

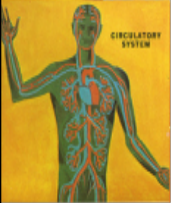
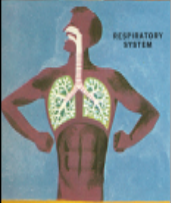
# Dr. Nervana Mostafa

MB BS, MD, PhD (UK)

**Chairperson Foundation Block**

Professor of Physiology  
College of Medicine

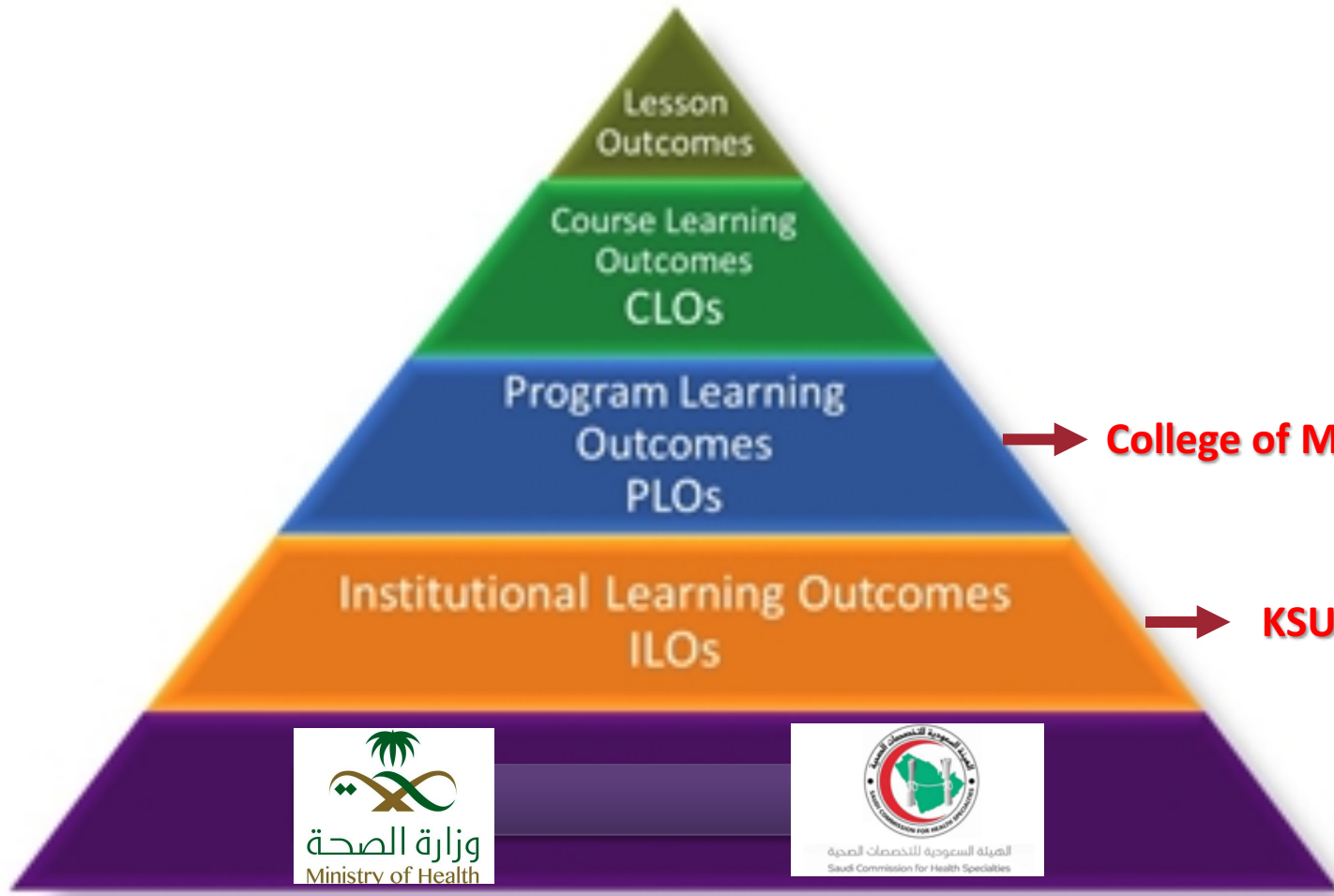
[nbayoumy@ksu.edu.sa](mailto:nbayoumy@ksu.edu.sa)



Block Title: **Foundation Block**

Credit Hour: **10**

Block Duration: **10 Weeks**



## Course Learning Outcomes (CLOs)

### 1- KNOWLEDGE

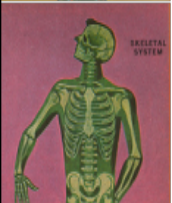
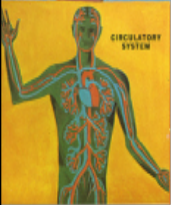
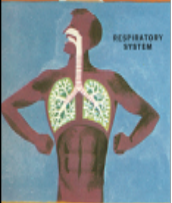
- Describe the **normal structure** (including its development) and **function** of the human body.
- Recognize the **basic disease forming processes**, including etio-pathogenesis, **pathology** and **defense mechanisms** of the body.
- Describe the **normal human chromosomes**, and the functions of **genes**, and list the modes of **inheritance**, and role of genetics in development of diseases.

