BIOCOORDINATION REACTIONS IN THE SYSTEMS CONTAINING COPPER(II) IONS, PHOSPHOCHOLINE AND PIRIMIDINE NUCLEOTIDES

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Phosphocholine (cholP) is a hydrophilic part of phosphatidylcholine (PC), one of the most abundant phospholipids [1]. PC plays an important role in the absorption and transport of dietary fat [2]. Phosphatidylcholines are a major component of biological membranes. Lecitines are involved in various metabolic processes, are very important components of the brain and nervous tissue, they protect the myelin sheath, form a protective barrier for the walls of the stomach, and participate in cholesterol management. For these reasons, they are studied for structural, mechanical and electrical properties. Their interactions with other bioligands and the formation of complexes – their stability and spatial arrangement – are also extremely important.

The complexation reactions of phosphocholine and pyrimidine nucleotides with copper(II) ions were studied in the water system. Using potentiometric methods and computer calculations, the stability constants of the species were determined. Using spectroscopic methods such as UV–vis, EPR, ^{13}C NMR, ^{31}P NMR, FT–IR and CD, the coordination mode was established for complexes created in the pH range 2.5 – 11.0. These studies will lead to a better understanding of the role of copper(II) ions in living organisms and will explain the interactions between them and the bioligands studied [3].

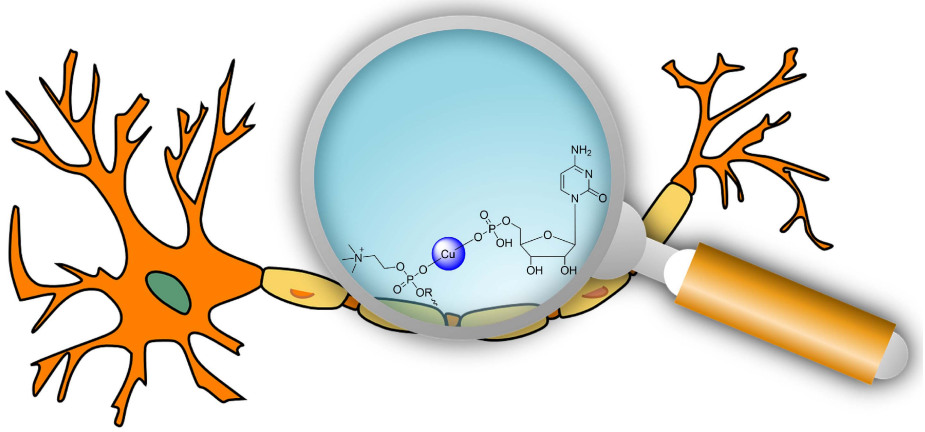

Figure 1. Proposed model of interaction in one of the complex created in the Cu(II)/cholP/CMP system.

[1] Gibellini, F. & Smith, T. K. The Kennedy pathway—De novo synthesis of phosphatidylethanolamine and phosphatidylcholine. IUBMB Life 62, 414–428 (2010).

[2] Kennelly, J. P. et al. Intestinal de novo phosphatidylcholine synthesis is required for dietary lipid absorption and metabolic homeostasis. J. Lipid Res. 59, 1695–1708 (2018).

[3] Gabryel-Skrodzka, M. et al. Biocoordination reactions in copper(II) ions and phosphocholine systems including pyrimidine nucleosides and nucleotides. Sci. Rep. 13, 10787 (2023).