Description of Funded Research Projects
1st Call for H.F.R.I. Research Projects to support Post-Doctoral Researchers

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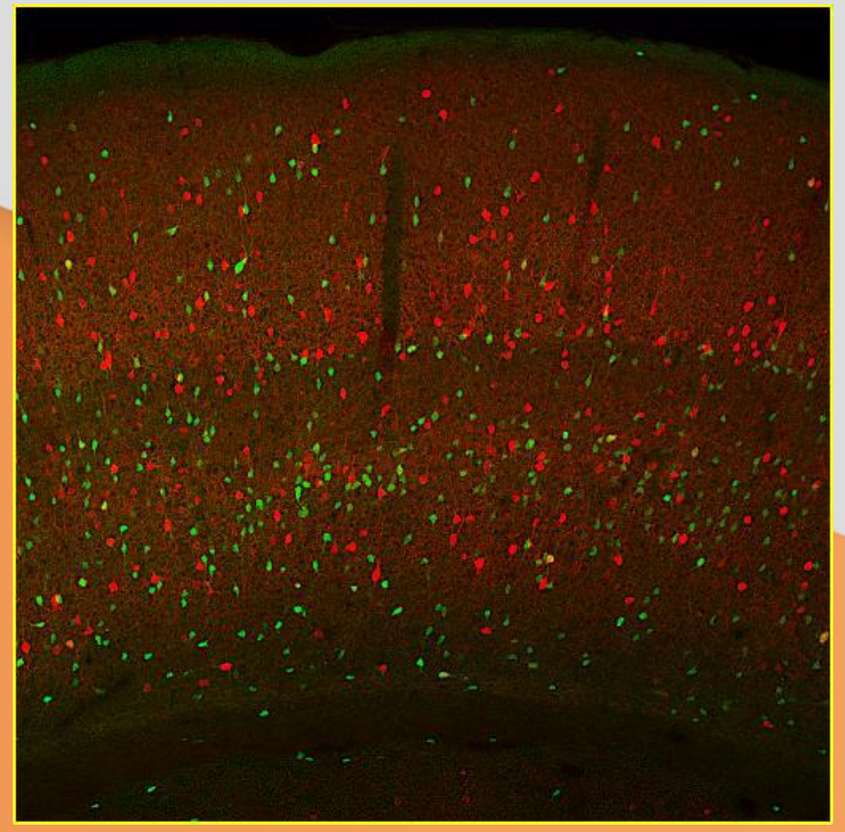
Research Project Title:

Mechanisms controlling the maturation of distinct interneuron population

Principal Investigator:

Myrto Denaxa



Popular Title:

How distinct populations of brain neurons, called interneurons, acquire their functional properties

Scientific Field:

Neuroscience

Host Institution:

BSRC “Alexander Fleming”

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The balance between excitation and inhibition (E-I balance) is essential for the generation of optimal neural circuit activity patterns and brain function. Cortical interneurons (cINs) represent the main source of inhibition for excitatory projection neurons (PNs) in the pallium (cortex), and changes in the number or activity of cINs have been associated with neurodevelopmental and neuropsychiatric disorders, such as epilepsy, schizophrenia and autism spectrum (ASD) disorders.

More than 20 IN subtypes with distinct functional properties have been identified in the pallium. Although there is extensive knowledge concerning certain aspects of their development, the mechanisms controlling their maturation and therefore their differentiation into distinct subtypes, are largely unknown. It has been proposed that the mature identity of cINs is determined mostly during early postnatal stages. Therefore, the cross talk between intrinsic genetic pathways and the cortical environment, in terms of network activity, might be fundamental for the maturation of cINs.

Our proposal aims to identify mechanisms that are implicated in the maturation cIN subtypes. By employing diverse state-of-the-art experimental approaches, such as mouse genetics, transcriptomics, electrophysiology, chemogenetics and virus based manipulations, we aim to characterize the changes of the genomic landscape and electrophysiological profile for two distinct cIN subtypes, occurring over the critical period of the first postnatal month, as well as, determine how the environment, in terms of network activity, affects the maturation process for both IN subtypes.

Project Impact on Society

Accumulating evidence links several psychiatric and neurological diseases with deficits in cortical interneurons. However, the challenge we face, due to the astonishing diversity of functionally unique interneuron populations in the adult brain, is to determine how type-specific interneuron deficits contribute to the pathophysiology of each condition. Unravelling genetic programs controlling the mature properties and therefore function of unique interneuron classes, can be the basis towards the identification of candidate susceptibility genes to particular psychiatric and neurological diseases and therefore break new ground in the development of novel treatments, as well as implementing effecting prevention in the general population.

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To me, H.F.R.I. funding would mean...

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The specific funding scheme from H.F.R.I. greatly support young scientists, such as myself, who want to have their own independent research group in Greece. The scheme’s funding helps me a lot to start building my research team and realizing the science of my proposal. I believe it is going to have a significant impact on my future scientific career. In addition, the postdoc H.F.R.I. action, contributed significantly to my decision to return to Greece. I believe it is a noteworthy effort to stimulate research in Greece.

The Principal Investigator,
Myrto Denaxa

Funding

Amount: **200,000 €**

Duration: **36 months**

Foundation: **H.F.R.I.**

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