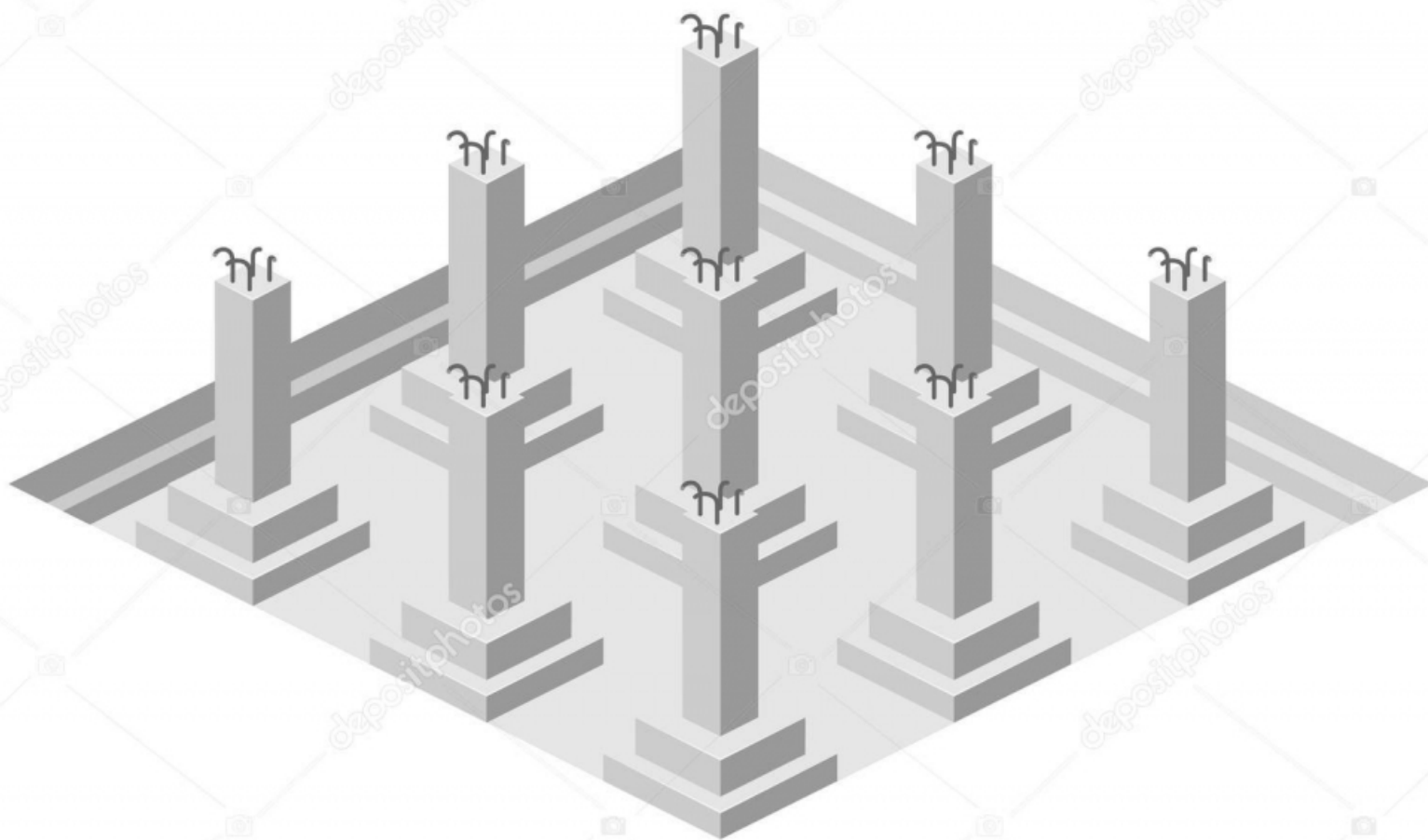
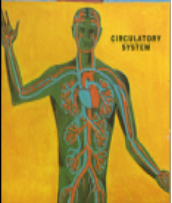
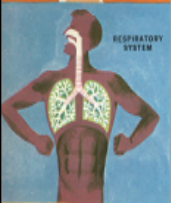
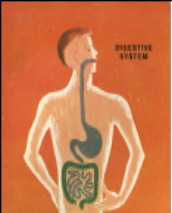
### 2. SKILLS

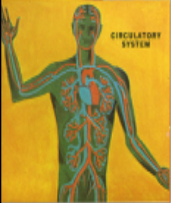
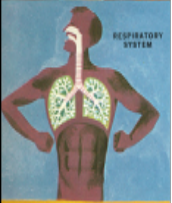
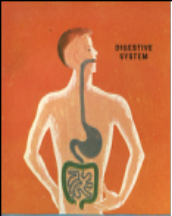
- Discuss the body **homeostasis mechanism** and its relation to **health** and **disease**.
- Explain the basic mechanisms of **drugs** work in the body including **pharmacokinetic** and **pharmacodynamics**.

### 3. Attitudes

- Work as an effective member of a **team** in a small group and contribute effectively in the learning process of PBL.
- Conduct an **electronic search** to gather evidence for and against a pre-identified problem/issue.
- **Psychomotor Skills**, Measure the vital signs of a normal individual such as taking the body temperature, pulse rate, respiratory rate, blood pressure, and calculating body mass index.







# Introduction to Physiology

## Levels of Organisation

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Slides adopted from  
Dr. Maha Saga

# Lecture 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.

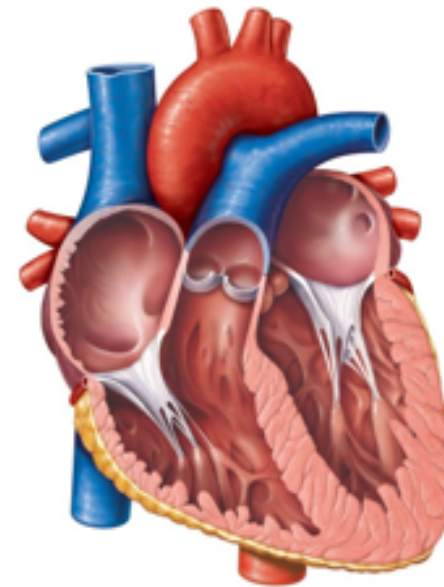
***Study source for this lecture:***

**(Guyton & Hall Textbook of Medical Physiology, 13<sup>th</sup>, Chapters 1 & 2)**

# What is *Physiology*?

- = Physio- + -logy
  - **Physio-**: nature
  - **-logy**: science or study of
- **Physiology**: The science dealing with the way a normal organism & their body parts **function**.
- It is a cornerstone to medicine.

What is the difference between ***anatomy*** & ***physiology*** of the heart?



