Institut NeuroMyoGène

INMG seminar

Thursday May 19th 2016 11:00

Salle Guillermond – Bâtiment l'Herbier

9 rue Raphael DUBOIS

Biophysical networks underlying electrical phenotype of dopaminergic neurons

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Neurobiologie des canaux Ioniques et de la Synapse

Any type of neurons can be easily identified based on its electrophysiological activity, such as its pattern of spontaneous activity, the shape of its action potential, its dendritic integration, etc. How is stability of such electrical phenotype achieved, what are its molecular principles, and what is the degree of robustness of electrical phenotype in the face of different perturbations are questions only very partially answered. We studied these questions on dopaminergic neurons of the substantia nigra pars compacta. Our work involved characterizing the electrical phenotype of these neurons and measuring its post-natal development and its stability at mature stages. We also characterized the specific relationships of electrophysiological parameters underlying the electrical phenotype. In order to determine how complex electrical phenotype is achieved, we then investigated the networks of co-regulation of ion channels at the genetic and at the protein levels. Our results suggest that ion channel gene expression and protein interactions display a modular structure that may be involved in stabilizing phenotype. We also show that electrical phenotype also presents such a modular structure. Our ultimate goal is to provide a systems-level approach to robustness of electrical phenotype.

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Dr. Jean-Marc Goaillard

http://www.unis-neuro.com/26-membre-goaillard-jean-marc.html

SELECTED PUBLICATIONS

Dufour MA, Woodhouse A, Amendola J and **Goaillard JM** (**2014**). Non-linear developmental trajectory of electrical phenotype in rat substantia nigra pars compacta dopaminergic neurons. **eLife**, 20th Oct 2014.

Amendola J, Woodhouse A, Martin-Eauclaire MF and **Goaillard JM** (**2012**). Ca^{2+}/cAMP-sensitive co-variation of I_A and I_H voltage dependences tunes rebound firing in dopaminergic neurons. **Journal of Neuroscience** 32:2166-2181.

Goaillard JM, Taylor AL, Schulz DJ and Marder E (**2009**). Functional consequences of animal-to-animal variation in circuit parameters. **Nature Neuroscience** 12:1424-30.

Taylor AL, **Goaillard JM**, Marder E (**2009**). How multiple conductances determine electrophysiological properties in a multicompartment model. **Journal of Neuroscience** 29:5573-86.