

Translation of neuron-glia interactions in complex cognitive functions

ABSTRACT:

Background

The classical paradigm that cognitive processing is exclusively neuronal has been challenged in the past ten years by an exciting body of evidence. Indeed, the importance of glial cells is rising due to emerging data supporting dynamic neuron-glia interactions, in which a cross-talk between astrocytes and neurons complements and modulates the communication between pre- and post-synaptic structures.

Aim

The main research objective of this project is to assess the interplay between astrocytes and neurons underlying cognitive function in the brain.

Methods

We have used complementary state-of-the-art techniques such as in vivo electrophysiology, innovative behavior, anatomical and molecular analysis, to seek a role of astrocytes in the computation of cognitive functions.

Results/Conclusions

Astrocytes appear as critical elements of the neuroglial network, whose function is required for the normal hippocampal function. This information accounts for new knowledge on the cognitive computation and this new player may account also for the cognitive decline observed for instance in ageing or pathological processes, arising as a possible therapeutic target for the treatment or prevention of cognitive deficits.

Keywords

Astrocyte, Cognition, Neural circuits, Behavior, Electrophysiology

Published Work:

Lima, A., Sardinha V. M., Oliveira A. F., Reis M., Mota C., Silva, M., . . . Oliveira, J. F. (2014). Astrocyte pathology in the prefrontal cortex impairs the cognitive function of rats. *Molecular Psychiatry*, 19(7), 834-841. doi: 10.1038/mp.2013.182

Oliveira, J. F., Dias, N., Correia, M., Gama-Pereira, F., Sardinha, V. M., ... Sousa, N. (2013). Chronic stress disrupts neural coherence between cortico-limbic structures. *Frontiers in Neural Circuits*, 7:10. doi: 10.3389/fncir.2013.00010

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