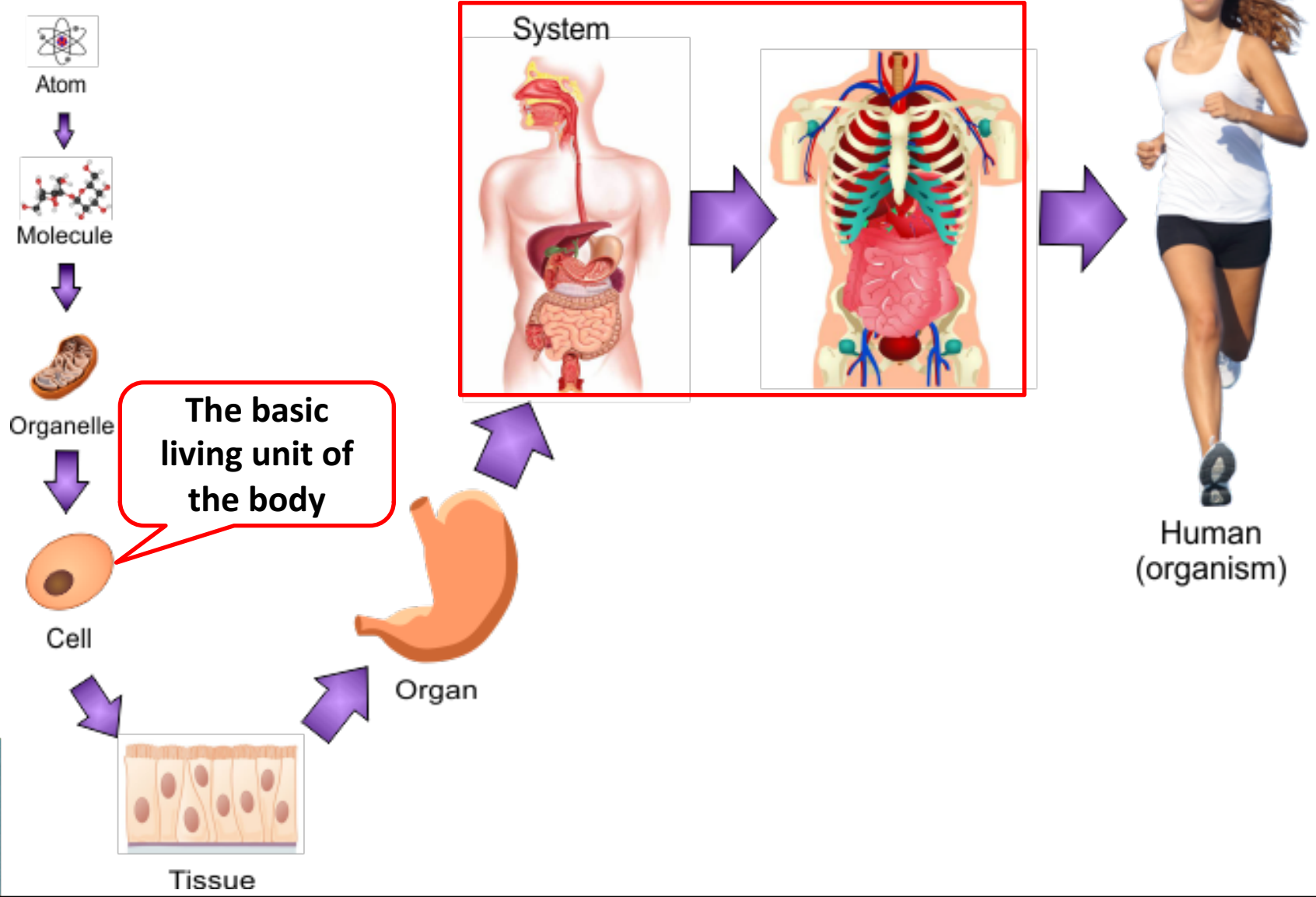
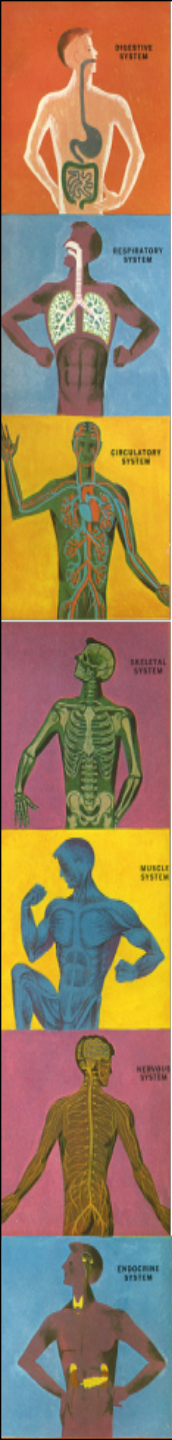


# How is it Related to Medicine?

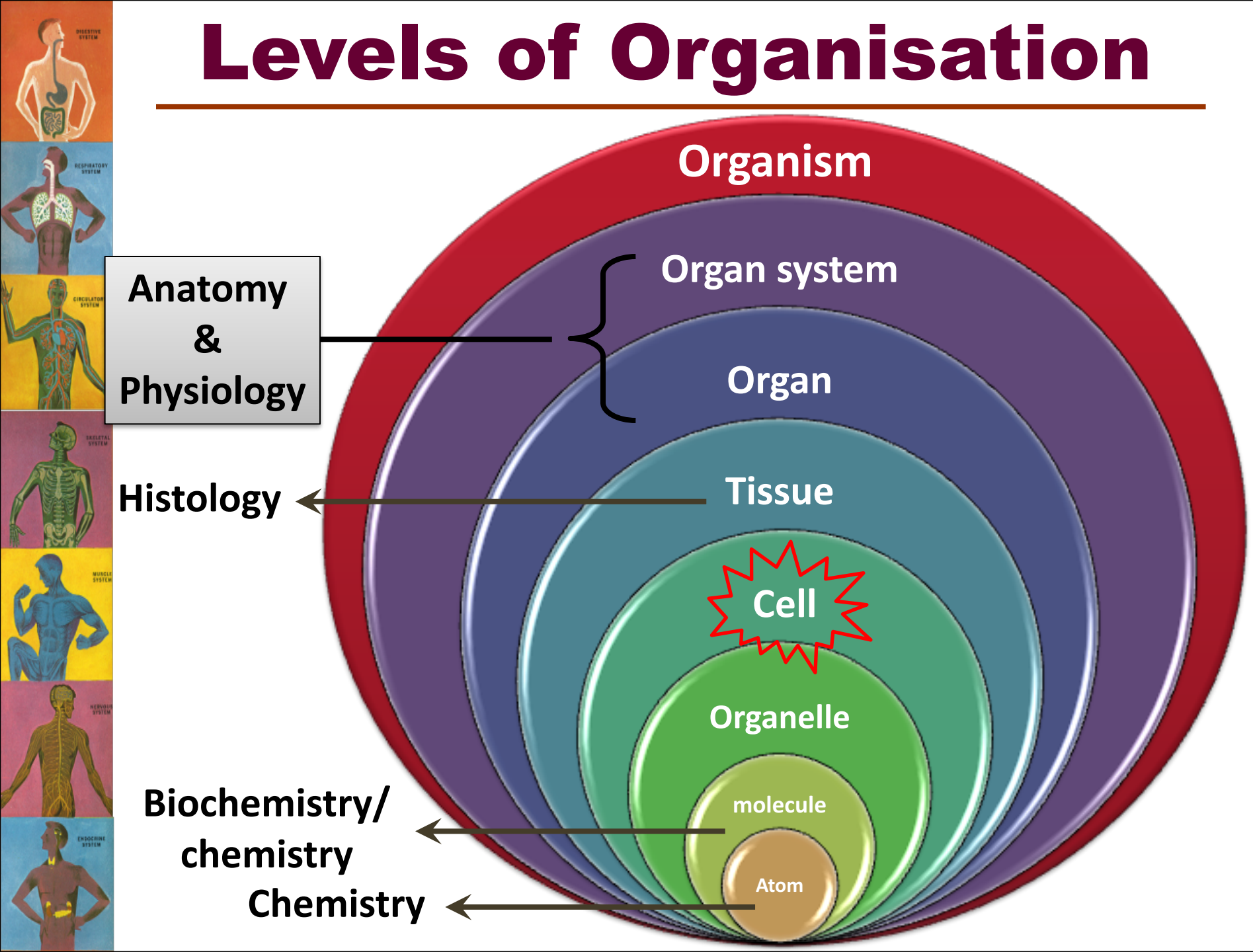
- Many disease states can be viewed as physiology “gone wrong” i.e. *Pathophysiology*.
- An understanding of physiology is essential for the study and practice of medicine.



