Foundation Block

Physiology team 441

I-
Introduction to Physiology-levels of organization of the human body

Team Leaders

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Editing File

Color index

- Main Text
- Important
- Dr's notes
- Female
- Male
- Extra

Objectives

- Define physiology.
- Provide an orientation to the subject of human physiology
- Describe the levels of organisation of an organism.
- The cell is the basic unit of life.
- Describe briefly the basic structure of the cell and state the function of the different cellular organelles.
- Discuss briefly the different levels of organization starting from the cell to body systems giving examples at each level.
- Study source for this lecture: (Guyton & Hall Textbook of Medical Physiology, 13th, Chapters 1 & 2)

★ What is Physiology?

What is the difference between anatomy and physiology of the heart?

Anatomy: studies the structure

Physiology: studies the function.

Physio: nature

logy:science or study of

- Physiology is The science dealing with the way a normal organism and their body parts function.
- (The study of how the body works and how these functions are maintained in a changing environment)

  (So, it is a cornerstone to medicine)

Types of physiology;

Cellular physiology

The study of the cellular components that primarily determines organ function. (such as, endoplasmic reticulum has function in storage and secretion.)

Systemic physiology

The study of the coordinated and networked processes that determine whole body function and adaptation to change.

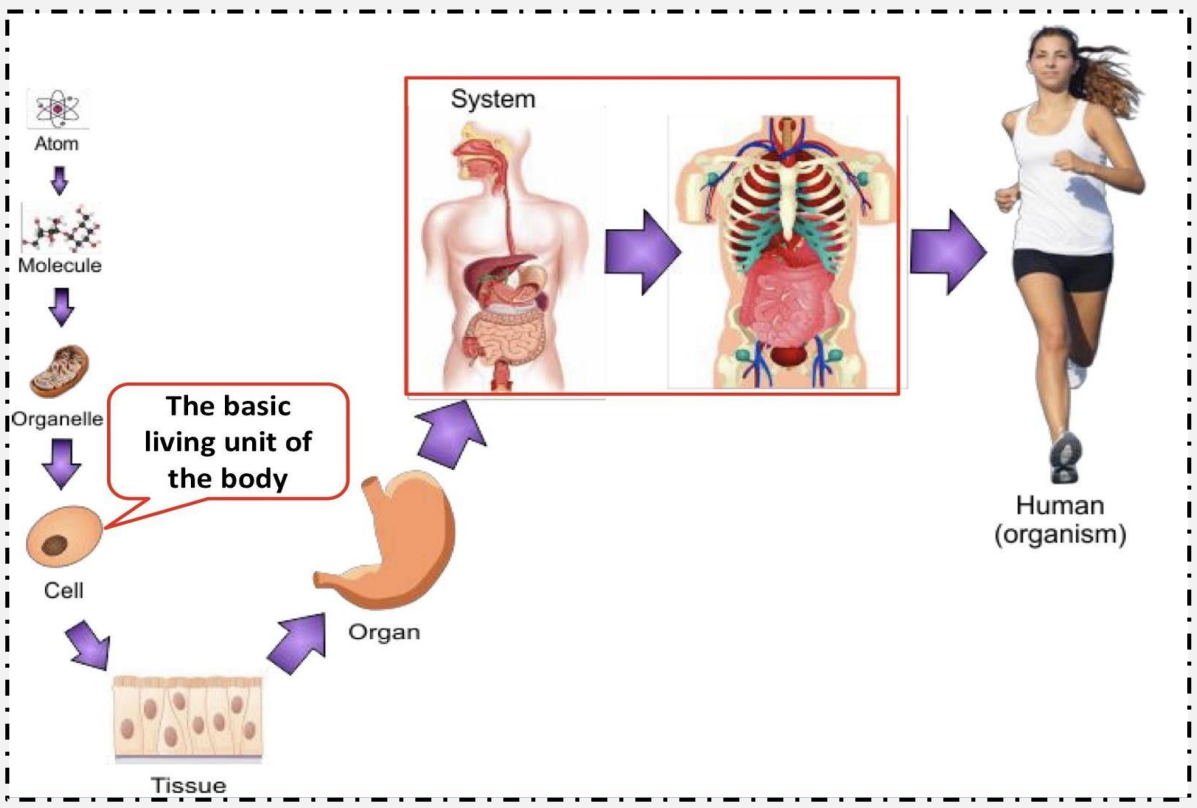
★ How is it related to medicine ?

