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Letter to Editor

Planar Patch Clamp and Techniques of Patch-Clamp Spectroscopy in Antimicrobial Therapy

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Introduction

Planar patch-clamp is an effective screening tool in pharmacology, institutionalized in molecular microbiology over 15 years ago [1]. The creation of planar polymer patch-clamp electrodes and silicon substrates in the 2000s [2,3] and the creation of microfluidic chips and perfusable chambers corresponding to this pharmacological screening technology, although works on the development of microfluidic chips for planar patch-clamp were already being published in the early to mid-2000s, and the first "benchmark study" of a chip for planar patch-clamp dates back to 2003 [4,5]. At the moment, there are automated and robotic schemes for planar patch-clamp, including those available for sale and maintenance [6-8]. In the CIS, this method is not widespread, however, devices such as the "Patchliner" with planar patch-clamp, capable of recording up to 8 cells synchronously, are available [9-11]. Patch-clamp tools can be used in the development of drugs and antimicrobial agents, screening of which can be performed on E. coli, etc. [12-14]. The response of the organism mediated by lysosomes can also be the subject of using this method, as lysosomal ion currents can also be measured in planar patch-clamp systems [PMID: 21139138].

Materials and Methods

In our work in 2017 ("Cellular Therapy and Transplantation"), a DIY planar patch-clamp system created in Russia based on components imported from Germany was tested. In this work, open-access planar patch-clamp recording files are used. Special DSP methods, different from Fourier transformation, are proposed/validated as methods of analysis and diagnosis on neural networks.

Results

It is shown that "patch-clamp spectroscopy" (obtaining spectra of patch-clamp data using DSP methods) with multiple cells is a representative approach applicable in cellular diagnostics. It is also possible to perform an equivalent analysis of reactive cytophysiological functions of lysosomes in antimicrobial therapy (using a chip model of planar patch-clamp) and the functionality of bacterial protoplasts.

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