# How is the Body Organised?



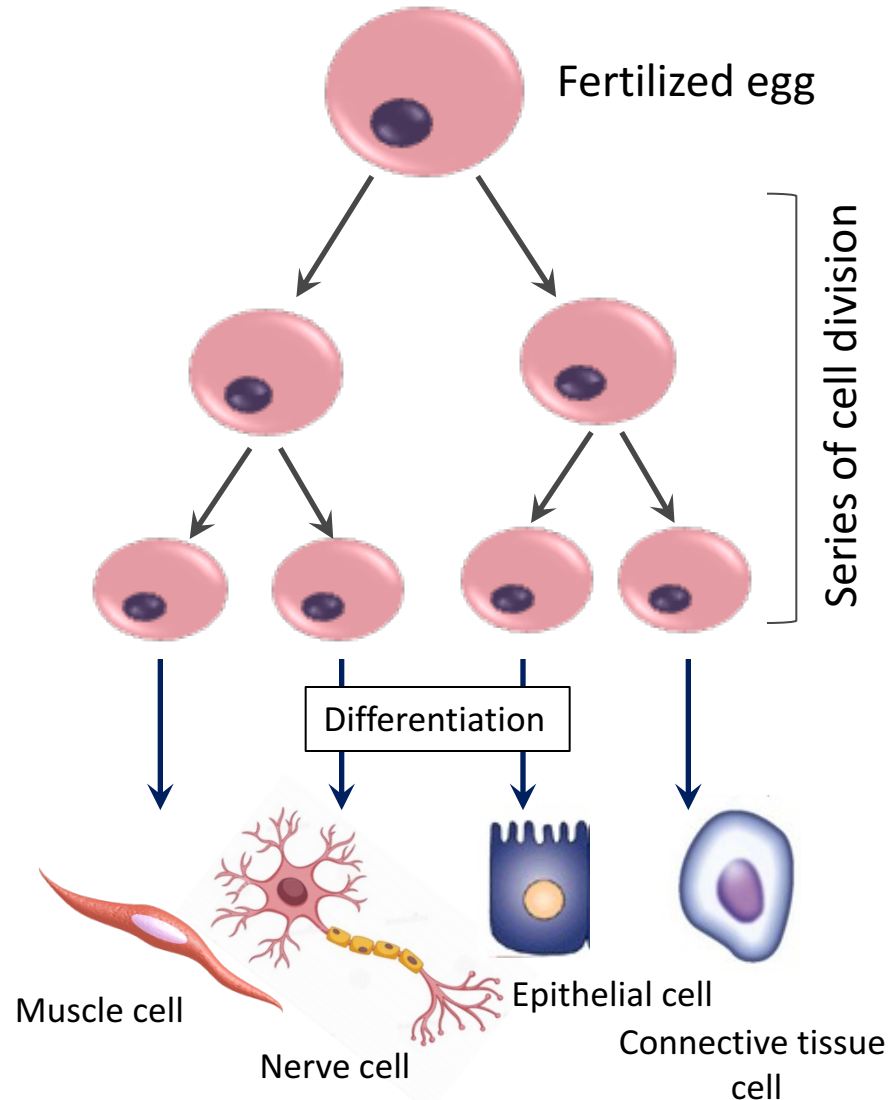
# Levels of Organisation



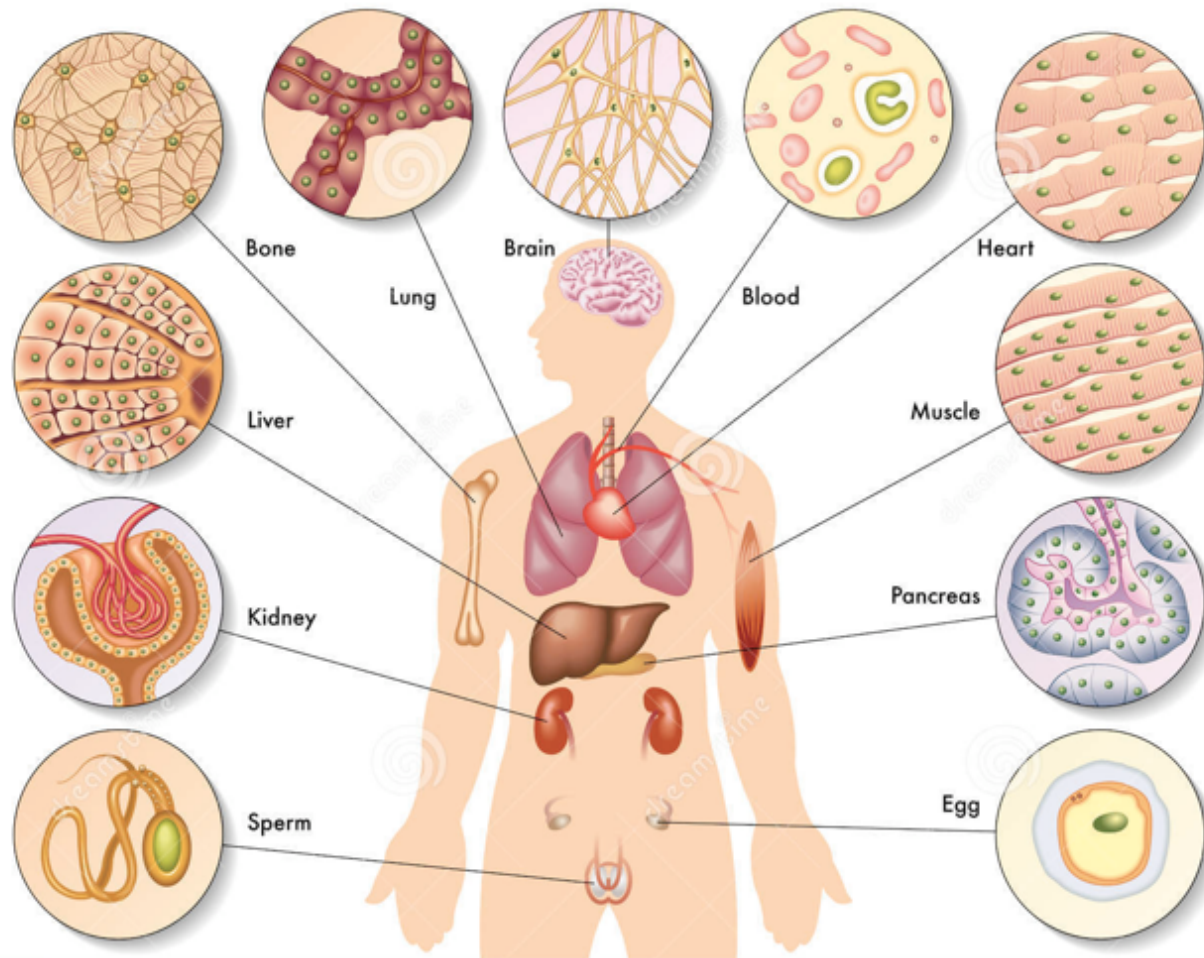
# “The Cell”

