

PHYSIOLOGY

Introduction to Physiology

Homeostasis & Cell Functions

Second Stage • Beauty & Laser Department

Lecture 1

1. What is Physiology?

- Physiology is the study of how the human body works.
- It explains the normal functions of cells, tissues, organs, and body systems.
- Example: Physiology explains how the heart pumps blood and how cells obtain energy.

2. Levels of Organization

- Cell → Tissue → Organ → Organ System → Human Body
- Cell: The basic structural and functional unit of the body.
- Tissue: A group of similar cells performing a specific function.
- Organ: A structure made of different tissues working together.
- Organ System: A group of organs working together.

3. Homeostasis

- Homeostasis is the ability of the body to maintain a relatively stable internal environment despite changes in the external environment.
- Examples: body temperature, blood glucose, blood pressure, blood pH, and water balance.
- Normal body temperature is approximately 37°C.

4. Why is Homeostasis Important?

- Cells need a stable internal environment to function normally.
- Severe disturbance of homeostasis can lead to cell dysfunction, tissue damage, and disease.

5. Components of Homeostatic Control

- Receptor: Detects a change in the internal environment.
- Control Center: Receives information and determines the appropriate response.
- Effector: Produces the response that helps restore normal conditions.

Receptor	Control Center	Effector
Detects change	Processes information	Produces response

6. Negative Feedback

- Negative feedback is the most common mechanism of homeostasis.
- It reduces or reverses the original change.
- Example: High blood glucose → Insulin release → Glucose enters cells → Blood glucose decreases.

7. Positive Feedback

- Positive feedback increases or reinforces the original change.
- It is less common than negative feedback.
- Examples: childbirth and blood clotting.
- Childbirth: Uterine contractions → cervical stretching → oxytocin release → stronger contractions.

Uterine contractions → Cervical stretching → Oxytocin → Stronger contractions

8. The Cell

- The cell is the basic functional unit of the human body.
- Examples include muscle cells, nerve cells, red blood cells, skin cells, and bone cells.
- Each cell is specialized to perform particular functions.

9. Main Parts of the Cell

- Cell Membrane: Separates the cell from its environment, protects the cell, and controls movement of substances.
- Cytoplasm: Contains organelles and is the site of many chemical reactions.
- Nucleus: Contains DNA and controls many cellular activities.

10. Important Cell Organelles

Organelle	Main Function
Nucleus	Controls cell activities and contains DNA
Mitochondria	Produce ATP / energy
Ribosomes	Protein synthesis
Endoplasmic Reticulum	Protein and lipid processing
Golgi Apparatus	Modifies and packages proteins
Lysosomes	Digest waste and damaged materials
Cytoskeleton	Maintains cell shape and movement

11. Functions of Cells

- Nutrition: Cells obtain nutrients and oxygen.
- Metabolism: Chemical reactions produce energy and cellular products.
- Growth: Cells increase in size.
- Reproduction: Cells divide to produce new cells.
- Communication: Cells communicate using chemical and electrical signals.
- Movement: Some cells can change their position or move substances.
- Excretion: Cells remove waste products.

12. Cell Membrane

- The cell membrane is mainly composed of phospholipids, proteins, and cholesterol.
- It is selectively permeable, allowing some substances to pass more easily than others.

13. Quick Review

Key Term	Simple Definition
Physiology	Study of normal body functions.
Homeostasis	Maintenance of a relatively stable internal environment.
Negative feedback	Reverses or reduces the initial change.
Positive feedback	Amplifies the initial change.
Cell	Basic functional unit of the body.
Nucleus	Contains DNA and regulates many cellular activities.
Mitochondria	Produce ATP / cellular energy.
Cell membrane	Controls movement of substances into and out of the cell.

14. Questions for Students

1. What is physiology?
2. What is homeostasis?
3. What are the three components of a homeostatic control system?
4. What is the most common type of feedback mechanism?
5. What is the main function of mitochondria?
6. What is the basic functional unit of the body?
7. What is the function of the nucleus?

End of Lecture 1