# Modeling electromagnetic fields detectability in a HH-like neuronal system.

Posted At : October 9, 2007 2:09 AM | Posted By : Tim Brunson, PhD
Related Categories: Bioelectric Medicine

Noise has already been shown to play a constructive role in neuronal processing and reliability, according to stochastic resonance (SR). Here another issue is addressed, concerning noise role in the detectability of an exogenous signal, here representing an electromagnetic (EM) field. A Hodgkin-Huxley like neuronal model describing a myelinated nerve fiber is proposed and validated, excited with a suprathreshold stimulation. EM field is introduced as an additive voltage input and its detectability in neuronal response is evaluated in terms of the output signal-to-noise ratio. Noise intensities maximizing spiking activity coherence with the exogenous EM signal are clearly shown, indicating a stochastic resonant behavior, strictly connected to the model frequency sensitivity. In this study SR exhibits a window of occurrence in the values of field frequency and intensity, which is a kind of effect long reported in bioelectromagnetic experimental studies. The spatial distribution of the modeled structure also allows to investigate possible effects on action potentials saltatory propagation, which results to be reliable and robust over the presence of an exogenous EM field and biological noise. The proposed approach can be seen as assessing biophysical bases of medical applications funded on electric and magnetic stimulation where the role of noise as a cooperative factor has recently gained growing attention.

Biol Cybern. 2006 Feb;94(2):118-27. Epub 2005 Dec 21.

Giannì M, Liberti M, Apollonio F, D'Inzeo G.

ICEmB at Department of Electronic Engineering, La Sapienza University of Rome, 00184 Rome, Italy. gianni@die.uniroma1.it

# Found Found

The document haThe document has