Many disease states can be viewed as physiology"gone wrong"

→ Pathophysiology →

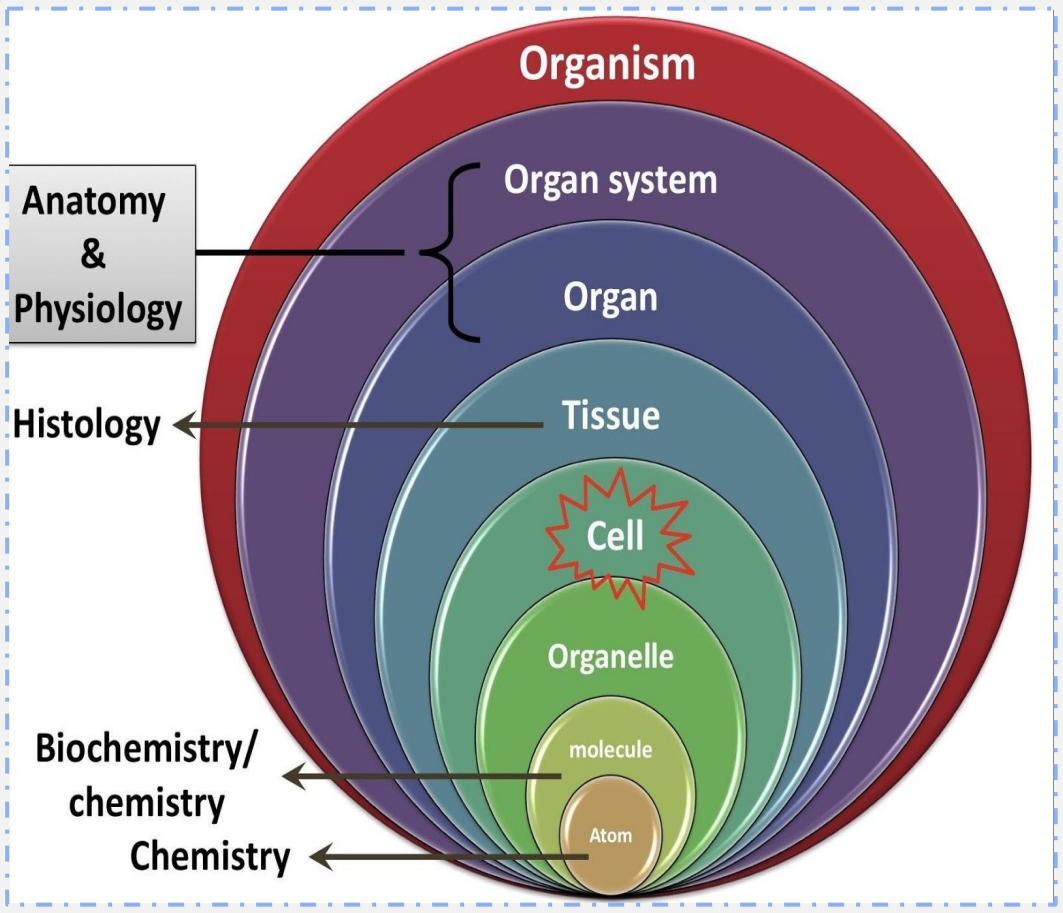
Thus, understanding of physiology is essential for the study and practice medicine.

★ How is the Body Organised?



★ Levels of Organisation

Atoms | **Molecules** | **Biomolecules** | **Organelles** | **Cells** | **Tissues** | **Organs** | **Systems**



★ The Cell ;

- **Cell** : is basic unit of the body
- Each human being begins as a single cell (**fertilized egg**).
- The number of cells increase by cellular division.
- The process of transforming an unspecialized cell into a specialized cell in know as **differentiation**
- Cells may differ markedly from one another, but they all share certain basic characteristics.

