



**Istituto Nazionale di Neuroscienze**

Consorzio Interuniversitario di Neuroscienze



UNIVERSITÀ  
DEGLI STUDI  
DI TORINO



Dipartimento di Neuroscienze  
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**NICO**  
Neuroscience Institute Cavalieri Ottolenghi

# INN Open Neuroscience Forum

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Seminar Room – Neuroscience Institute Cavalieri Ottolenghi  
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## CORTICAL LAYER II IMMATURE NEURONS ARE HETEROGENEOUS IN MAMMALS

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### **Abstract**

The doublecortin-positive (DCX+) pre-natally generated neurons discovered in the layer II of the rodent piriform cortex are considered a reservoir of “immature” neurons in the adult brain. In some non-rodent species they extend into neocortex and in sheep also into subcortical regions. Hence, immature neurons might be more important in large-brained, long-living mammals. We assessed the occurrence, distribution and amount (linear density - cells/mm of layer II) of type 1 (small-bipolar) and type 2 (large-ramified) DCX+ cortical neurons at 4 comparable brain levels in 13 mammalian species endowed with different brain anatomy, lifespan, ecological niche. Sections were immunostained for cell proliferation (Ki-67, BrdU) and immaturity/maturity markers (PSA-NCAM, NeuN). All non-rodent species considered hosted DCX+ neurons in neocortex, with highly heterogeneous linear densities. By contrast, morphological and phenotypic features were rather constant: type 2 cells represented 10-20% of the total, mostly expressing NeuN, whereas 15-30% of DCX+ cells were also PSA-NCAM+. BrdU and Ki-67 antigen detection confirmed that all DCX+ neurons were non-newly generated/not proliferating. These results show that “immature” cortical neurons do represent a well preserved, yet, highly heterogeneous feature in mammals, especially considering rodent and non-rodent species.