Effects of TEA and 4-AP on Firing Frequency of Proprioceptive Neurons in Crustaceans

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Abstracts will be considered for both poster and platform presentations

Neurophysiology

Ion channel pathologies can lead to severe neurological problems because these channels are required for normal electrical function and conduction. In neuronal conduction, repolarization of the membrane to resting state is typically dependent on potassium channels. Examining proprioceptive neurons in model animals while blocking K channels which are 4-AP and/or TEA sensitive can help reveal the contribution of these channel types in whole organ function within a range of physiological functions. Both 4-AP and TEA block potassium channels, though different potassium channels may show differing sensitivity to these drugs. The actions of 4-AP and TEA independently, as well as combined, were explored in both the blue crab propodite-dactylopodite (PD) chordotonal organ the Crayfish muscle receptor organ (MRO). The PD organ monitors joint position in relation to rate of movement and static position. The MRO is analogous to the muscle spindle in humans. Varying concentrations were used on both preparations. Extracellular recordings were collected and analyzed for changes in firing pattern observed with the application of these drugs. Based on previous research, an alteration in activity in an intact sensory unit is expected to occur with the application of these drugs; the extent to which this occurs was investigated. It is expected if sensory neurons are not able to repolarize rapidly the rate of firing will be compromised. Blockage of K channels may lead to cells remaining depolarized, potentially leading to voltage gated Na channels staying inactivated, completely silencing neuronal activity.