

BB101  
Prof. Sanjeeva Srivastava  
Feb 02, 2024

## **Summary of today's session – Lecture 8- Cell communication and cell cycle**

Dear Students,

In today's class, we discussed few fundamental cell biology concepts.

### **Cell communication:**

Cell signaling involves three key stages: reception, transduction, and response. In the reception stage, the target cell receives signals from external molecules. The transduction stage involves the conversion of these signals into a form that the cell can process internally. Finally, in the response stage, the cell generates a specific response based on the received signals. Various membrane-associated receptors play crucial roles in cell signaling. These include G protein-coupled receptors, which activate intracellular signaling cascades upon ligand binding. Tyrosine kinase receptors, another type, phosphorylate proteins to initiate signaling pathways. Intracellular receptors respond to signals that can penetrate the cell membrane, and ion channel receptors allow the passage of ions, influencing cell function. Each receptor type contributes to the intricate network of cellular communication.

### **Cell Division: A Fundamental Process**

Cell division is a vital biological process that underlies the growth, development, and maintenance of living organisms. It culminates in the formation of genetically identical daughter cells. The intricacies of this process are governed by the cell cycle, a sequence of events where the mitotic phase alternates with interphase.

A critical mechanism in cell biology is meiosis, a process essential for sexual reproduction. Meiosis reduces the number of chromosome sets in a cell from diploid to haploid, contributing significantly to genetic diversity.

### **Eukaryotic Cell Cycle Regulation: Orchestrating Precision**

The eukaryotic cell cycle, the driving force behind cell division, is meticulously regulated by molecular controls. Cyclins and Cdks (Cyclin-dependent kinases) act as checkpoints, ensuring the proper progression of the cell cycle and maintaining cellular integrity.

### **Cancer Cells: Defying Cellular Order**

Disruptions in the normal regulation of the cell cycle have severe consequences. Cancer cells, characterized by their ability to evade regulatory mechanisms, divide uncontrollably, forming tumors. Understanding these aberrations is crucial for developing strategies to combat cancer and related diseases.

### **Special Guest Speaker – Prof. Ambarish Kunwar**

Professor Ambarish discussed his innovative work in microscopy, specifically highlighting a mobile-based system. Additionally, he shared insights into the development of other devices designed for UV sanitation. Furthermore, he introduced a new project focused on utilizing robots for brain research. The presentation provided a comprehensive overview of Prof. Ambarish's diverse research initiatives, ranging from advanced microscopy techniques to cutting-edge robotics in the field of neuroscience.

### **Summary:**

Cell communication is a multifaceted process involving three pivotal stages: reception, transduction, and response. During reception, target cells receive external signals, which are then transduced into an internal form the cell can process. The ensuing response is a specific cellular reaction based on the received signals. Membrane-associated receptors, including G protein-coupled receptors, tyrosine kinase receptors, intracellular receptors, and ion channel receptors, play crucial roles in orchestrating this intricate network of cellular communication. Simultaneously, cell division stands as a fundamental biological process governed by the cell cycle, alternating between the mitotic phase and interphase, with meiosis contributing to genetic diversity. The eukaryotic cell cycle is meticulously regulated by molecular controls, such as cyclins and Cdks, acting as checkpoints to ensure precise progression and maintain cellular integrity. However, disruptions in this regulation lead to cancer cells evading control mechanisms, resulting in uncontrollable division and tumor formation, underscoring the critical importance of understanding these processes for developing effective strategies against cancer and related diseases.

### **Resource Update:**

The course handout and reference materials have been updated and are accessible through the provided Google Drive link:

<https://drive.google.com/drive/folders/1FgzzCom1n6WKlgheQrFLA1U8rkJuISGT>

Our next lecture will delve into Development and stem cells.

Best wishes,  
Sanjeeva