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Effect of local anesthetics on channel-forming activity of Gramicidin A

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One of the mechanisms of action of antibacterial agents such as Gramicidin A (GrA) is the forming of ion-permeable transmembrane pores in the specific membrane of microbial cells. GrA produced by *Bacillus brevis* forms ion channels in phospholipid bilayer membranes and is active against Gram-positive organisms such as *Escherichia coli* and *Staphylococcus aureus*. GrA is commonly used as a model to study ion channel proteins. The permeability of ion channels is regulated by many factors and one of them is the membrane boundary potential consisted of the dipole and the surface components. Some pharmacological agents interacting with the cell membrane are able to change the boundary potential. Among them are Local Anesthetics (LAs). By using a fluorescence assay and planar lipid bilayer technique to measure ion transport across liposomal membranes in the presence of LAs we showed that LAs such as Lidocaine, Prilocaine, Mepivacaine and Bupivacaine increased the membrane surface potential and reduced GrA single channel conductance. At the same time LA procaine had no effect on the boundary potential of the membrane and thus had no effect on GrA-channel conductance. LA tetracaine reduced GrA-channel conductance due to increased dipole potential of the membrane. The results of our studies showed that regulation of GrA channel conductance by LAs occurs due to changes in the electrostatic properties of the membrane. We conclude that comprehension of mechanism of GrA action is important for determination of mechanism of other pore-forming antibiotics.

Biography

Anastasiia Zakharova was graduated from Peter the Great St. Petersburg Polytechnic University in 2014. Presently she is a PhD student at the Institute of Cytology of Russian Academy of Science. She has published two papers in *Journal of Membrane Biology* and *European Biophysical Journal* and has participated in a scientific international conference.

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