AL-MUSTAQBAL UNIVERSITY COLLEGE

Department of Biomedical Engineering

Biochemistry

(Introduction to biochemistry)

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Biochemistry:

It is a branch of the natural sciences and is concerned with the study of the chemical composition of cell parts in various living organisms, whether they are simple organisms such as (bacteria, fungi and algae) or complex organisms such as humans, animals and plants. Biochemistry is sometimes described as the science of life chemistry, due to the link between biochemistry and life. Scientists in this field have focused on researching chemical reactions within living organisms of all kinds by studying the cellular components of these organisms in terms of the chemical structures of these components, their locations and their vital functions. As well as studying the various biological reactions that occur within these living cells in terms of construction and composition, or in terms of demolition and energy production. Which greatly helps in understanding the tissues, organs and functions of living organisms

Clinical chemistry:

is the biochemical analysis of body fluids to support the diagnosis and treatment of disease. It uses chemical reactions to determine the levels of different chemical compounds in body fluids. Many simple chemical tests are used to detect and quantify different compounds in blood and urine. It is the most frequently tested samples in clinical chemistry.

Given the branching of biochemistry, it has been divided into three main directions:

1- The study of the chemical composition of the components of cells in terms of type and quantity, and this field was called Biochemical Anabolism.

2- A physiological study of the components of living cells, nutritional transformations, and energy production. This field is called Physiological Biochemistry & Kinetic Biochemstry.

3- Studying the function of biological compounds inside cells and the relationship between them and the functions of orga

Main branches of biochemistry:

Due to the great diversity of its approaches, the biochemistry has been derived in branches that have specific objects of study. Below are the main branches of biochemistry.

1-Structural Biochemistry

Structural biochemistry is a branch of the life sciences that combines biology, physics and chemistry to study living organisms and to summarize some mutual principles that all life forms share.

It is also more generally referred to biochemistry. Biochemists seek to describe in molecular terms the structures, mechanisms and chemical processes shared by all organisms, providing organizational principles that underlie life in all its various forms.

2-Metabolic biochemistry

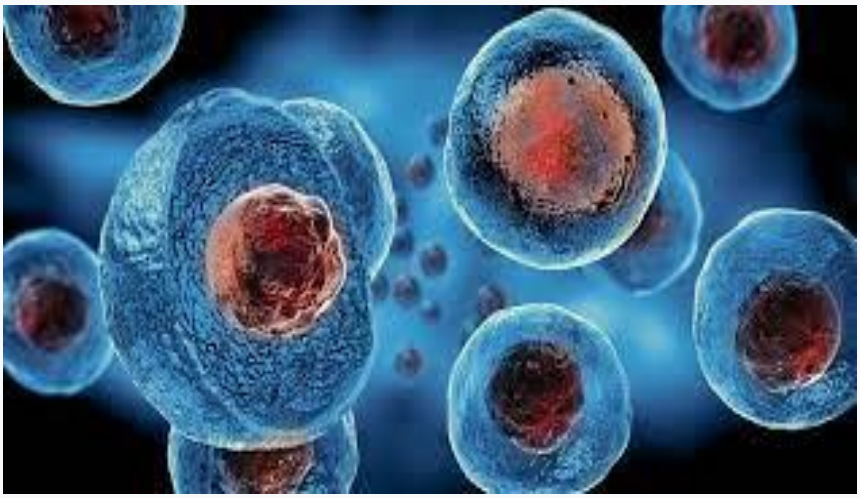
It is the branch of biochemistry that studies the generation of metabolic energy in higher organisms with an emphasis on its regulation at the molecular, cellular and organ levels.

Also emphasized are the chemical concepts and mechanisms of enzymatic catalysis. Includes selected topics in:

- Carbohydrate, lipid and nitrogen metabolism
- Complex lipids and biological membranes
- Hormone signal transduction and others.

