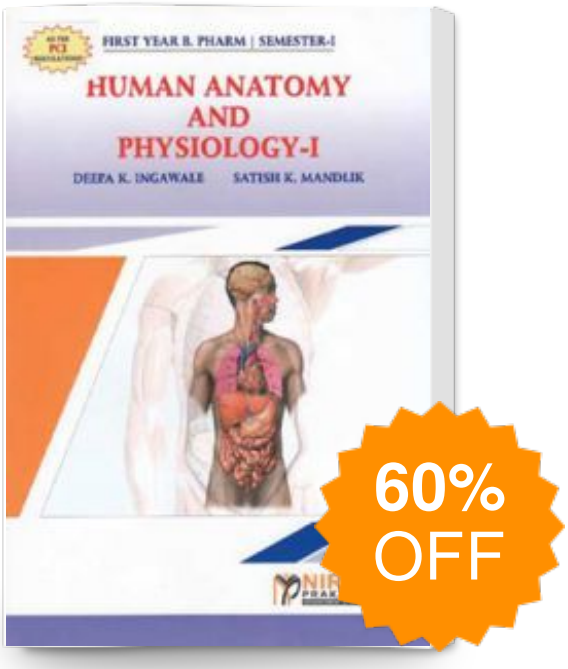
Functions:

- Heart pumps blood through the blood vessels.
- Blood carries oxygen and nutrients to cells and carbon dioxide and wastes away from cells.
- It helps to regulate acid–base balance, temperature, and water content of body fluids.
- Blood components help to defend against disease.

Digestive System:

Organs: Mouth, pharynx, oesophagus, stomach, small and large intestines, and anus; accessory organs such as salivary glands, liver, gall bladder and pancreas.

A Textbook Of Human Anatomy And Physiology - I



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