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EVALUATION OF ANTIOXIDANT ACTIVITY OF LONG-CHAIN ESTER-FUNCTIONALIZED IMIDAZOLIUM SALTS

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It is known that free radicals take part in most biochemical reactions of the body, especially in oxidation processes. The earliest and non-specific violations of the body's protective and adaptive reactions under the influence of negative industrial and environmental factors are accompanied by an increase in the amount of reactive oxygen species (ROS) and, accordingly, intensification of free radical oxidation (ROP) processes [1]. Conformational changes of lipids lead to a violation of the structural and functional properties of biomembranes, an increase in their lability and permeability, an imbalance of membrane enzyme systems, and a violation of the electron transport chains of mitochondria [2].

With changes in the protein-lipid composition of the membrane, there are fluctuations in the activity of Na+, K+-ATP-ase, under the influence of the products of lipid peroxidation (POL), the activity of Ca2+-ATP-ase also undergoes changes [3].

In addition, ROP products damage proteins, thiol compounds, and nucleotide phosphates, change the degree of glycolysis of proteins, and damage nuclear DNA with the formation of its single-strand breaks [4, 5].

Today, POL is considered one of the main causes of cell damage and death due to the action of ROS [6]. It is known that protection of the cell from the damaging effect of ROS in the body is carried out by several antioxidant enzymes (superoxide dismutase, catalase and peroxiredoxins), as well as low molecular weight antioxidants localized in the hydrophobic membrane (tocopherol) and hydrophilic intracellular and extracellular environment (thiol compounds, selenium derivatives, ascorbic acid, glutathione, uric acid) [7, 8]. The systemic work of antioxidants normalizes the redox balance, POL processes and stabilizes the state of cell membranes. In recent years, antioxidants, both natural and synthetic, are increasingly used in clinical practice as effective blockers of uncontrolled oxidation processes, and in a wide range of medical science and practice - from surgery to psychiatry. The possibilities of using certain antioxidants as antimicrobial agents are widely considered in the available literature [9-10]. A combination of antioxidant and positive biological properties with important key indicators of a highly effective, including, pharmaceutical drug.

It should be noted that there is little data in the literature regarding the antioxidant activity of common disinfectants based on long-chain quaternary ammonium compounds. In this study, six long-chain imidazolium salts, comprising polar ester groups in the alkyl radical, have been synthesized. The pro-/antioxidant activity of imidazolium salts was assessed *in vitro* by the amount of inhibition of the rate of ascorbate-dependent free radical lipid peroxidation and there was represented as the concentration of one of the final products of free radical processes oxidation of lipids - malondialdehyde (MDA). The content of MDA was determined by the reaction with thiobarbituric acid (TBA) [11].

Ester-functionalized imidazolium salts were synthesized according to following scheme.

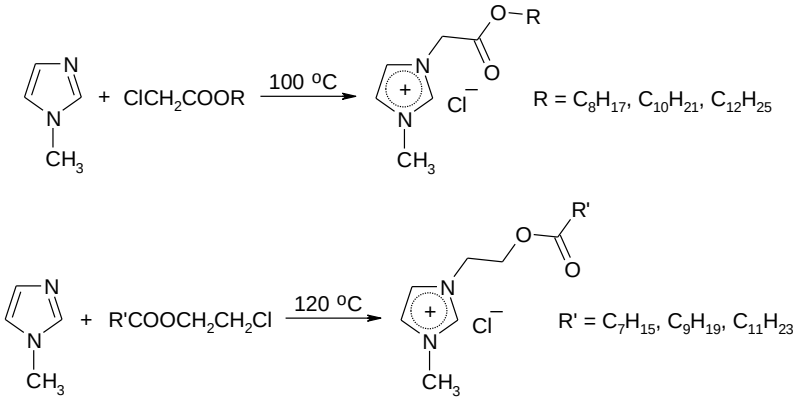

Table 1 presents the value of the antioxidant activity of the synthesized compounds.

Table 1

Antioxidant activity of ester-functionalized long-chain imidazolium salts

N	Compound	AOA, %
1	1-dodecyloxycarbonylmethyl-3-methylimidazolium chloride	27.3 ± 0.6
2	1-decyloxycarbonylmethyl-3-methylimidazolium chloride	17.5± 0.6
3	1-octyloxycarbonylmethyl-3-methylimidazolium chloride	6.2 ± 0,2
4	1-undecylcarbonyloxyethyl-3-methylimidazolium chloride	22.7 ± 0.5
5	1-nonylcarbonyloxyethyl-3-methylimidazolium chloride	15.5 ± 0.5
6	1-heptylcarbonyloxyethyl-3-methylimidazolium chloride	4.4 ± 0.3

The obtained results indicate that compounds **1** and **4** have the highest antioxidant potential, compounds **2** and **5** are less active, and compounds **3** and **6** have no antioxidant activity. Thus, the length of the alkyl radical is an important factor affecting the antioxidant activity of imidazolium salts. The high antioxidant activity of compounds **1** and **4** is probably due to their high surface activity. However, the mechanism of inhibition of free radicals by such compounds requires further detailed study.

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