

محاضرة البيولوجي النظري

- 4 -

Macromolecule Definition

Macromolecules are large, complex molecules. They are usually the product of smaller molecules, like proteins, lipids, and carbohydrates.

Another name for a macromolecule is a *polymer*, which derives from the Greek prefix poly- to mean "many units." In broken-down terms, a macromolecule is the product of many smaller molecular units.

Examples of Macromolecules

Energy from Carbohydrates

The small molecular units that make up macromolecules are called *monomers*. Monomers are usually single-celled, and isolated after a *polymer*, or macromolecule, is broken down in a chemical process.

Metabolism, or the conversion of food into energy, is the most common of these chemical processes. When you metabolize food, your body breaks the macromolecules

found within the food into smaller units, which are then used to propel the body through the day.

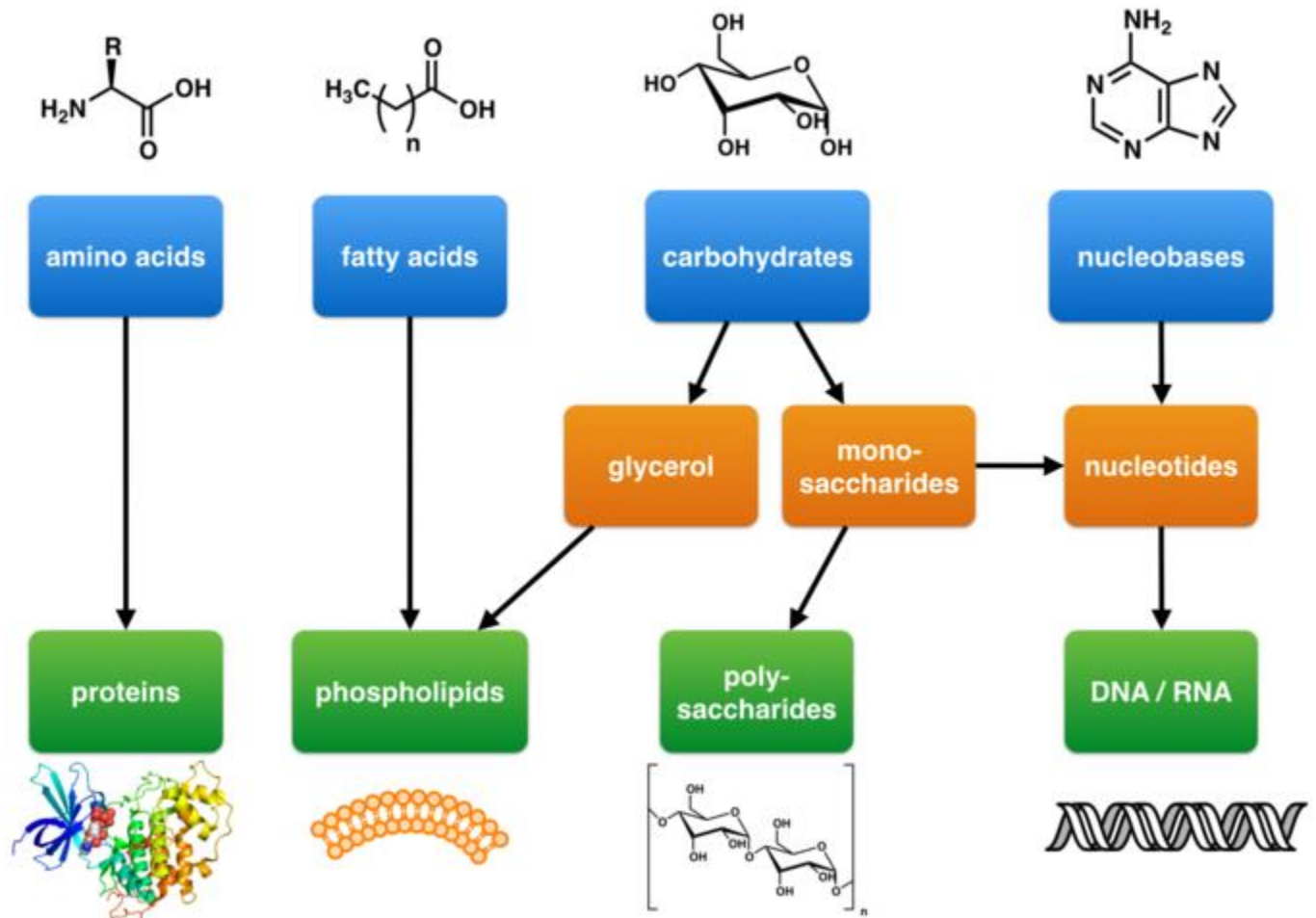
Carbohydrates constitute one of the most-studied macromolecules in biology. Simple or complex, they yield *glucose*, or “[blood](#) sugar,” as their primary energy unit. Furthermore, both simple and complex carbohydrates are, at the most basic level, chains of glucose molecules.

Metabolizing carbohydrates, therefore, necessitates that the body break down these glucose chains. The body does so by releasing enzymes, like *amylase*, which adhere to the glucose chains to detach them and isolate the glucose [molecule](#). This process culminates in the macromolecule’s yielding energy, as well as small amounts of H₂O and CO₂, for the body to consume.

Related Biology Terms

- **Polymer** relatively large molecule consisting of a chain or network of many identical or similar monomers chemically bonded to each other.
 - **Monomer** relatively small molecule that can form covalent bonds with other molecules of this type to form a polymer.
-

Sources of biological macromolecules Foods such as bread, fruit, and cheese are rich sources of biological macromolecules.



Four Classes Of Biological Macromolecules

There are four major classes of biological macromolecules:

1. carbohydrates
2. lipids
3. proteins
4. nucleic acids

Each of these types of macromolecules performs a wide array of important functions within the cell; a cell cannot perform its role within the body without many different types of these crucial molecules.

Carbohydrates have major functions within the body:

- Providing **energy** and **regulation** of blood glucose.
- Sparing the use of **proteins** for **energy**.
- Breakdown of fatty acids.
- Dietary fiber.

What are the biological functions of proteins?

Here are 7 important functions of protein in your body.

- Growth and Maintenance.
- Causes Biochemical Reactions.
- Acts as a Messenger.
- Maintains Proper pH.
- Balances Fluids.
- Bolsters Immune Health.
- Transports and Stores Nutrients.

Functions of Lipids

Lipids can serve a diverse range of functions within a cell, including:

- **Storage of energy** for long-term use (e.g. triglycerides)
- **Hormonal roles** (e.g. steroids such as oestrogen and testosterone)
- **Insulation** – both thermal (triglycerides) and electrical (sphingolipids)
- **Protection** of internal organs (e.g. triglycerides)
- **Structural components** of cells (e.g. phospholipids and cholesterol)