

Functional studies of a new microbial proteorhodopsin from *Sphingomonas paucimobilis*

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Studies of new proteorhodopsins from various bacteria have shown that they have both similarities and differences in their functional properties compared to the model rhodopsin - BR. In particular, the group of microbial rhodopsins with the DTG motif in the active center, which includes the proteorhodopsin from *Sphingomonas paucimobilis* (SpaR), may be of interest [Malyar N., 2020].

In this work, the dependence of SpaR activity on the concentration of divalent ions and pH of the medium was investigated [Okhrimenko, Ivan S., et al., 2023]. For this, the rhodopsin was embedded in liposomes and photocurrents were recorded through a bilayer lipid membrane. It was found that zinc ions, neutral and alkaline pH inhibit the light-induced proton transfer of SpaR. These data suggest that SpaR and similar proteins may form a subclass of the group of proteorhodopsins with a specific motif, the common distinguishing feature of which is a strong sensitivity of proton transport to pH and zinc ions.

The dependence of the protein SpaR's photocycles on pH was also shown. The elongation of the photocycle occurs due to the formation of the O-state, which leads to a parallel decrease in the proton transport activity of the protein [Okhrimenko, Ivan S., et al., 2023].

Thus, studies of the proteorhodopsin SpaR allow for a better understanding of its mechanisms of action and differences in functional properties. This can help in further improving the process of developing and improving optogenetic tools and their effectiveness.

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