

Living organisms are subject to daily fluctuations in temperature. Given that these changes are often unregulated, understanding their effect on neuronal performance is significant in understanding many functions of said organisms. In this study, the focus is on the influence of temperature on the transition between a tonic firing regime (steady spiking at a fixed firing rate) and a bursting one (sequences of spikes followed by a period of quiescence). This particular transition is of great interest, because it is associated with several functional and pathological neuronal conditions, including the sleep-wake transitions and neurodegenerative diseases such as Parkinson's disease and Alzheimer's disease. To obtain data regarding this relationship, computer simulations were conducted using the Huber-Braun model equations which allowed for mimicking of various dynamical states with features similar to those observed in real neurons. The results show a positive relationship between temperature and the firing rate of action potentials, and between temperature and the parameter space area in which the neuron behaves in a bursting state, indicating that temperature is a possible mechanism that alters both the firing rate of neurons and the tonic-to-bursting transition.