



SEMINARIO PRESENCIAL

Miércoles, 12 de Abril de 2023
12:30 h. Instituto Cajal (CSIC) Madrid

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The Differential Effects of Neuronal Hyperexcitation on the Hippocampal Neurogenic Niche: Reactive Neural Stem Cells and Aberrant Neurogenesis

Abstract

Postnatal and adult neurogenesis takes place in the dentate gyrus of the hippocampus in the vast majority of mammals due to the persistence of a population of neural stem cells (NSCs) that also generate astrocytes and more NSCs. NSCs and newborn neurons are highly plastic and undergo continuous modifications in response to the changes brain homeostasis. The properties of NSCs as well as the process of neurogenesis and gliogenesis, are specially reshaped by changes in neuronal activity. In response to different levels of neuronal hyperexcitation (NHE) NSCs can generate more neurons or abandon neurogenesis altogether to become pro-neuroinflammatory reactive NSCs. Newborn neurons that are generated in excess and differentiate under NHE can be normal or present an aberrant phenotype: they migrate abnormally and develop altered soma size, dendritic arborization and dendritic spines. In this seminar I will provide an integrated vision of the response of NSCs and newborn neurons to different levels of NHE within the clinical framework of epilepsy, and discuss involved mechanisms and potential therapeutic strategies.

Affiliation and short bio

My work is focused on hippocampal neural stem cells and neurogenesis in healthy conditions, epilepsy and aging. I have made key contributions to the field that have been published in top influencing journal such as Cell Stem Cell, PNAS, Molecular Psychiatry, Plos Biology...). They accumulate 6500 citations, an h-index 31 and a i10-index 46 (3200, 23 and 33 respectively since 2017). My lab, besides me, is currently composed by 2 senior researchers (Ramón y Cajal Contracts); 2 postdocs (IKUR and Basque Government), 6 students (FPU, Basque Government, UPV/EHU y Fundación Tatiana Guzmán) and a lab technician (INVESTIGO Program). Since 2011 I have obtained more than 2 million € in competitive funding at the regional, national and European level, including among others, 3 consecutive Spanish Ministry of Science "MINECO/MICINN" grants (in 2013, 2016 and 2019); an ERA-NET NEURON grant to lead an international consortium to work on TBI (2017-2020); and CURE Epilepsy (USA) grants. My PhD thesis was funded by Laboratorios Lacer. My Postdoc was funded by a 1-year Cold Spring Harbor Laboratory Association fellowship (2003-2004) and then a Spanish Ministry of Science 2-year postdoctoral fellowship (2005-2007). Then awarded a 2-year NARSAD Young Investigator Award (2008-2009). In 2011 I got a tenured IKERBASQUE Research Professor position cofounded by the Marie Curie Action COFUND/SmartBrain program to lead my team at the newly formed Achucarro Basque Center for Neuroscience. In 2012 I was awarded a Ramón y Cajal Program contract and later the I3 certificate.

Related publications with the topic:

Martín-Suárez S, Abiega O, Ricobaraza A, Hernández-Alcoceba R, Encinas JM. Alterations of the hippocampal neurogenic niche in a mouse model of Dravet syndrome. *Front Cell Dev Biol.* 2020 Jul 21;8:654. IF 5.2.

Valcárcel-Martín R, Martín-Suárez S, Muro-García T, Pastor-Alonso O, Rodríguez de Fonseca F, Estivil-Torrús G, Encinas JM. Lysophosphatidic Acid Receptor 1 Specifically Labels Seizure-Induced Hippocampal Reactive Neural Stem Cells and Regulates Their Division. *Front Neurosci.* 2020 Aug 14;14:811. IF 3.6

Muro-García T, Martín-Suárez S, Espinosa N, Valcárcel-Martín R, Marinas A, Zaldumbide L, Lara Galbarriatu L, Sierra A, Fuentealba P, Encinas JM. Reactive disruption of the hippocampal neurogenic niche after induction of seizures by injection of kainic acid in the amygdala. *Front Cell Dev Biol.* 2019 Aug 20;7:158. IF 5,2.

Sierra A, Martín-Suárez S, Valcárcel-Martín R, Pascual-Brazo J, Aelvoet S-A, Abiega O, Deudero JJP, Brewster AL, Anderson AE, Baekelandt V, Maletić-Savatić M, Encinas JM. Neuronal Hyperactivity Leads to Accelerated Depletion of Neural Stem Cells and Impairment of Hippocampal Neurogenesis. *Cell Stem Cell.* 2015 May 7;16(5):488-503. IF: 23.2