3-Cell Biology

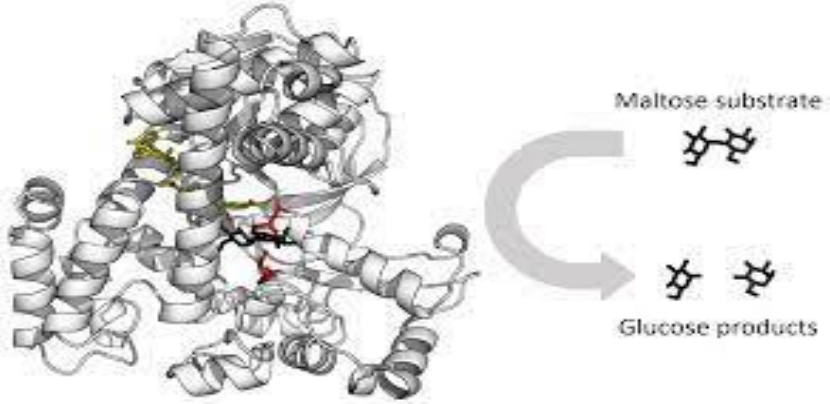
The cell is the basic unit of all living things. Cells that perform the same general function are combined to form tissue. Several tissues gather to form organs. There are a number of organs that overlap functionally, which is known as the organ



4-Enzymology

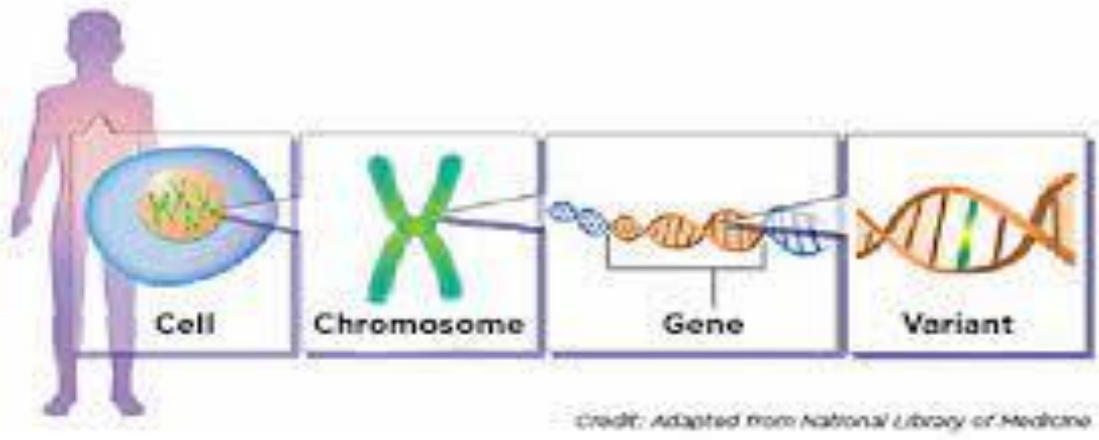
They are protein molecule biological catalysts. It speeds up chemical reactions. The molecules that enzymes act on are called substrates, where the enzyme

converts the substrate into molecules known as products. Most metabolism needs enzymes in order to happen fast enough to sustain life



