Abstract

Objective: To determine from computational simulation, the response of an unmielynate axon to a constant current stimulus for different HH style maximum sodium (GNa) and potassium (GK) conductance in the space GNa vs. GK such that 0S/cm² < GNa < 6.4S/cm² and 0S/cm² < GK < 2S/cm² at 40°c. Methodology: The propagation of action potentials along a neuronal structure called neurox was simulated using the software NEURON. Passive properties and HH style sodium and potassium channels whose opening and closing rates were corrected with the thermic coefficient, were inserted in neurox. Results: There is a region of dots in the space GNa vs. GK that are limited by the lines and on which one unique action potential is spread along the neurox at 40°C. Conclusion: HH style sodium and potassium conductance can exist in neurons that work at 40ºC, with diverse possibilities of combinations of GNa and GK that overcome the restrictions imposed by increment of speed in the opening and closing of the corresponding channels. This work established a methodological reference for exploring other areas of combinations of conductances.

Keywords

HH style sodium and potassium conductance, temperature, simulation, propagation, action potential.