FLUORESCENT PROBES FOR DETERMINATION OF PRO/ANTIOXIDANT PROPERTIES OF AMINO ACIDS IN THE PRESENCE OF Cu (II) IONS

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Reactive oxygen species (ROS: $HO^{\cdot}$, $O_2^{\cdot-}$, H_2O_2, HClO) formation in the body occurs via several mechanisms, involving both endogenous and environmental factors. ROS can induce damage to proteins, lipids, DNA and, as a result, the development various diseases. Especially, the $HO^{\cdot}$ radicals play an important role in many disease states due to a higher oxidation potential. One of the ways of $HO^{\cdot}$ formation in the body is the decomposition of H_2O_2, catalyzed by transition metal ions (Fe^{2+}, Cu^{2+}, etc.). The formation of ROS in biosystems is controlled by various endogenous and exogenous compounds - antioxidants, acting through various mechanisms. Due to the high reactivity of $HO^{\cdot}$, it is important to assess the potential of compounds to accept these particles and, thus, reduce the likelihood of free radical damage to cell components. Fluorescent probes can detect short-lived active particles.

The ability of some *amino acids* to acceptance or mediate the formation of $HO^{\cdot}$ by means of a molecular probe, terephthalic acid (TFA), generating with $HO^{\cdot}$ a fluorescent product (2-HO-TFA), has been studied. The antiradical properties of compounds (i.e., the ability to accept $HO^{\cdot}$) were evaluated by their effect on the kinetics of TFA hydroxylation and the IC_{50} index. To determine the relative reaction rate constant ($k_{S,HO^{\cdot}}$) of the test compound (S) with $HO^{\cdot}$, the method of competing reactions was used.

It has been established that cysteine (Cys) and N-acetylcysteine (ACC) in combination with Cu^{2+} ions or vitamin B_{12} (cyanocobalamin) induce the formation of $HO^{\cdot}$. It has been shown that under the conditions of Cu^{2+}/H_2O_2(0.05/5; 0.1/1 mM)-mediated generation of $HO^{\cdot}$ in a series of sulfur-containing amino acids at the concentrations range of (0.005-10 mM) methionine and methionine sulfoxide are unambiguously effective $HO^{\cdot}$-scavengers. Taurine has a low anti-radical activity. Cys and ACC at low concentrations (0.005-0.1 mM) exhibit pro-oxidant properties, promoting an increase in $HO^{\cdot}$ amount, at high concentrations become effective antioxidants. Under these conditions, glycine (Gly), α-alanine (Ala) and β-alanine at low doses (0.005–0.1 mM) do not show any antiradical activity. However, in the concentration range of (0.15–2.5 mM), Gly and α-Ala are better $HO^{\cdot}$-scavengers than β-Ala. These results are useful for understanding the pro-oxidant and cytotoxic properties of the studied biologically active compounds.