## The Basic Living Unit of the Body

- Each human being starts as a single cell (i.e. fertilized egg).
- The number of cells increase by cellular **division**.
- The process of transforming an unspecialized cell into a specialized cell is known as **differentiation**.



# The Cell

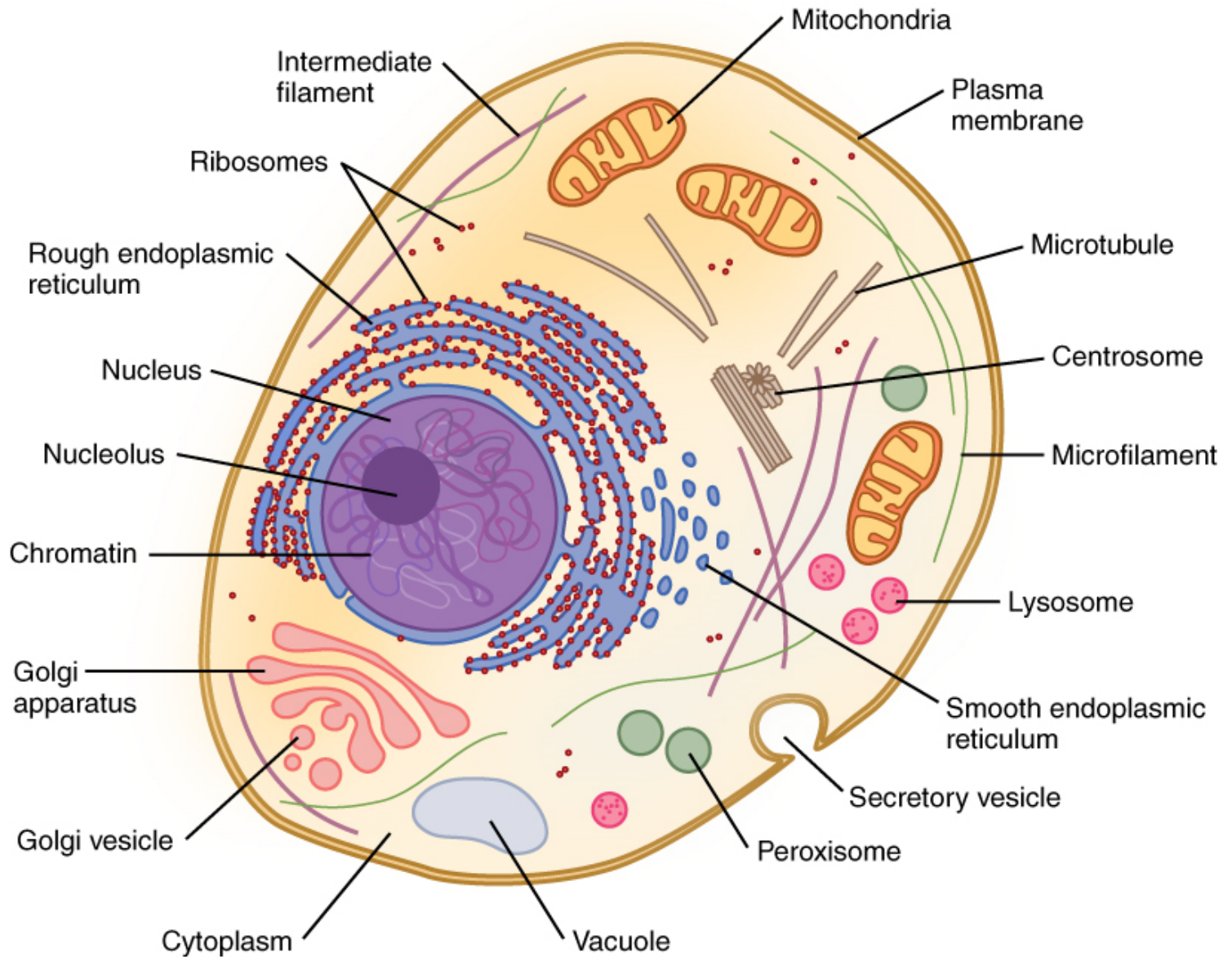


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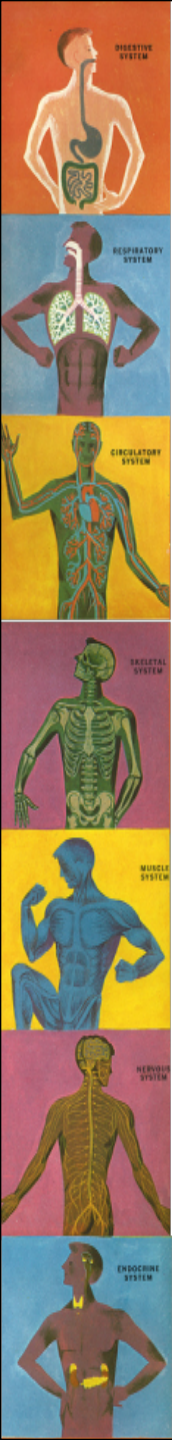
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Cells may differ markedly from one another, but they all share certain basic characteristics.

