INSTITUTO CAJAL

SEMINARIO PRESENCIAL

Viernes, 19 de Abril de 2024
12:30 h. Instituto Cajal - CSIC

Dra. SARA BIZZOTO

INSERM/Paris Brain Institute (ICM)

BRAIN MOSAICISM: A JOURNEY ON A CELL'S LIFE

Abstract

Each one of our cells has a unique genome that results from the accumulation of somatic DNA changes starting from the zygote and during the entire life, until death. Somatic single nucleotide variants (sSNVs) virtually label each cell division thus, providing a mosaic of natural markers of cell lineages. Post-mitotic cells also accumulate somatic mutations but the rates, genomic locations and mechanisms of somatic mutation vary depending on the tissue and cell type. During my talk, I will show how sSNVs identified in post-mortem human tissue and subsequently in single-cell genomes, can be exploited to retrospectively study cell phylogenies, and dissect lineage behaviour at landmark steps of human development. Furthermore, I will show that human neurons and oligodendrocytes, despite sharing the same tissue environment for years or decades, accumulate somatic mutations in different ways, which has important implications for disease predisposition.

Affiliation and short bio

Sara Bizzotto is a principal investigator at INSERM/Paris Brain Institute (ICM).
Sara obtained a PhD in Genetics and Neurodevelopment from Sorbonne University in 2016 in the lab of Fiona Francis at Institut du Fer à Moulin. Her PhD work contributed to showing that mutations in the *EML1* gene cause a rare and severe cortical malformation, and the role of the gene in neural progenitors during cortical development.
After her PhD, Sara joined the lab of Christopher A. Walsh at Harvard Medical School, where she studied somatic mosaicism in the human brain. Her postdoctoral work showed that somatic mutations can be used as reliable natural markers of cell lineages in humans. She also studied cell type-specific patterns and mechanisms of somatic mutation in the aging human brain.
In 2021, Sara obtained an MSCA reintegration fellowship to join the lab of Stéphanie Baulac at ICM, and continue her work on somatic mosaicism focusing on the role of somatic mutations in epileptic developmental brain disorders.
In 2023, Sara obtained a permanent position at Inserm. She was also awarded the FENS-EJN Young Investigator Prize, and obtained an ERC Starting Grant to study how cell lineages shape the human central nervous system.

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Instituto Cajal. CSIC
Avda. Doctor Arce, 37. 28002. Madrid. Tel. 91 585 4750
www.cajal.csic.es

Related publications with the topic

Bizzotto S*, Dou Y*, Ganz J*, Doan RN, Kwon M, Bohrson CL, Kim SN, Bae T, Abyzov A, Brain Somatic Mosaicism Network, Park PJ, Walsh CA. Landmarks of human embryonic development inscribed in somatic mutations. Science (2021) Mar 19;371(6535):1249-1253. DOI: 10.1126/science.abe1544

Ganz J*, Luquette LJ*, Bizzotto S*, Miller MB, Zhou Z, Bohrson CL, Jin H, Tran AV, Viswanadham VV, McDonough G, Brown K, Chahine Y, Chhouk B, Galor A, Park PJ#, Walsh CA#. Contrasting somatic mutation patterns in aging human neurons and oligodendrocytes. Cell (2024). https://doi.org/10.1016/j.cell.2024.02.025

Bizzotto S and Walsh CA. Genetic mosaicism in the human brain: from lineage tracing to neuropsychiatric disorders. Nat Rev Neurosci 23, pages 275–286 (2022). https://doi.org/10.1038/s41583-022-00572-x

Bizzotto S. The human brain through the lens of somatic mosaicism. Frontiers in Neurosci 17 (2023). https://doi.org/10.3389/fnins.2023.1172469

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