NICO
Neuroscience Institute Cavalieri Ottolenghi

UNIVERSITÀ DEGLI STUDI DI TORINO

FONDAZIONE CAVALIERI OTTOLENGHI

NICO Seminars 2018

Thursday, 22nd March – h. 14:30

Seminars Room, NICO

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Molecular mechanisms of neural circuit development

The midbrain dopamine system is involved in the control of cognitive and motor behavior. Midbrain dopamine neurons (mDA) are grossly divided into two anatomically and functionally distinct subpopulations: substantia nigra pars compacta (SNc) and ventral tegmental area (VTA) neurons. SNc neurons make precise connections with dorsal striatum (nigrostriatal projections), while VTA neurons target ventral striatum and cortex (mesocorticolimbic projections). Both pathways collectively run in the medial forebrain bundle (MFB) towards the forebrain. However, how mDA neurons establish their complex connections remains poorly understood. Therefore, we use the mDA system to examine how axons find their way during development, how neurons migrate and how ultimately synaptic connections are established.

In this lecture, I'll cover two topics. First, novel axon-dependent mechanisms for mDA axon pathfinding that rely on specific cell adhesion molecules, and 2) recently developed mouse genetics tools to distinguish between different subsets of dopaminergic projections in vivo (called Pitx3-ITC mice).

The subtractive genetic strategy we have developed relies on the expression of different fluorescent proteins in different subsets of mDA neurons in a single mouse. Pitx3-ITC mice display labeling of SNc neurons and selective visualization of nigrostriatal projections in the MFB and in striatum, from early embryonic development onwards. Combination of Pitx3-ITC mice with 3D-imaging of solvent cleared organs (3DISCO) technology and light sheet imaging allows for 3D analysis of neuronal migration and axonal/dendritic development of SNc neurons.

Host: **Silvia De Marchis**