

COMPARATIVE ANALYSIS OF FULLERENES C₆₀₋₈₀ IN ULTRA-LOW DOSES ON THE LEVEL OF FATTY ACID MEMBRANE PHOSPHOLIPIDS AND INTERCELLULAR SUBSTANCES AND CYTOPLASM HEART AND LIVER OF RATS WITH EXPERIMENTAL MYOCARDITIS

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Active development of nanopharmacology and nanotoxicology offers tremendous prospects for the use of nanopreparations in medicine. However, the impact of nanopreparations on membrane and sub-membrane's compartments until recently been studied enough. And absolutely did not investigated their influence into the ultralow doses (ULD; $4,6 \cdot 10^{-13}$ - $4,6 \cdot 10^{-16}$ M). However, by analogy with the effect of pharmacological agents and other xenobiotics in the ULD, we can assume that nanopreparations must also have activity in the ULD. To confirm this hypothesis, we selected the same experimental conditions the same study subjects, as in the pre-study of the effect of preparations in ULD.

Aim: To compare the effects of fullerenes C₆₀₋₈₀ (F) into ultralow doses: $4.6 \cdot 10^{-13}$ M (ULD-1) and $4.6 \cdot 10^{-16}$ M (ULD-2) on the levels of fatty acid (FA) membrane's phospholipids of cardiomyocytes and hepatocytes and the level of the FA in the intercellular substance and cytoplasm (ICS) in the experimental myocarditis.

Materials and methods:For the study were taken inbred rats - males, weighing 250-300 grams. Experimental myocarditis is modeled using the cytokine storm. Extraction of the phospholipids from membranes made with Folchs reagent. Qualitative and quantitative analysis of fatty acids (FA) was investigated on a gas chromatograph "Agilent 6080" with an external source standards. Statistical analysis was performed using the program «STATISTICA 6.1.».

Results and discussion: The main result of the study was to confirmation the hypothesis that the fullerenes C₆₀₋₈₀ in midget doses affect the change in the level of fatty acid phospholipid membranes as the cardiomyocytes, so hepatocytes. In this case influence not only dose-dependent, but and a organospecific. The same conclusion can be say in analysis of the impact of F in the ULD-1,2 on ICS the same tissue.

When comparing the actions of F in ULD -1 FA phospholipid of membranes of cardiomyocytes in ICS, increased content Myristoleic, Palmitoleic, Linolenic, cis-Vaccenic, Arachidonic, Erucate and Eicosanoic acids. The highest content was observed for Arachidonic and Eicosanoic acids (25% and 14%, respectively). There was also a decrease in the concentration of the FA in relation to their level in the ICS for Linoleic, Petroselinic, Elaidic, Linoleic and Nervonic acids. Furthermore, the content of Linoleic and Linolenic acids were in trace concentrations. Also the content of Docosahexaenoic acid was equal to the membrane phospholipids and ICS.

Comparative study of the effect of F in ULD-2 of FA of the phospholipid membranes and CIS cardiomyocytes showed that the concentration in the phospholipids Myristoleic, Palmitoleic, Linolenic, Linoleic, cis-Vaccenic, Arachidonic, Eicosanoic and Docosahexaenoic acid was increased. The highest concentration had registered at the Myristoleic and Eicosanoic acid (19.2% and 13.94%, respectively). At the same time, the level of Linoleic, Petroselinic, Elaidic, Oleic, Erucate and Nervonic acids was lower in membranes than in the ICS. Also, concentration Linoleic, Petroselinic, Oleic and Nervonic acids were significantly lower in membranes than in the ICS. The level of cis-Vaccenic acid was in trace concentrations. When comparing the action of F in ULD-1 and ULD-2, the picture of the impact, practically, matches in the vector of action. The exception is Linoleic acid which appeared in the membranes, and ICS was also in trace concentrations. Docosahexaenoic in ULD-1 was equal to the concentration in the membranes and in ICS, and ULD-2 was decreased in ICS, in relation to the membranes. Erucate in ULD-2 was increased and, in ULD-1 decreased.

Finally, was investigated liver, Results showed that the effect of F in the ULD-1 actively change FA synthesis in the membranes and in the ICS. Comparative analysis of FA levels in phospholipids of the membranes

and ICS showed that the concentration of Myristoleic, Palmitoleic, Petroselinic, Linolenic, cis-Vaccenic, Eicosenoate, Erucate and Docosahexaenoic acid above in hepatocyte's membrane phospholipids than in ICS. However, the impact of F in the ULD-1 lowers Linoleadic, Elaidic, Oleic, Arachidonic, Eicosanoic and Nervonic acids. Attention is drawn to substantial a significant decrease Linoleadic acids in membranes relative to the ICS (0,55% versus 4,99%). Effect of F in the ULD-2 has been effective in the ICS, than in membranes. Thus, the level Linoleadic, Petroselinic, Oleic, Arachidonic, Eicosanoic, Docosahexaenoic and Nervonic acids was higher than that in the membranes. Only Myristoleic, Palmitoleic, Elaidic, Linolenic, cis Vaccenic and Erucate acids were lower in ICS, than in membranes.

Thus, fullerenes C_{60-80} in ultra - low doses effectively influence the synthesis of fatty acids in the organs of rats with experimental infarction.