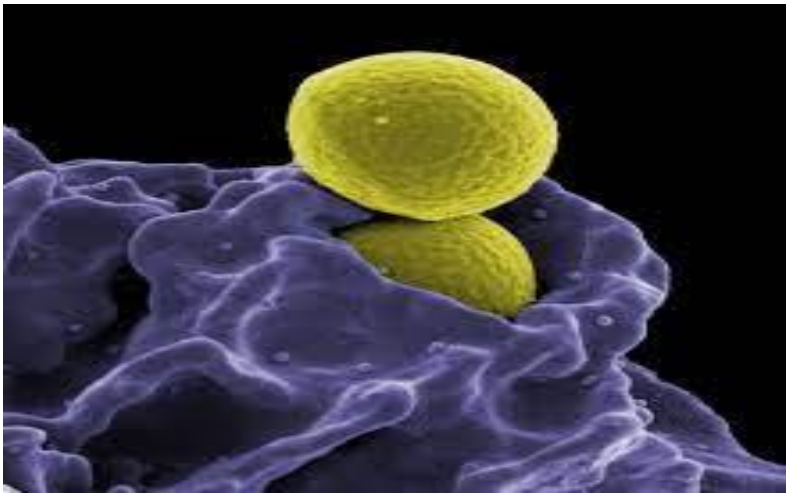
5-Genetics

is the scientific study of genes and heredity—of how certain qualities or traits are passed from parents to offspring as a result of changes in DNA sequence. A gene is a segment of DNA that contains instructions for building one or more molecules that help the body work. DNA is shaped like a corkscrew-twisted ladder, called a double helix. The two ladder rails are called backbones, and the rungs are pairs of four building blocks (adenine, thymine, guanine, and cytosine) called bases. The sequences of these bases provide the instructions for building molecules, most of which are proteins. Researchers estimate that humans have about 20,000 genes.



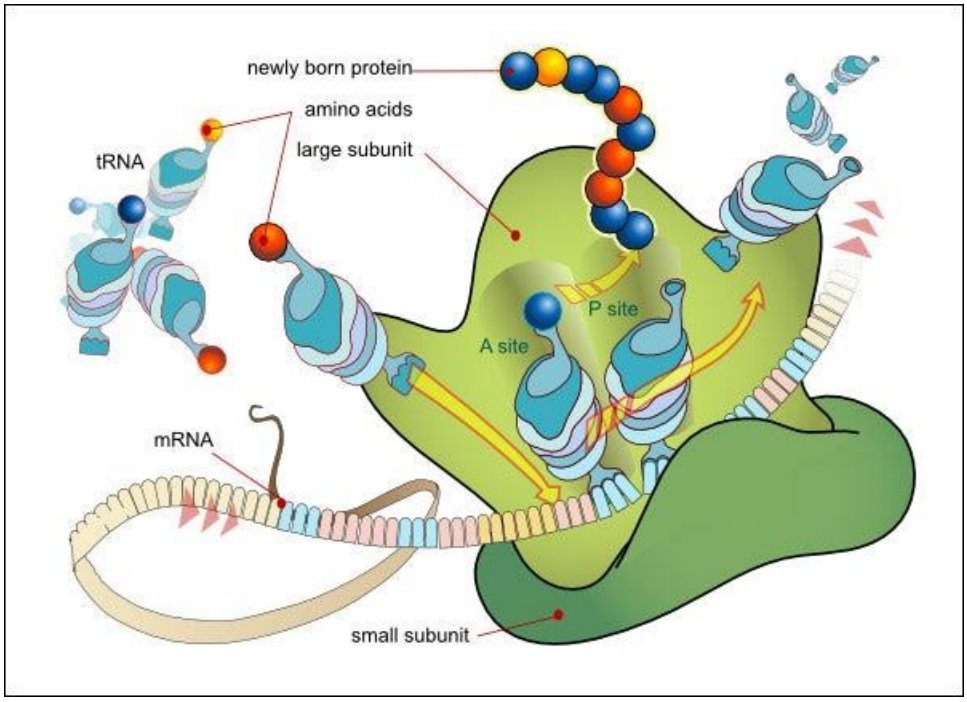
6-Immunology

is the study of the immune system and is a very important branch of the medical and biological sciences. The immune system protects us from infection through various lines of defence. If the immune system is not functioning as it should, it can result in disease, such as autoimmunity, allergy and cancer. It is also now becoming clear that immune responses contribute to the development of many common disorders not traditionally viewed as immunologic, including metabolic, cardiovascular, and neurodegenerative conditions such as Alzheimer's.



7-Molecular Biology

is the field of biology that studies the composition, structure and interactions of cellular molecules – such as nucleic acids and proteins – that carry out the biological processes essential for the cell' s functions and maintenance.



8-Bioinformatics

is the use of information technology within biology to take advantage of that in data storage and warehousing, and DNA sequence analysis.

To work in the field of bioinformatics, you must be familiar with a number of sciences, including biology, mathematics and computer science, in addition to the laws of physics and chemistry, and of course, your knowledge of information technology (IT) in order to analyze and study biological data. The use of bioinformatics is not limited to computing biological data, but rather to solving many biological problems and discovering multiple biological patterns.