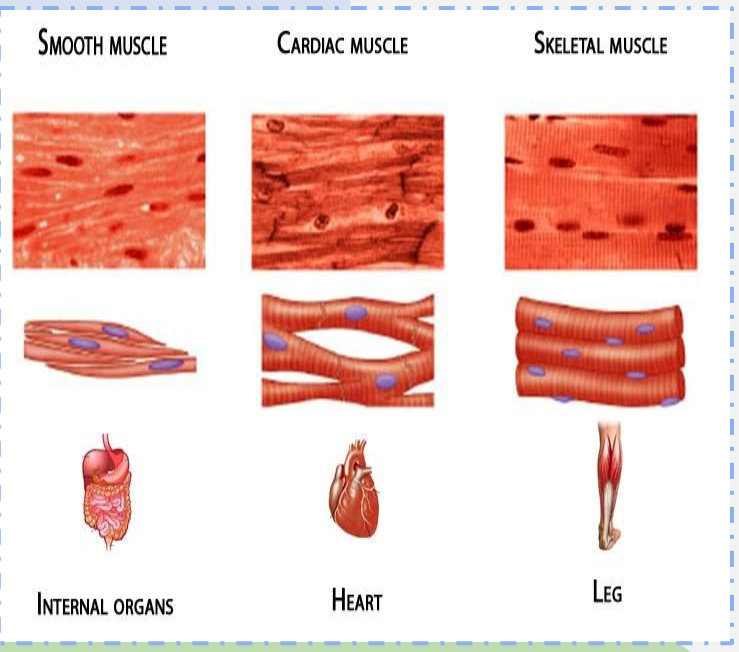
★ Cell Structure

Cell organelles	Cell membrane(selective barrier)
1-Nucleus (carry of gene) 2-Ribosomes (generate proteins) 3-Endoplasmic reticulum(storage and secretion) -Smooth(synthesis of lipids) -Rough(secret of protein) 4- Golgi apparatus (packaging proteins) 5-Mitochondria(source of energy) 6-Lysosomes(hydrolyse) 7-Peroxisomes(detoxify) 8-Cytoskeleton(structural support,motility)	Will be discussed later.

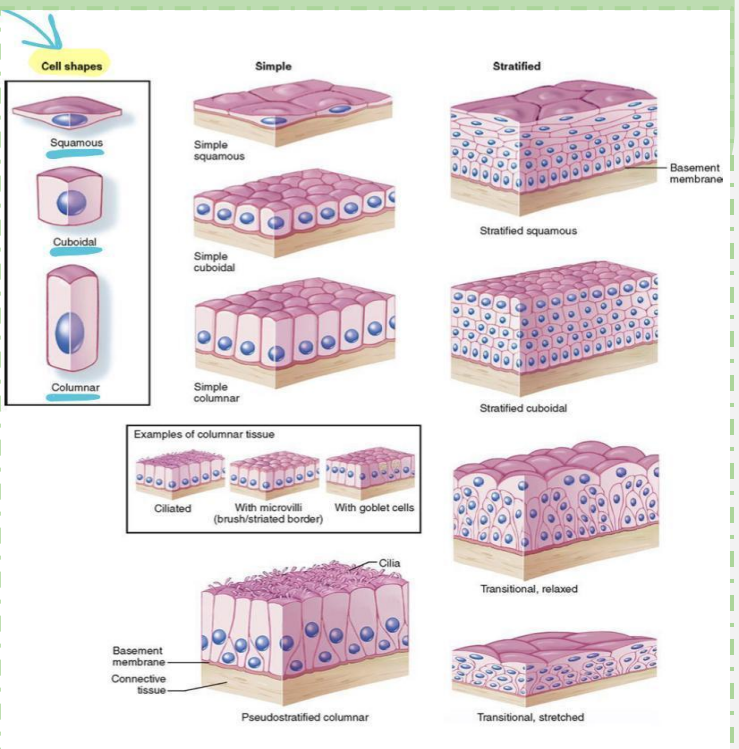
You should know the Function of each organelles.

★ Tissues

- A collection of a single type of specialized cells = **tissue.**



The four major tissue types in the body:
1-Muscle tissue
2-Nervous tissue
3-Epithelial tissue
4-Connective tissue



1- Muscle Tissue

Muscle tissue is specialized to generate mechanical force(cause movement).
Three types of muscle tissue:
1-Skeletal muscle
2-Smooth muscle
3-Cardiac muscle

2-Nervous Tissue

specialized to initiate, integrate, and conduct electrical signals to other cells,carry information.
These signals may:
1-Initiate new electrical signals in other neurons.
2-Stimulate a gland to secrete hormones.
3-Stimulate muscle contraction.

3-Epithelial Tissue

- It covers exposed surfaces, line internal passageways and chambers, produce glandular secretions.
- There are many shapes of epithelial cells according to the function they need to perform.
- There are many types of epithelial tissue.

4-Connective Tissue

- It connects anchors and support the structure of the body.
- It consist of many and diverse cell and tissue types each with its specific function.
- It fills internal spaces and store energy

★ Tissues cont.

