Glutathione and albumin as the main blood components involved in the transformation of nitrosyl iron complexes

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Dinitrosyl non-heme iron complexes (DNICs) are a stable depot of nitrogen monoxide (NO), a signaling molecule involved in the regulation of many physiological processes. In this work, the interaction of their synthetic analogs, a promising cardiotropic and cytostatic compounds of the composition $[Fe(SC(NH_2)_2)_2(NO)_2]_2[Fe_2(S_2O_3)_2(NO)_4]$ and $[Fe(SC(NHCH_3)_2)_2(NO)_2]BF_4$ [1,2], with reduced glutathione (GSH) and bovine serum albumin (BSA) in aqueous solutions was studied by experimental and theoretical methods.

It was found that the studied complexes react with GSH to form a new binuclear DNIC with two GS^-- ligands. The resulting complex is a more prolonged NO donor than the initial ones. It was shown that the products of aerobic decomposition of complexes ($[Fe(NO)_2]^+$ and $[Fe(NO)(NO)_2]^+$ fragments) can bind in the hydrophobic pocket of the BSA. As a result of these interaction, high molecular weight DNICs are formed with Cys34 and His39 as a ligands. According to EPR- and UV-spectroscopy data, the interaction of complexes with the protein leads to their significant stabilization. In addition to coordination binding, studied complexes can be adsorbed on the protein surface due to weak intermolecular interactions, resulting in prolonged generation of NO.

We believe that the resulting compounds formed in the model systems are the pharmacologically active forms of complexes in the body.

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