FENS Forum 2008

For posters, morning sessions: 9:30-13:30; afternoon sessions 13:30-17:30.
Authors are expected to be in attendance at their posters at the time indicated.
For other sessions, time indicates the beginning and end of the sessions.

First author Khazen, Georges (poster)

Poster board D52 - Tue 15/07/2008, 11:30 - Hall 1
Session 154 - Tactile-somatosensory 2
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Title Recreating the ion channel diversity underlying morpho-electrical subtypes of neocortical neurons.

Text

Understanding the molecular basis of electrical behavior in different neurons is a fundamental goal in neuroscience. Experimental observations suggest different sets of ion channels could underlie the same morpho-electrical subtypes. Recreating this molecular diversity for different morpho-electrical classes is a primary objective in the Blue Brain Project where faithful representation of the biological diversity is important. A calibration framework is used to refine the modeling of these diverse morpho-electrical classes. A crucial step in the calibration is the incorporation of observed genetic constraints to provide the biological, as opposed to theoretical solutions to electrical diversity.

Here, we present a probabilistic model that estimates the likelihood of a given gene to be expressed in different morpho-electrical subtypes. As a starting step, we limit our analysis to a set of 26 genes coding for specific voltage-gated ion channels that underlie the electrical properties of neurons. Based on RT-PCR measurements of 203 cells, the model follows a bottom-up approach by first computing a probabilistic expression profile for each morphological and electrical class and for each layer in the neocortex. It then calculates the joint probability of expression for all morpho-electrical classes in each layer as well as the probability that specific combinations of genes are simultaneously expressed. This model generates different profiles of ion channels underlying different morpho-electrical subtypes in different neocortical layers, which are consistent with the experiments and can therefore be used to recreate the observed molecular diversity underlying each morpho-electrical subtype of neurons in the neocortex.

Theme D - Sensory and motor systems
Tactile/somatosensory - Brain stem, thalamus, cortex