

Semi-rational optimization of VirChR1, a viral channelrhodopsin, via mutagenesis

Monday 24 October 2022 14:45 (15 minutes)

The previously characterized viral channelrhodopsin VirChR1 shows the necessary characteristics of an optogenetic tool. It also shows a unique impermeability for Ca^{2+} ions, presumably helping avoid the impact of calcium influx, which is useful for the neuroscientific applications of optogenetics. VirChR1's ability to drive neural firing is compromised by the low ion conductance. To fix this, it is necessary to improve the protein's capacity to conduct photocurrents, while conserving its Ca^{2+} sensitivity. Here, an approach called semi-rational mutagenesis is used in order to alter the rhodopsin's characteristics in a desired fashion. Specifically, over 20 VirChR1's mutants were electrophysiologically characterized to find the effects of the particular mutations on the function of VirChR1 and enhance its features through mutation combinations.

Primary author: Mr MATVEEV, Grigory (Center for Molecular Mechanisms of Aging and Age-related Diseases, MIPT)

Co-authors: Ms PODOLYAK, Elizaveta (Center for Molecular Mechanisms of Aging and Age-related Diseases, MIPT); Mr TSYBROV, Fedor (Center for Molecular Mechanisms of Aging and Age-related Diseases, MIPT); Mr ALEKSEEV, Alexey (Center for Molecular Mechanisms of Aging and Age-related Diseases, MIPT); Mr KOVALYOV, Kirill (European Molecular Biology Laboratory, Hamburg unit c/o DESY); Mr ZABELSKII, Dmitry (European XFEL, Holzkoppel 4, 22869, Schenefeld)

Presenter: Mr MATVEEV, Grigory (Center for Molecular Mechanisms of Aging and Age-related Diseases, MIPT)

Session Classification: Life Science

Track Classification: Life Science