

GDCB Promising Scientist Seminar Series

Dr. Carmen Falcone

Friday, September 24, 4pm

Evolution and development of a special type of astrocytes in mammals: Interlaminar Astrocytes



Dr Falcone's seminar abstract:

Interlaminar astrocytes (ILAs) are an astrocyte subtype in the cerebral cortex that have a soma in layer I and long interlaminar processes that course perpendicular to the pia into deeper cortical layers. We performed a comparative study of ILAs in 46 species encompassing most orders of mammals. We found that ILAs are present in all mammals and not only in primates as previously described, but that primates have the highest number of ILAs and the most morphologically complex ILAs. We distinguished 2 types of ILAs: rudimentary pial ILAs, that have short GFAP+ processes constrained to layer I, and typical pial ILAs that have long GFAP+ processes that exit layer I and extend into deeper cortical layers. ILAs have been described in postnatal animals, but exactly when they appear during development had not been determined. We studied ILA developmental origin and differentiation of ILAs in the prenatal and postnatal cortex by analyzing GFAP+ and S100b+ ILAs in mouse, rhesus macaque, chimpanzee, and human. We found that ILAs are present in the prenatal brain, and increase in number and morphological complexity throughout development. We compared the expression of specific markers in ILAs across development in mouse and macaque and found some similarities in protein expression by mouse rudimentary ILAs and macaque typical ILAs, but noted key differences that may indicate distinct functions across species. We hypothesize that ILAs are generated by radial glial (RG) cells in the prenatal brain, via direct or indirect steps. These data provide new information on ILA astrogenesis and function in the developing cerebral cortex.

Dr. Carmen Falcone earned her B.S. in General and applied biology from The University of Naples Federico II in Naples, Italy, a Master's in Neuroscience from University of Trieste, Italy and a Ph.D. in Functional and Structural Genomics from International School of Advanced Studies at Trieste, Italy. In 2018, she started her postdoc at UC Davis in the laboratory of Prof. Martinez-Cerdeno, in the field of Evolutionary Developmental Neuroscience. After 4 years of post doctoral work, she received a grant to open her own lab in Italy in 2022. She has been a staunch advocate for international scholars and carried out a lot of outreach. Dr. Falcone founded and organized BioRoom, a virtual seminar during the COVID-19 pandemic. She is also the founder and administrator of 'International Scholars in the US', a slack group with a community of 1,000 international scholars.

Recent publications:

1. Falcone C., McBride E. L., Hof P. R., Hopkins W. D., Manger P., Sherwood C. C., Noctor S. C., MartínezCerdeño V. "Redefining varicose-projection astrocytes in primates", accepted at *Glia*
2. Falcone C.*, Mevises N. Y.*, Hong T., Dufour B., Chen X., Noctor S. C., Martínez-Cerdeño V. (* Equally contributing authors) "Neuronal and glial cell number is altered in a cortical layer-specific manner in autism", accepted at *Autism*, 2021 April

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