Sovremennye Tehnologii v Medicine 2016 vol.8 N4, pages 212-221

# Optogenetics: Perspectives in biomedical research

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## Abstract

© 2016, Nizhny Novgorod State Medical Academy. All rights reserved.Optogenetic tools, photochromic switches and genetically encoded biosensors revolutionized contemporary neuroscience research. These approaches provided unprecedented opportunities for monitoring and modulating the function of specific neurons and have literally shed light on the mechanisms of neuronal networks function in the brain. A number of light-sensitive biosensors for non-invasive monitoring of ions and enzymes have been developed. These molecular designs expand extremely rapidly and a number of new approaches for image analysis of various proteins in living cells have being proposed. In this review we discuss new tools for molecular imaging and remote activation of receptors, ionic channels and synaptic networks, as well as its potential for biomedical research.

http://dx.doi.org/10.17691/stm2016.8.4.26

## Keywords

FRET, Förster resonance energy transfer, Genetically encoded sensors, Optogenetic neuromodulation, Optogenetic therapy, Optogenetics, Photosensitive ligands, Rhodopsins