BMC Neuroscience

Poster presentation

New pulse shapes for effective neural stimulation

Lorenz Hofmann*, Christian Hauptmann and Peter A Tass

Address: Neuromodulation, Institute for Neuroscience and Medicine, Juelich, Germany

Email: Lorenz Hofmann* - l.hofmann@fz-juelich.de

* Corresponding author

from Eighteenth Annual Computational Neuroscience Meeting: CNS*2009
Berlin, Germany. 18–23 July 2009

Published: 13 July 2009

BMC Neuroscience 2009, **10**(Suppl 1):P318 doi:10.1186/1471-2202-10-S1-P318

This abstract is available from: http://www.biomedcentral.com/1471-2202/10/S1/P318

Electrical stimulation of neural structures is the basis of spinal cord stimulation (for pain therapy) as well as deep brain stimulation (for the therapy of neurological and psychiatric disorders). In deep brain stimulation, an electrical stimulus pulse is applied permanently or in pulse trains via an implanted electrode to selective brain regions. Recent applications tend to excite the neural structures up to a level at which they will eventually fire an action potential. Thus the neuronal activity within a region can be influenced. In order to carry out safe stimulation and prevent tissue or electrode damage, the waveform generally consists of biphasic, charge-balanced pulses. Effective yet gentle stimulation is of prime importance to aid in the prevention of side effects and in conserving the battery life of implants. We have developed new pulse shapes and tested these with different parameters for their effectiveness based on numerical simulations using the Hodgkin-Huxley neuron model. Our results show a predominance of the new pulse shapes over the widely used standard pulse shape while key requirements to the waveform are maintained.