Simulation of Nerve Conduction Block Induced by High Frequency Biphasic Electrical Current Based on Schwarz Model

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The purpose of this research is to achieve selective stimulation of nerve fibers consistent with physiological stimulation by blocking the action potentials by biphasic high-frequency stimulation. In this paper nerve conduction block has been simulated and compared by high frequency biphasic square pulses and a new suggested waveform (high frequency exponentially rising pulse) for myelinated axon based on Schwartz equations. In this simulation the diameter of nerve fibers, has been selected (2 and 20 μm) and has used (1-5 mA) current range and the frequency of simulation has considered 3.2 , 3.4 and 3.6 KHz. Both square and exponentially rising waveforms can block large fibers before small fibers but the exponentially rising waveform is able to increase blocking range of large fibers .The major advantage of high frequency blocking is its rapid execution and withdrawal, so is a practical method for clinical uses and also the biphasic stimulation causes less tissue and electrode damage.

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