Nanochemistry and biotechnology

Effect of local anesthetics on cells hydration at drug-receptor reactions

E.N. Soloshenko[1], A. K. Kondakova[1], N.V. Khmil[2], V.G. Kolesnikov[2], Z. M. Shevchenko[1], T .P. Yarmak[1]

[1] *Department of biochemical, Institute of Dermatology and Venerology, Med. Sci. Acad. of Ukraine. Chernyshevskiy Str. 7/9, Kharkov-61057, Ukraine.*

[2] *Department of biophysics, A.Ya. Usikov Institute for Radiophysics and Electronics, Nat. Acad. of Sci. of Ukraine. Proskura St., 12, Kharkov-61085, Ukraine. E-mail: dreval@ire.kharkov.ua*

One of the main purposes of advanced biotechnology is designing and application of medical drugs and also diagnostics methods of new generation in clinic. Modern medical and biologic researches have been shown that various pharmacological preparations, including local anesthetics, have a number of limitations in the using because of serious allergic reactions.

Presently, the mechanism action of local anesthetics as articaine, ubistesin and septonest which are tertiary amines and that under physiologic conditions exist in a mixture of protonated and neutral forms are intensively investigated. The charged forms appear to be more potent than the neutral forms once they gain access to the local anesthetic binding site on the cytoplasmic "side" of the conducting pore of the Na channel [1]. It is assumed that activation of transmembrane TRPV1 channels assists permeation of compounds similar to tertiary amines (for example QX-314) to the cytoplasmic compartment, where they potently blocks Na channel [2]. Red blood cells like lymphocytes are informative objects at development of human organisms' sensitization. It is known that hydration of transmembrane TRP channels represents their structurally-dynamic properties resulting in redistribution between quantity of the bound and free water. By means of EHF-dielectrometry method it is shown that stimulation of red blood cells by articaine, ubistesin and septonest has been differently reflected in change of a real part of permittivity (). Findings by method EHF-dielectrometry and also erythrocyte sedimentation rate were good correlated (r 0,92) that allows to recommend this radio physical method for diagnostics of early revealing of a sensitization to medicinal allergens.

1. *Butterworth J., Gerry S.* Local anesthetics: a new hydrophylic pathway for the drug-receptor reaction// Anesthesiology.-2009.-**111,** N 1.-P. 12-14.

2. *Binshtok A.M, Bean B.P, Woolf C.J.* Inhibition of nociceptors by TRPV-1-mediated entry of impermeant sodium channel blockers // Nature.-2007.-**449**.-P. 607–610.