INSTITUTO CAJAL

SEMINARIO PRESENCIAL

Viernes, 11 de Octubre de 2024
12:30 h. Instituto Cajal - CSIC

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UNLOCKING lncRNA FUNCTIONS AT THE SYNAPSE

Abstract

Long non-coding RNAs (lncRNAs) have been identified as key players in the establishment of long-term memories (LTM). While nuclear-enriched lncRNAs are recognized for their roles in transcriptional and epigenetic modifications, the functions and regulatory mechanisms of cytoplasmically enriched lncRNAs in neuronal function are less understood. Our recent research has uncovered that lncRNAs are actively transported to neuronal dendrites, where they act as scaffolds for diverse coding and noncoding RNAs as well as proteins. I will discuss the mechanisms of lncRNA transport from the soma to dendrites, their transport dynamics, essential regulatory elements that mediate their function, their interactomes, and their impact on activity dependent structural changes at the synapse and the establishment of long-term memories.

Affiliation and short bio

Sathya Puthanveettil is an Associate Professor in the Department of Neuroscience at the Herbert Wertheim University of Florida Scripps Institute in Jupiter, Florida, USA. He received his Ph.D. from Washington State University and conducted postdoctoral research in Eric Kandel's laboratory at the Howard Hughes Medical Institute, Columbia University College of Physicians and Surgeons in New York. In 2010, he began his independent lab at Scripps Research, Scripps Florida.

Dr. Puthanveettil's research focuses on the cellular and molecular mechanisms underlying the formation and persistence of long-term memory. A major area of investigation is the role of long-distance bidirectional transport between the soma and synapses in mediating structural changes in neurons and establishing long-term memories. His work has led to the discovery of several long non-coding RNAs as key mediators of synapse function and plasticity. His research is funded by the National Institutes of Health, the National Science Foundation, the Alzheimer's Drug Discovery Foundation, and the Community Foundation.

Related publications with the topic

1: Espadas I, Wingfield JL, Nakahata Y, Chanda K, Grinman E, Ghosh I, Bauer KE, Raveendra B, Kiebler MA, Yasuda R, Rangaraju V, Puthanveettil S. Synaptically-targeted long non-coding RNA SLAMR promotes structural plasticity by increasing translation and CaMKII activity. Nat Commun. 2024 Mar 27;15(1):2694. PMCID: PMC10973417.

2: Swarnkar S, Avchalumov Y, Espadas I, Grinman E, Liu XA, Raveendra BL, Zucca A, Mediouni S, Sadhu A, Valente S, Page D, Miller K, Puthanveettil SV. Molecular motor protein KIF5C mediates structural plasticity and long-term memory by constraining local translation. Cell Rep. 2021 Jul 13;36(2):109369. PMCID: PMC8319835.

3: Grinman E, Nakahata Y, Avchalumov Y, Espadas I, Swarnkar S, Yasuda R, Puthanveettil SV. Activity-regulated synaptic targeting of lncRNA ADEPTR mediates structural plasticity by localizing Sptn1 and AnkB in dendrites. Sci Adv. 2021 Apr 16;7(16):eabf0605. PMCID: PMC8051873.

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