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Chapter-1 | Introduction to biochemistry

Syllabus

Introduction to biochemistry: Scope of biochemistry in pharmacy; Cell and its biochemical organization

Introduction to biochemistry:

- Biochemistry is the study of the chemical processes and substances that occur within living organisms.
- It combines the principles of chemistry, biology, and physics to understand the complex chemical reactions and structures that make up living systems.
- Biochemists study the structure and **function** of biomolecules such as proteins, nucleic acids, carbohydrates, and **lipids**, as well as the enzymes and metabolic pathways that drive these reactions.
- They also investigate the genetic and **molecular mechanisms** that regulate these processes. Biochemistry is a fundamental field in the life sciences, with applications in medicine, agriculture, and biotechnology.

Scope of biochemistry in pharmacy:

The scope of biochemistry in pharmacy is quite broad, as it encompasses many different aspects of drug discovery, development, and delivery. Some of the key areas where biochemistry plays a role in pharmacy include:

1. **Drug design and development:** Biochemistry is used to understand the structure and function of biomolecules such as enzymes and receptors, which are important targets for drug development. Biochemists use this knowledge to **design and develop** new drugs that can bind to these targets and modulate their activity.
2. **Drug metabolism and pharmacokinetics:** Biochemistry is also used to understand how drugs are metabolized in the body, which can affect their efficacy and safety. Biochemists use this knowledge to optimize the pharmacokinetics of drugs, making them more effective and less toxic.
3. **Natural products:** Biochemistry is used to identify and isolate natural compounds from plants, microbes, and other sources, which can be used as drugs or drug leads. Biochemists use techniques such as chromatography and mass spectrometry to purify and analyze these compounds.
4. **Biotechnology:** Biochemistry is used to develop biotechnology products such as vaccines, diagnostic tests, and gene therapies. Biochemists use techniques such as recombinant DNA technology and protein engineering to create these products.;

5. **Pharmaceutical formulation:** Biochemistry is used to develop dosage forms of drugs such as tablets, capsules, and injectable solutions. Biochemists use this knowledge to optimize the stability, solubility, and bioavailability of drugs in these dosage forms.

Overall, biochemistry plays a critical role in many different aspects of pharmacy, from drug development to formulation to delivery.

Cell and its biochemical organization:

The cell is the basic unit of life and is composed of a variety of different biochemical compounds and structures. The main components of a cell include:

1. **The cell membrane:** The cell membrane is a selectively permeable barrier that surrounds the cell. It is composed of a lipid bilayer that controls the movement of molecules in and out of the cell.
2. **The cytoplasm:** The cytoplasm is the gel-like substance that fills the cell and contains all of the cell's organelles and other structures.
3. **The nucleoplasm:** The nucleoplasm is the gel-like substance that fills the nucleus of the cell, it contains the genetic material of the cell (DNA) which is responsible for the cell's growth and reproduction.
4. **The mitochondria:** The mitochondria are structures within the cytoplasm that are responsible for generating the energy needed by the cell through the process of cellular respiration.
5. **The ribosomes:** The ribosomes are small structures within the cytoplasm that are responsible for synthesizing proteins, they are made up of RNA and proteins.
6. **The endoplasmic reticulum and Golgi apparatus:** The endoplasmic reticulum and Golgi apparatus are structures that help to transport and modify molecules within the cell, they are essential for the cell's internal organization and communication.
7. **The lysosomes:** The lysosomes are small structures within the cytoplasm that are responsible for breaking down and recycling waste materials within the cell.;

All of these different structures and compounds work together to maintain the integrity and function of the cell, and to ensure that the cell can carry out all of its necessary functions such as growth, reproduction, and metabolism.