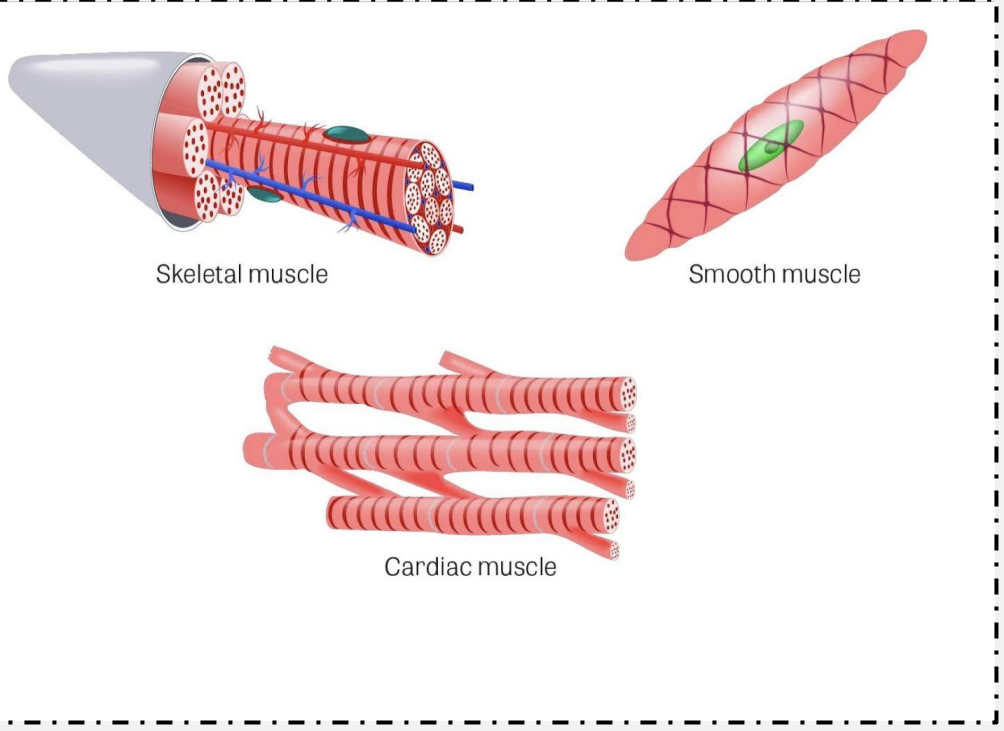
- There are shared properties:

1-It lines surfaces.

2- Offers protection.

3-May be involved in secretion and absorption of ions & organic molecules.

