

# **Introduction to Biochemistry**

**3rd stage**

**Anbar University-College of Pharmacy-Clinical Laboratory Sciences Department  
2019-2020**

**Dr. Yousif H. Khalaf**

## **Objectives:**

**At the end of the semester the students should be able to understand**

- The chemical structure, and function of all biomolecules present in the living organisms.

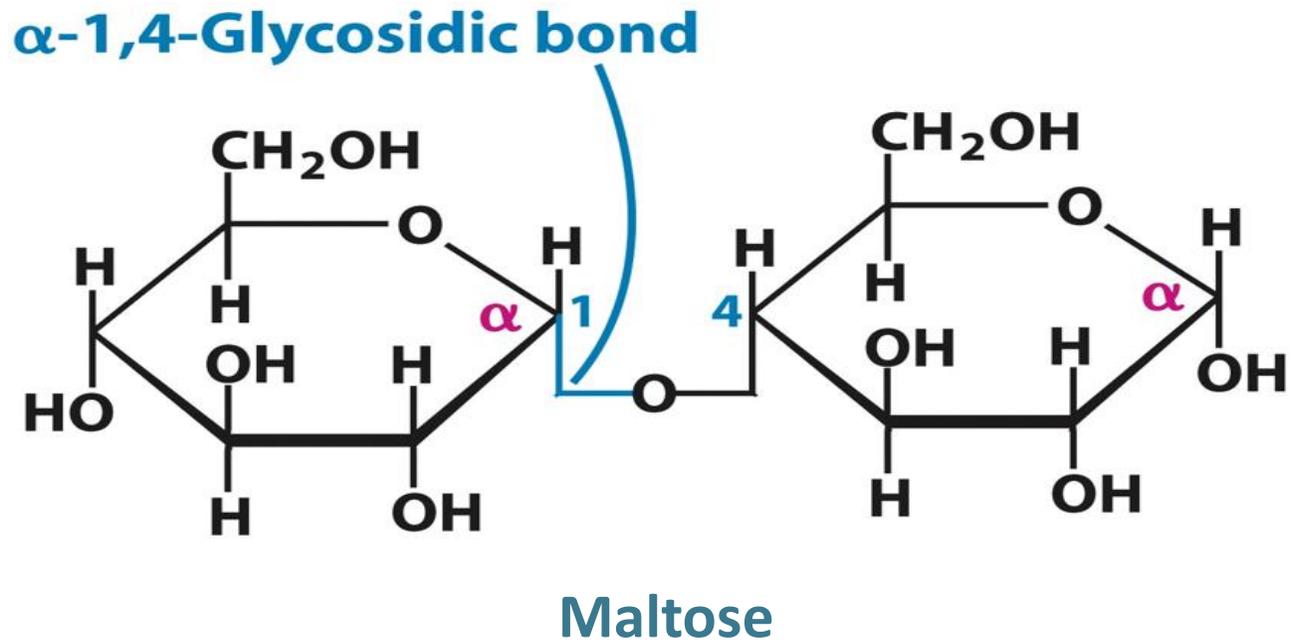
## **References**

- ✓ Harper's Illustrated biochemistry, 26<sup>th</sup> edition
- ✓ Biochemistry – Berg, Tymoczko and Stryer, 6<sup>th</sup> edition
- ✓ Lippincott's Illustrated Reviews: Biochemistry 5<sup>th</sup> edition

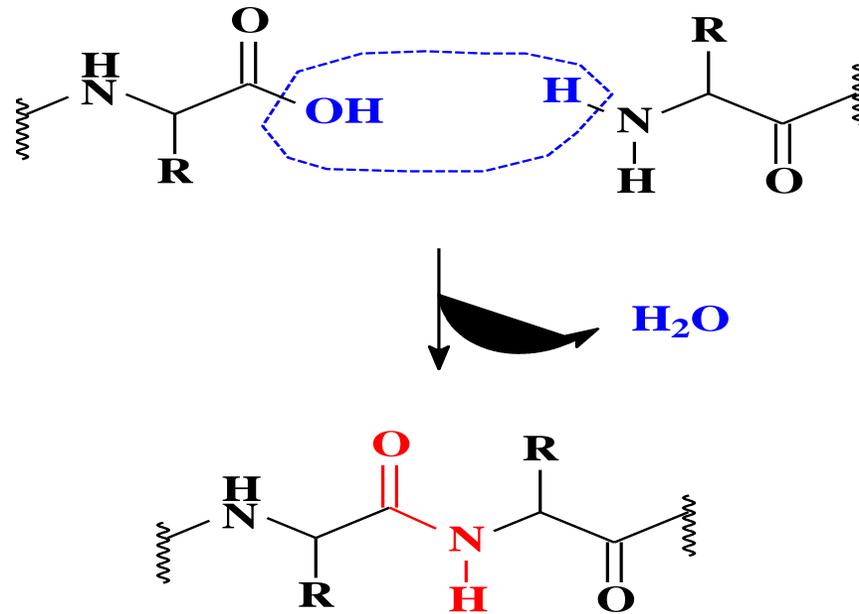
## What is Biochemistry?

