

3.3

PROTEINS

Of the four classes of biological molecules, the proteins are the most diverse in their functions. By some estimates, our cells make more than 50,000 different proteins, with each protein having a specific job within the body. Consider lactase, whose job it is to break down lactose into glucose and galactose within the small intestine. Lactase binds specifically to lactose. It won't break down sucrose or maltose. Just lactose. And if the lactase enzyme is absent or broken? Talk to someone who is lactose-intolerant about their symptoms.

With such diversity, what gives a protein its functionality and specificity? For proteins, form is function. In other words, the specific 3-dimensional shape of a protein is what allows it to do its job. Table 1 lists some of the major functions of proteins, but this list is not exhaustive. In fact, it is hard to think of any function in the body in which proteins are not integral. In this unit, we will learn about the molecular structure of proteins and discuss some of their important functions.

Function	Example
Structure	Collagen in tendons and ligaments, Keratin in the nails and skin
Transport	Hemoglobin in the blood, Na ⁺ , K ⁺ -ATPase in cell membranes
Protection	Antibodies of the immune system
Movement	Actin and Myosin in muscles
Enzymes	Digestive enzymes in the small intestine (Lactase, Sucrase, Trypsin)
Receptors	Membrane proteins that respond to chemical messengers (insulin receptors)
Regulation	Chemical messengers: hormones, neurotransmitters, cytokines

Amino Acids
Peptide Bonds and Polypeptides
Protein Structure
Classes of Proteins
Enzymes



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