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

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