- **Biochemistry** is the science concerned with studying the various molecules that occur in living cells and organisms and with their chemical reactions. Because life depends on biochemical reactions, biochemistry has become the basic language of all biologic sciences.
- **Biochemistry and medicine** are intimately related. Health depends on a harmonious balance of biochemical reactions occurring in the body, and disease reflects abnormalities in biomolecules, biochemical reactions, or biochemical processes.
- **Biochemical processes** is the study of chemical processes within and relating to living organisms. By controlling information flow through biochemical signalling and the flow of chemical energy through metabolism, biochemical processes give rise to the complexity of life.
- Biochemical approaches are often fundamental in illuminating the causes of diseases and in designing appropriate therapies. The judicious use of various biochemical laboratory tests is an integral component of diagnosis and monitoring of treatment.
- **Biochemistry spills over into pharmacology, physiology, microbiology, toxicology, and clinical chemistry.** In these areas, a biochemist may investigate the mechanism of a drug action; engage in viral research; conduct research pertaining to organ function; or use chemical concepts, procedures, and techniques to study the diagnosis and therapy of disease and the assessment of health.

- The key biomolecules present in the living organisms are **carbohydrates, proteins, lipids and nucleic acids**
- **Carbohydrates** are built from **monosaccharides**, small molecules (Aldehydes or Ketones with Multiple Hydroxyl Groups) to form **disaccharides** and **polysaccharides** by **O-glycosidic bonds**.



- **Proteins** consist of small molecules called **amino acids**, many amino acids are linked by dehydration synthesis to form proteins by **peptide bonds**

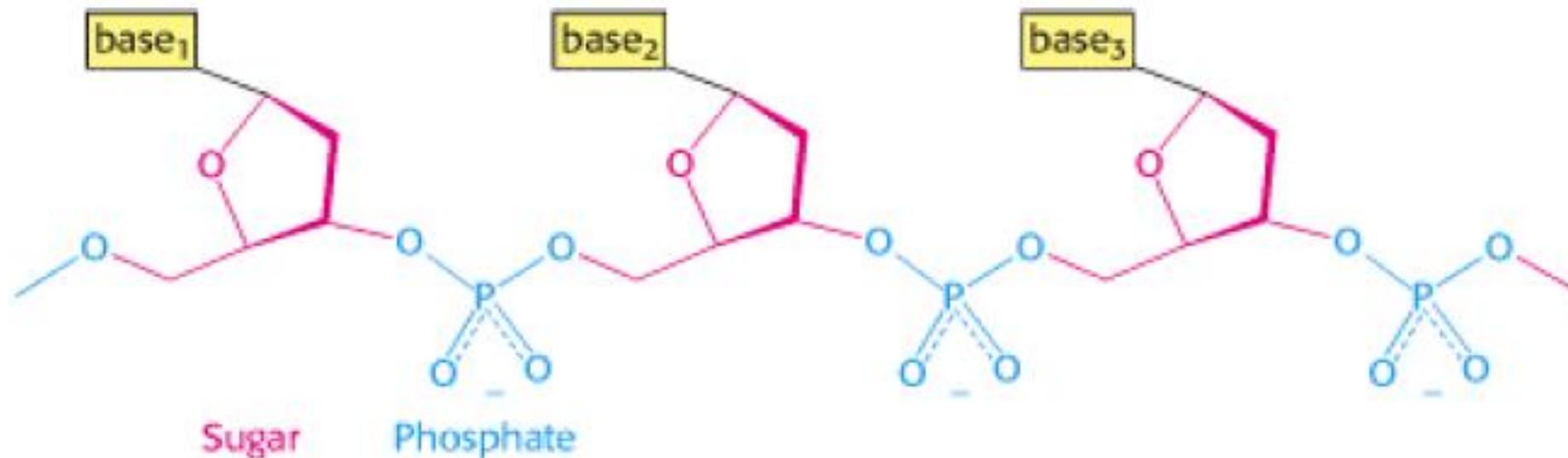


## Lipids

- Lipids are compounds that are **insoluble in water** and **soluble in organic solvents**, such as alcohol and ether. Lipids include fats, oils, phospholipids, steroids, and cholesterol.
- Formed by dehydration synthesis of one glycerol for every 3 fatty acids.

## Nucleic acids & DNA

- The bases that found in nucleic acids are aromatic heterocyclic compounds derived from either **pyrimidine or purine**. Five of these bases are the main components of nucleic acids, **DNA** and **RNA**.
- DNA is a linear polymer made up of four different monomers (**Nitrogen bases**) which is built of repeating **sugar-phosphate units**. The sugars are molecules of deoxyribose from which DNA receives its name.



## **Enzymes**

Enzymes = Biological Catalysts , made of protein ,Helps reaction of something (substrate).

## **Vitamins**

Vitamins are organic molecules that are necessary for normal metabolism in animals. Most vitamins function as coenzymes or cofactors.

## **Hormones**

Hormones are chemical messengers released from endocrine cells or glands into the interstitial fluid, where they then diffuse into the blood and travel to target cells. Chemical nature of hormones is either protein or organic molecules.

