Review of: "Depolarization block of interneurons"

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Potential competing interests: No potential competing interests to declare.

Summary:

In the present manuscript, authors study a Hodgkin-Huxley neuron model of a CA1 interneuron where they study depolarization block. This is a phenomenon where the system stops spiking when it receives very strong excitation. The authors study the system by approaching it with a dynamical systems analysis and computational resolve the system for different values of input current, synaptic conductance, and type of synapse (deterministic or randomly distributed). The rationale is that this type of study is important for uncontrolled activity found in the brain such as epilepsy.

Even though I feel that the presentation of the results could be improved, I do think their work is important.

Having said that, I have specific comments below which I believe should be addressed by the authors in order to improve the quality of the work.

Specific comments:

One specific comment I have is that the authors should attempt to describe in more details the ionic sources of their observations. As they clearly mention that their neuron is a resonator, perhaps they could study the same scenarios when particular deletion of sodium and/or potassium currents is done. It's known that some currents act as low-pass filters (leaky currents) and others could be classified and amplifying or resonant currents. The Izhikevich book the authors cite describes this in more details. Connecting the depolarization block to a specific current(s) could be more appealing in particular for pharmacological interactions.

Introduction, first paragraph: Please note that hippocampal theta rhythm can be caused by other factors such as the medial septum or even certain combinations of ionic currents. In addition, the mechanism described here for the gamma is known as PING: pyramidal interneuron gamma. It would be interesting to add references for these mechanisms.

From Figure 2 and 3, plotting a curve where peak value is seen vs. the Iext value would be informative, in particular for very high values of Iext.

Minor:

Page 3: Hodgkin-Huxeley: Hodgkin-**Huxley**.

Table 3 is not in English.

Results, first paragram: … and the solutions tends: the solution**tend**

Page 7, last paragraph: In this figures: In**these** figures