# Cell Structure



# Cell Structure



## Cell organelles

- Nucleus.
- Ribosomes.
- Endoplasmic reticulum:
  - Rough
  - Smooth
- Golgi apparatus.
- Mitochondria.
- Lysosomes.
- Peroxisomes.
- Cytoskeleton.

## Cell membrane

- Will be discussed in a future lecture.

***What is the function of each?***

# Tissues

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

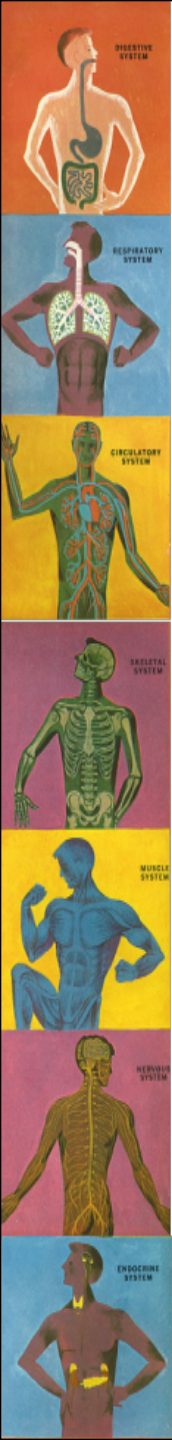
The four major tissue types in the body

Muscle tissue

Nervous tissue

Epithelial tissue

Connective tissue



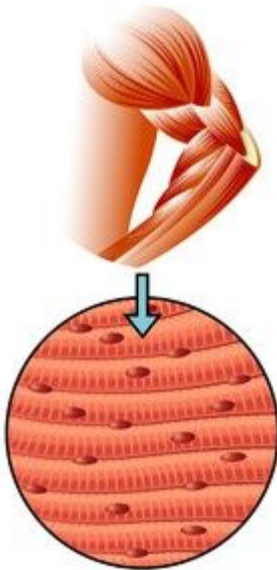


# Muscle Tissue

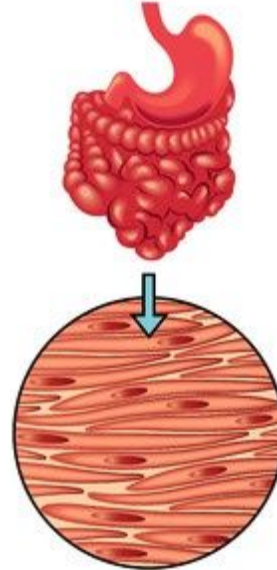
**Muscle tissue** is specialized to generate mechanical force i.e. cause movement.

Three types of muscle cells/tissue

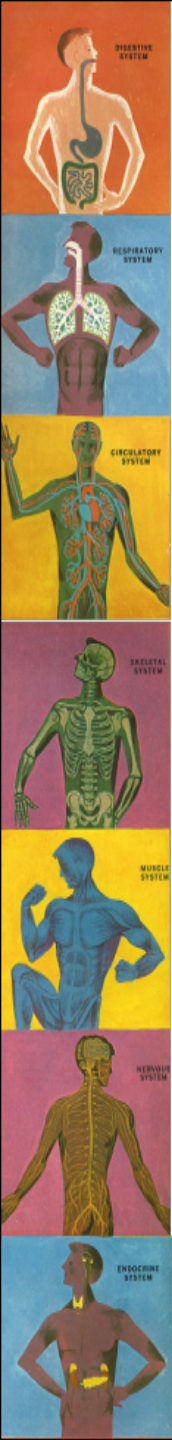
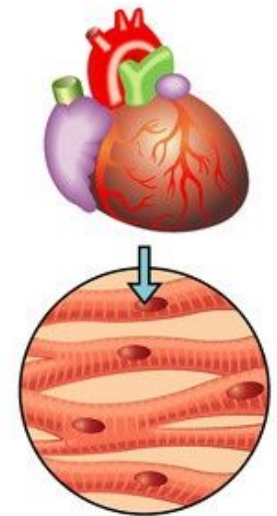
Skeletal muscle



