

Anhelina Prasol

Kyiv National University of Technologies and Design

(Kyiv)

Scientific supervisor – PhD Maria Chernets

GENERAL CHARACTERISTICS AND STRUCTURE OF PROTEINS

Proteins play an important role in the construction of living organisms and in the maintenance of life processes. The first attempt to give a scientific basis for the proteins was made in 1838 by a Dutch chemist and physician Mulder, who was the first to use the name «proteins» and determine the content of nitrogen [1, 7].

Being a compulsory component of living organisms proteins are their main structural components and in quantitative terms rank first among all macromolecules contained in a living cell [1, 7].

Proteins are high molecular weight organic nitrogen-containing compounds, constructed of a large number of amino acids, linked together by an acid-amide (peptide) bond to the polypeptide chain or chains that have a complex spatial organization (conformation) and perform various functions of living organisms [1, 10].

Protein compounds, due to the combination of a large number of functional groups and a variety of conformational states, provide a variety of chemical and other transformations that underlie the biological functions of organisms [1, 7-8].

Proteins are the most complex organic compounds in nature; the number of possible variants of protein molecules can be infinite, which is necessary for the implementation of species, organ and tissue specificity of organisms [1, 7].

Characterizing protein substances by the degree of complexity, two large groups can be distinguished: simple and complex proteins. Simple proteins form only amino acids in hydrolysis. Complex proteins consist of simple protein and an additional non-protein nature group. Complex proteins are divided into groups depending on the structure of the non-protein part – the prosthetic group. In the form of molecules, proteins are divided into globular and fibrillar [1, 50].

Simple proteins are divided into the following classes: albumins, globulins, procamins, histones, prolamins, glutenins, proteinases [1, 51].

Amino acids – structural monomers of proteins. During full acid, alkaline or enzymatic hydrolysis of proteins free amino acids are released [1, 10].

Human body contains about 60 amino acids and their derivatives, but not all of them are a part of the proteins. Among them there is a group of 20 most important amino acids, which are constantly found in protein compounds. Amino acids that constitute a part of the proteins, have been called proteinogenic (standard) [1, 11].

A lot of free peptides can be found in living organisms. Some of them are formed under certain conditions as a result of partial enzymatic hydrolysis, and some – are found as free compounds, not related to the structure of the protein. Natural peptides have extremely high biological activity. Many of them have a clear pharmacological effect and are of interest as medicines [1, 53].

Molecules of proteins are very complex. For the comfort of their study, the concept of the four levels of organization of the protein molecule was introduced: the primary (linear polypeptide chain), secondary (spatial spiralization or formation of layered-folded structures from one polypeptide chain or between the chains), tertiary (spatial stacking of the polypeptide chain in a certain volume due to its bends), quaternary (combining polypeptide chains into a macromolecule) [1, 21].

Some profound changes occur in the protein molecule under the effect of various physical (temperature, ultrasound, etc.), chemical (mineral and organic acids, alkalis, organic solvents, heavy metals, alkaloids, etc.) factors which are associated with a violation of the quaternary, tertiary and secondary structures. These cause a change in the physical, chemical and biological properties of the protein that is denaturation.

Thus, proteins, peptides, amino acids and their derivatives that exhibit biological activity have been used in pharmaceuticals as drugs. Proteins have a great economic importance. They are the most important components of nutrition for humans and farm animals. Chronic deficiency of proteins leads to a variety of diseases, thus reducing the average life expectancy.

REFERENCES

1. Біологічна хімія: [Підручник / Л.М. Вороніна, В.Ф. Десенко, Н.М. Мадієвська та ін.]; За ред. проф. Л.М. Вороніної. – Х.: Основа; Видавництво НФАУ, 2000. – 608 с.
2. Біологічний словник / За ред. К.М. Ситника і В.О. Топачевського. – К., 1986.
3. Боечко Ф.Ф., Боечко Л.О. Основні біохімічні поняття, визначення і терміни. – К., 1993.
4. Химическая энциклопедия: В 5 т. – М., 1988.