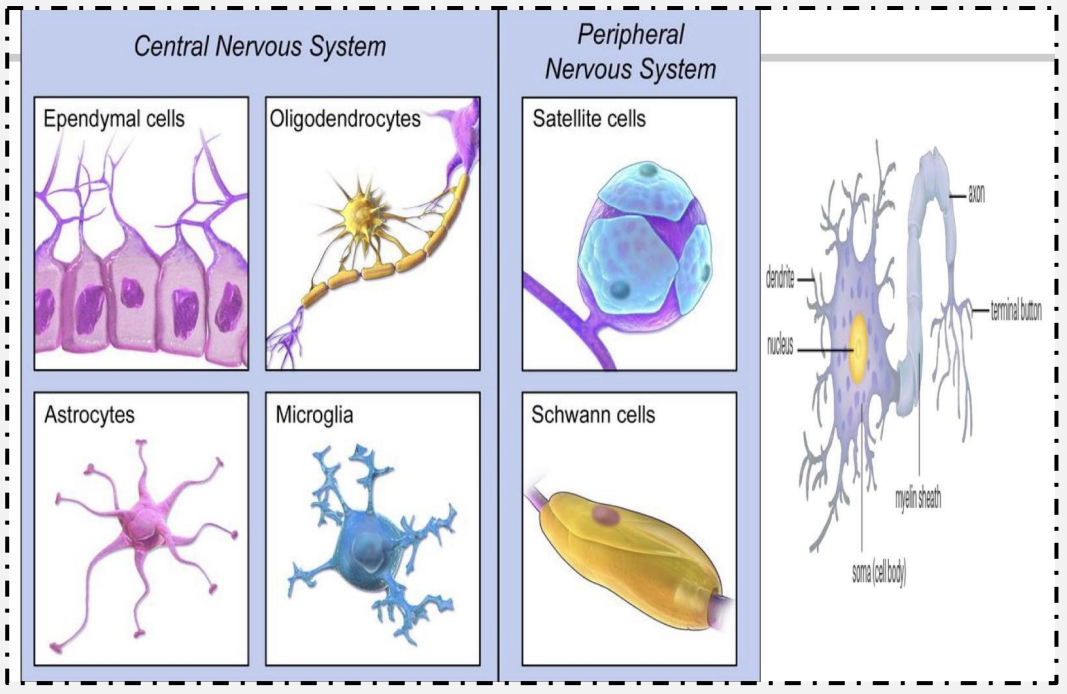
1- Muscle Tissue



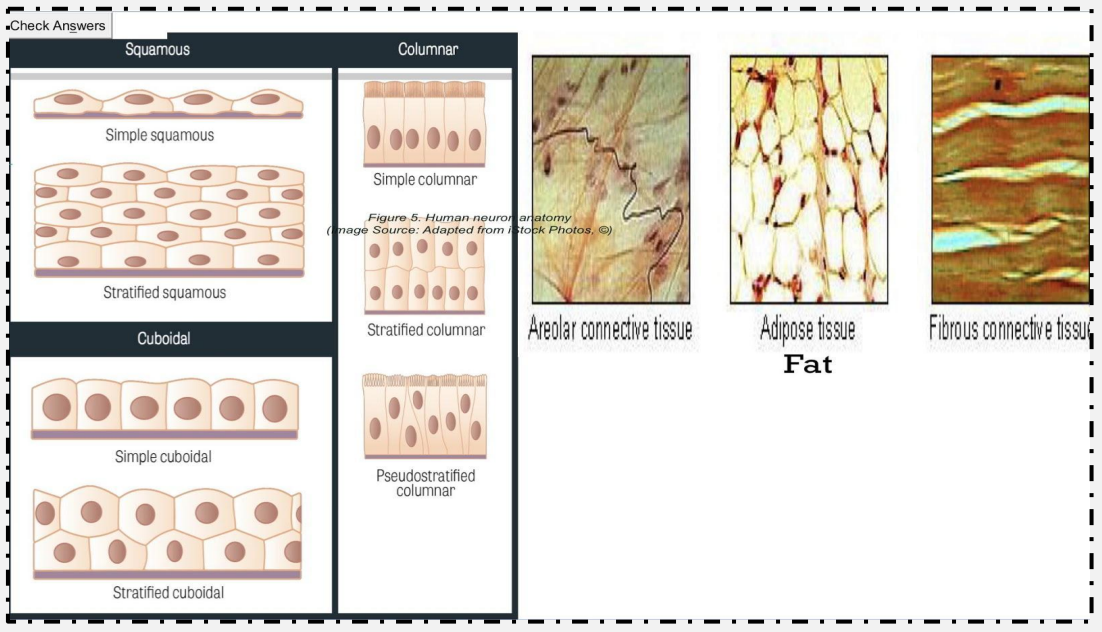
★ Organs & Systems

- The combination of two or more types of tissues forms an organ.
- Several organs come together and are organised into a system.

2-Nervous Tissue



3-Connective Tissue



Definitions:

1- **Physiology**: is The science dealing with the way a normal organism and their body parts function.

2-**Cellular physiology:** is the study of the cellular components that primarily determines organ function.(such as, endoplasmic reticulum has function in storage and secretion.

3- **Systems physiology:** is the study of the coordinated and networked processes that determine whole body function and adaption to change.

4- **Pathophysiology:** Many disease states can be viewed as physiology"gone wrong"

5**-Differentiation:** The process of transforming an unspecialized cell into a specialized cell .

6-**Cell :** is basic unit of the body

7-**Tissue :** collection of a single type of specialized cells .

8-**Muscle tissue:** is specialized to generate mechanical force(cause movement)

9-**Nervous Tissue:** is specialized to initiate, integrate, and conduct electrical signals to other cells.

10-**Epithelial Tissue:** cover exposed surfaces line internal passageways and chambers produce glandular secretions.

11-**Connective tissue:** it connects anchors and support the structures of the body, also it fills internal spaces and store energy.

12-**Organ:** The combination of two or more types of tissues.

13- **System:** Several organs come together.

Test yourself

★ MCQs

Q1: The process of transforming an unspecialized cell into a specialized cell in know as			
A- hybridization	B-specification	C-localization	D-differentiation
Q2: It connects anchors and support the structures of the body			
A- connective tissue	B-epithelial tissue	C-muscle tissue	D-nervous tissue
Q3: Muscle tissue is specialized to generate ..... force			
A- chemical	B-mechanical	C-electrical	D-magnetic
Q4: cover exposed surfaces line internal passageways and chambers produce glandular secretions			
A- connective tissue	B-epithelial tissue	C-muscle tissue	D-nervous tissue

1-D 2-A 3-B 4-B

★ SAQ

Q1:What are the types of muscle tissues?

A1:
-Skeletal muscle
-Smooth muscle
-Cardiac muscle

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