

HUMAN ANATOMY AND PHYSIOLOGY-I, BP-101(T)

UNIT-I (Introduction to human body)

CLASS:5

TOPIC – General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent

Cell Communication:

- Cell communication is most important for the multicellular organism for the normal activity in a daily life
- Cell communication occurs by electrochemical communications
- All the communication system involve receiving, collecting, and responding to appropriate information according to the cell signaling molecules (internal or external communications)
- Cellular Response depends upon the signaling molecules and cell type
- Internal communication mainly involves mainly the nervous and endocrine system; these are important for the homeostasis and regulation of the vital body function.
- Signaling Molecules: 1. Neurotransmitters and 2. Hormones.
- Communication with external environments involves the special senses (Vision, Hear, Taste), and these also depends on the nervous system.

Cell Signalling:

- Cell Signaling are also known as signaling cascade, signal- transduction pathways, etc
- A signal-transduction pathway is a series of steps by which a signal on a cell's surface or nucleus is converted into a specific cellular response within the cell.
- Cellular Responses: Depending upon signaling molecule, cell type and signaling pathways
- Cell Signaling occurs in three Stage (As per Earl W. Sutherland
 1. Reception
 2. Transduction
 3. Response

Cell Signaling Receptors:

Receptors: proteins, which receive the signal from Biological active molecules.

1. Ligand Gated Ion Channel (LGIC)- Fastest
2. G-Protein Coupled Receptor (GPCR)
3. Enzyme Linked Receptor
4. Nuclear Receptor- Slowest

Cell Signaling Pathways:**Signal Transduction Pathways**

1. cAMP/PKA signaling pathway
2. IP3/Ca²⁺ Signaling Pathway
3. DAG/PK-C Signaling Pathway
4. NO/cGMP Signaling Pathway
5. Ca²⁺ Signaling Pathway
6. MAPK Signaling Pathway
7. Ion conduction Pathway

Cell SignalingTypes:

Cell Signaling is either local or long distance. Based on this signaling can divide in various forms:

1. Contact Dependent
2. Paracrine Signaling
3. Synaptic Signaling
4. Endocrine Signaling
5. Autocrine Signaling

1. Contact Dependent:

- cell signal occurs in between cells having physical contact with each other. This occurs at the cell membrane level.
- One cell has a signal molecule, and the other has a receptor moiety on their cell surfaces.
- But both the cells are physically connected where the signaling occurs.
- Important for development of immune cells.

2. Paracrine Signaling:

- This is a signal where one cell signals nearby neighboring cells. This is somewhat similar to the above type. But, the cells need not be directly connected.
- The signal molecules are released by one cell. These molecules reach nearby cells around and transmit the signal
- Example: Response of Histamine, Serotonin, Prostaglandins

3. Synaptic Signaling:

- This signal occurs at Synaptic junction.
- Important role in Neurotransmission within the nervous system.

IMPORTANT QUESTIONS:

2M QUESTIONS:

1. Define Anatomy and Physiology along with its scope.
2. Define Homeostasis.
3. What is feedback system.
4. Define cell. Write the functions of mitochondria.
5. Differentiate mitosis and meiosis.
6. Differentiate Phagocytosis and Pinocytosis.
7. Define: 1. Facilitated transport 2. Osmosis transport.
8. Differentiate exocrine and endocrine signaling.
9. Define Autocrine and Juxtacrine signaling.
10. Define tissue and its types with examples.

5M QUESTIONS:

- 1) Draw a labelled diagram cell showing its cell organelles and their function.
- 2) Define tissue and its types in detail.
- 3) What is cell cycle and explain in detail.
- 4) What is cell division and explain its types.
- 5) What are different cell junctions.
- 6) Explain cell signaling and cell communication.
- 7) What is homeostasis and explain its feedback mechanism

10 M QUESTIONS:

1. Define tissue and its types in detail.
2. What are different cell junctions.
3. Explain cell signaling and cell communication.