

# **Primary structure of protein as nanowire for metabolic electronic transport (Nanochemistry and Nanobiotechnology)**

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In article [1] we have noted that the protein is a typical double nanostructure – depending on the considered structural level. In this article we considered the secondary structure, where the protein behaves as a nanotube. Now consider the primary structure of the protein, which are nanowires for electronic transport in the metabolism.

A question about possibility of active transport of electron along the band of conductivity of primary structure of protein molecule examined, as one of possible complementary mechanism of the redox process. For the active transport of electron along the band of conductivity of primary structure of protein the presence of some directed electrostatic field even without of the external field is needed. Supposition about the origin of such field in proteins speaks out: it is conditioned by heterogeneity of radical composition of amino acid in it.

Analysis of the average electronic configuration of the protein molecule is made. It was shown that within such analysis in the potential energy of interaction between the electron and nuclear subsystem actually saves two non-compensated contributions. It cannot be compensated even in the considered (zero) approximation. One of these contributions is the interaction of the electron with the nuclei of atoms of oxygen, the other – with the nuclei of hydrogen atoms. Both are indeed related to the radicals. For effective potential energy of an electron in a protein was got.

Shown, that even in the absence of an external field the effective field is not equal to zero. This is provides the active transport of electrons along the primary structure of protein molecules. As well, the external fields can do local regulative influence on the transport of electron in proteins by compensating remaining addends, or its strengthening. Established, in particular, that the external magnetic field may have the influence on the dynamics of electron, that is similar to the influence of an electric field. It may also have regulatory influence on electronic transport through the band of conductivity of the protein molecule.

1. *Suprun A.D., Shmeleva L.V.* Alpha-helical regions of the protein molecule as organic nanotubes // *Nanoscale Research Letters.* - 2014. **9.** - P. 200.