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Microbial Ion Channels for Synthetic Neurobiology

Berichterstattung

Projektinformationen

MIC-SN

ID Finanzhilfevereinbarung: 303564

Projekt abgeschlossen

Startdatum
1 März 2012

Enddatum
29 Februar 2016

Finanziert unter
Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Gesamtkosten
€ 100 000,00

EU-Beitrag
€ 100 000,00

Koordiniert durch
INSTITUTE OF SCIENCE AND TECHNOLOGY AUSTRIA
Austria

Dieses Projekt findet Erwähnung in ...

Final Report Summary - MIC-SN (Microbial Ion Channels for Synthetic Neurobiology)

Background: A major challenge in biology is to understand how cells respond to signals from the environment. Extracellular signalling molecules, e.g. hormones or neurotransmitters, bind to membrane receptors. Ionotropic receptors, also called ligand-gated ion channels (LGIC), form pores through which ions can travel between the extra- and intracellular space. Signalling in excitable cells in the nervous system is driven by LGICs, and aberrant signalling of nerve cells can result in prominent dysfunctions, many of which are linked to ageing. In contrast to LGICs of higher organisms, which have been the subject of extensive investigation in the past decades, large families of microbial LGICs (m-LGICs) are unexplored from a genetic and functional point of view. This limited understanding of m-LGICs has the direct consequence that we are not ready to exploit their wide biotechnological potential as new methods to control biological signals or as targets of new antimicrobial agents.
Summary of project objectives: The objectives of this project are 1. To identify m-LGIC sequences and analyze their diversity; 2. To characterise m-LGIC function using a combination of low-and high-throughput approaches; 3. To control neuronal signalling in a model of epilepsy with m-LGICs.
Main results of this reporting period: As the first main result we discovered leak currents in m-LGICs that are biologically-interesting but render these channels unsuited for experiments in mammalian neurons. As a second main result, we achieved the functional expression of a plant ligand-gated ion channel (p-LGIC; AtGlr1.4 of Arabidopsis thaliana) in mammalian (human) cells, which has all properties originally desired from the m-LGIC and will allow the control of mammalian nerve cells with orthogonal biomolecules.
Broader impact: While this project is motivated by fundamental research, it has additional implications for the identification of antimicrobial agents and for understanding human disorders.
Integration and future perspective: The fellow was able to (i) build a gender-balanced, international and interdisciplinary research group (lab managers, graduate students and post-doctoral fellows), (ii) attract competitive research funding, and (iii) disseminate his work through oral presentations at international conferences and international research institutions. The fellow has also taken part in teaching (graduate and undergraduate level), outreach and dissemination related to integration.

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