Smooth muscle



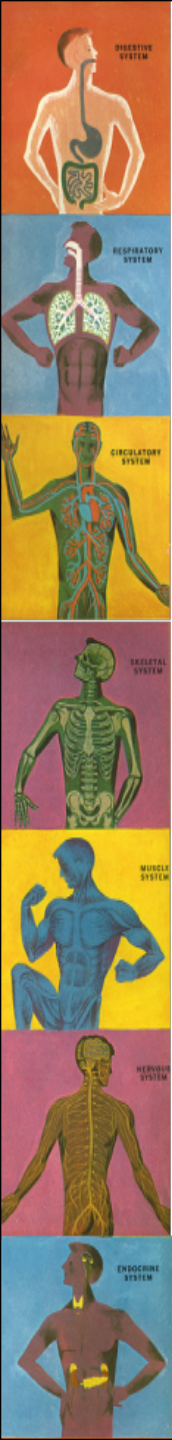
Cardiac muscle



# Nervous Tissue

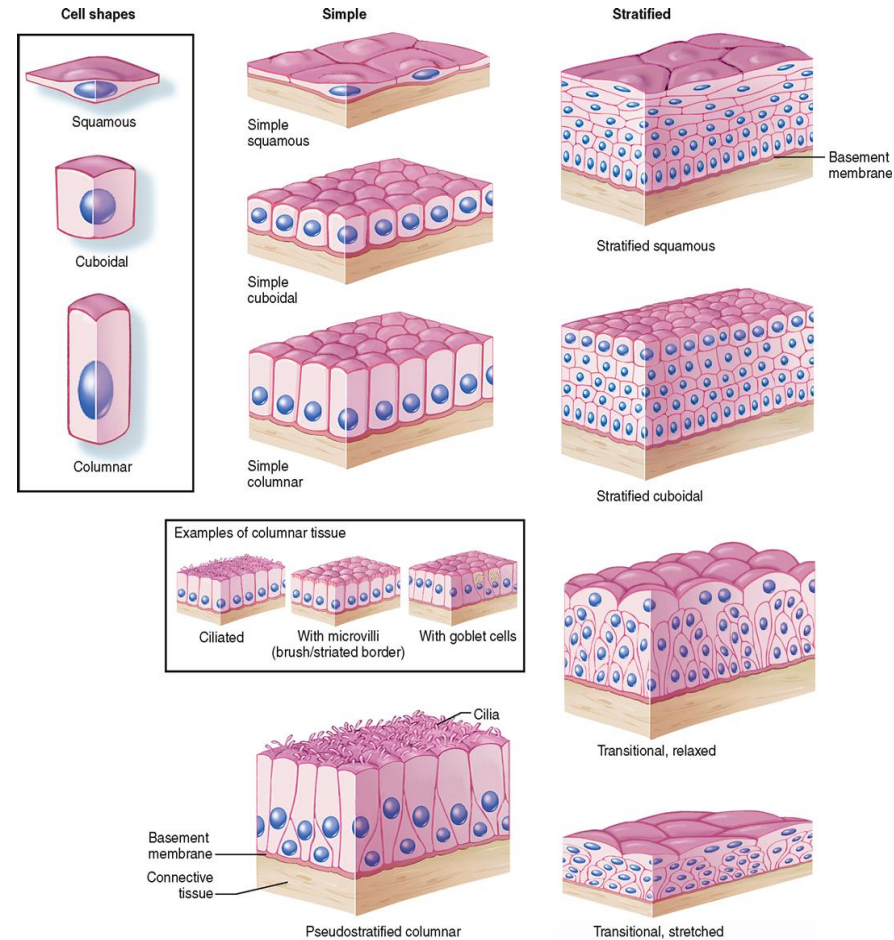
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- Is specialized to *initiate, integrate, and conduct* electrical signals to other cells.
- These signals may;
  - Initiate new electrical signals in other neurons.
  - Stimulate a gland to secrete hormones.
  - Stimulate muscle contraction.

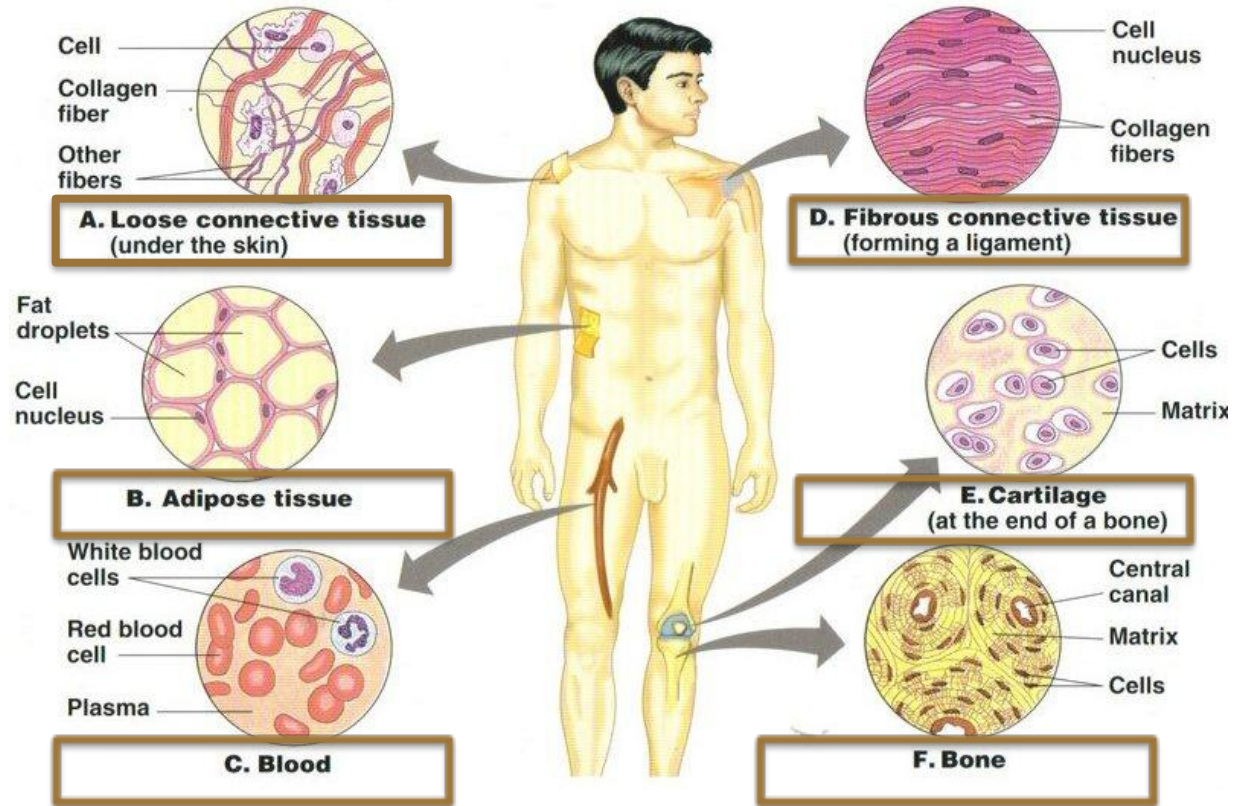


# Epithelial Tissue

- There are many shapes of epithelial cells according to the function they need to perform.
- Thus, there are many types of epithelial tissue.
- ***There are shared properties:***
  - It lines surfaces.
  - Offers protection.
  - Maybe involved in secretion and absorption of ions & organic molecules.



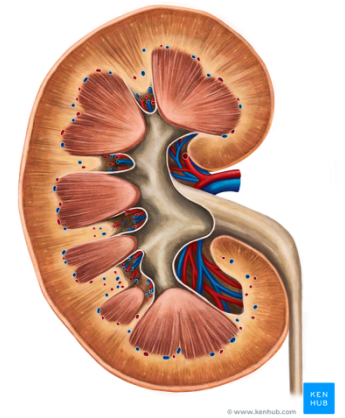
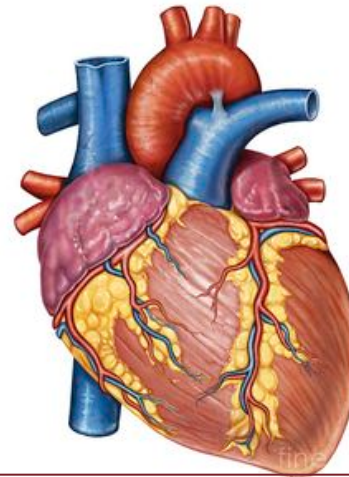
# Connective Tissue



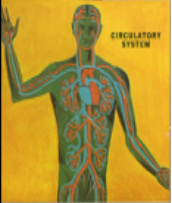
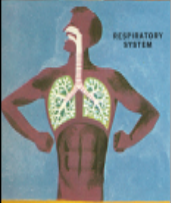
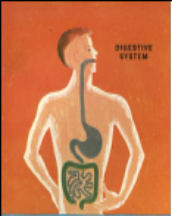
- It **connects**, **anchors** and **support** the structures of the body.
- It consists of many and diverse cell and tissue types, each with its specific function.

