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*Alcohol's Effect on Neuron Firing.*

Neurons are responsible for transmitting messages throughout the body via long distance electrical signals known as action potentials. These depend on the active transport of sodium and potassium ions across the neuron cell membrane. The effect of various drugs on the process of neuron firing is a current research interest. The Hodgkin-Huxley equations, a system of four nonlinear ordinary differential equations, mathematically model the influx and efflux of these ions across the cell membrane. In the presence of alcohol, the release of potassium ions is accelerated. We propose a modified version of these equations, which incorporates the effect of alcohol, and examine its implications through mathematical analysis in dynamical systems. We investigate the qualitative behavior and interpret the results of the steady-state solutions in the fast and fast-slow phase planes. (Received September 26, 2006)