# Organs & Systems

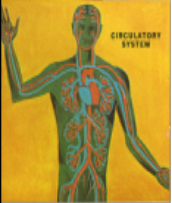
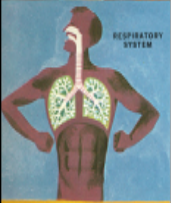
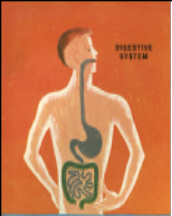
The combination of two or more types of tissues forms an **organ**.



Several organs come together and are organised into a **system**.

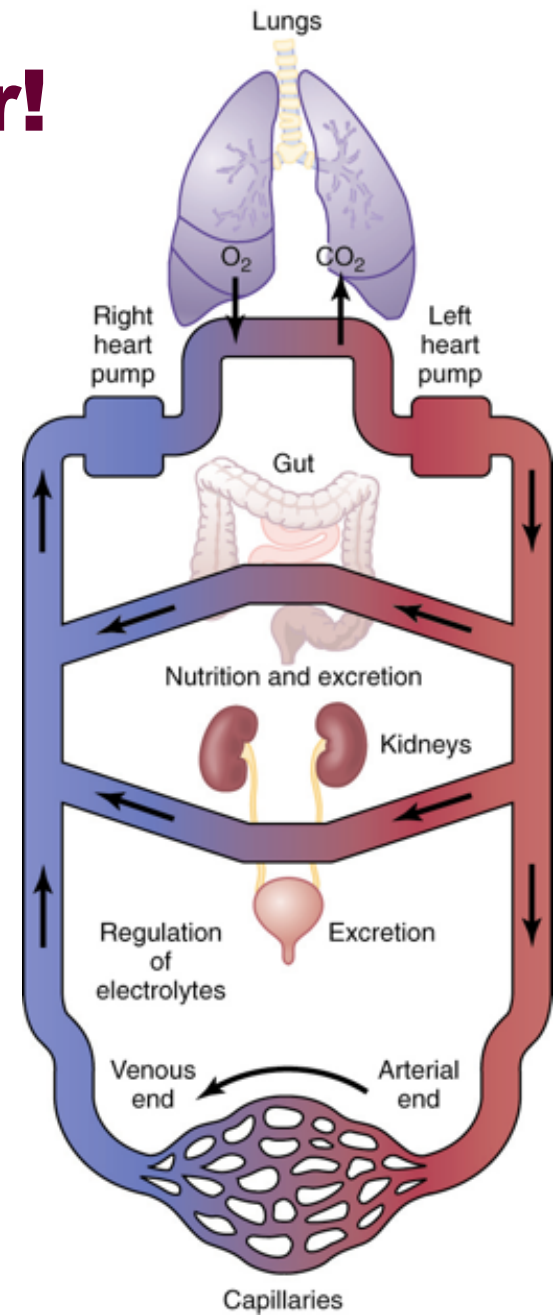
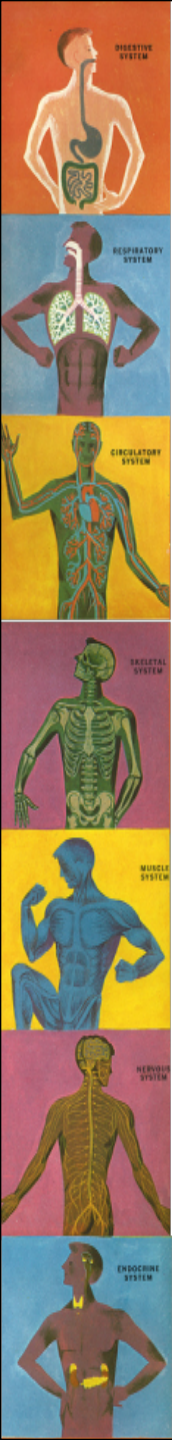


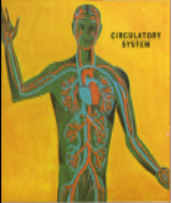
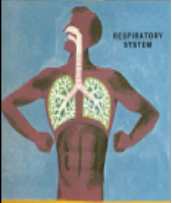
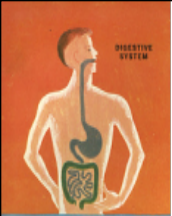
# Systems



System	Major Organs	Primary Functions
Integumentary	Skin, hair, nails	Protection, thermoregulation
Nervous	Brain, spinal cord, nerves	Regulation of other body systems
Endocrine	Hormone-secreting glands, such as the pituitary, thyroid, and adrenals	Secretion of regulatory molecules called hormones
Skeletal	Bones, cartilages	Movement and support
Muscular	Skeletal muscles	Movements of the skeleton
Circulatory	Heart, blood vessels, lymphatic vessels	Movement of blood and lymph
Immune	Bone marrow, lymphoid organs	Defense of the body against invading pathogens
Respiratory	Lungs, airways	Gas exchange
Urinary	Kidneys, ureters, urethra	Regulation of blood volume and composition
Digestive	Mouth, stomach, intestine, liver, gallbladder, pancreas	Breakdown of food into molecules that enter the body
Reproductive	Gonads, external genitalia, associated glands and ducts	Continuation of the human species


# Putting things together!





Thank you





Block Objectives :

**By the end of the course, students should be able to:**

- \* Realize the **anatomical structure** and **design of the medical curriculum** and use the support available in the college in their transition to the university system.
- \* Understand the **relationship** between the **structures** of the different components of the cell and their **functions**.
- \* Understand the **ultra-structure** and **functions** of the different body systems and integrate knowledge from *Anatomy, Histology, Physiology, Biochemistry, and Immunology*.
- \* Identify major **microorganisms** affecting the human body and discuss their **pathological** effects.
- \* Develop effective **communication skills** and explore **biopsychosocial**, and **ethical** issues in their assessment of the patient.
- \* Use a wide range of **resources** in researching their learning issues and developing their **self-directed skills**.
- \* Use **clinical cases** to apply knowledge learnt, generate hypotheses, build an enquiry plan, and use evidence to refine their hypotheses, and justify different views.