The role of basal forebrain cholinergic and GABAergic projection systems in learning/Momentum grant

https://neurodegenerationresearch.eu/survey/the-role-of-basal-forebrain-cholinergic-and-gabaergic-projection-systems-in-learningmomentum-grant/

Name of Fellow

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Hungarian Academy of Sciences

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Country

Hungary

Title of project/programme

The role of basal forebrain cholinergic and GABAergic projection systems in learning/Momentum grant

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Hungarian Academy of Sciences

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€ 712,341

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01/01/2015

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5.0

The project/programme is most relevant to:

Neurodegenerative disease in general

Keywords

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electrophysiology | optogenetics | Alzheimer's disease

Research Abstract
The basal forebrain constitutes a major neuromodulatory center, providing extensive projections to the entire forebrain. Mounting evidence demonstrates that these projections play a key role in cognitive functions, including learning and memory, and damage or deterioration of the basal forebrain leads to severe cognitive impairments, such as dementia and executive dysfunction. Given the association of basal forebrain with higher cognitive functions and a host of disease states, surprisingly little is known about how it accomplishes these intricate tasks. The goal of the proposed research is to reveal the cell type specific contribution of basal forebrain neurons to learning processes and explore the translational potential of the results. I will monitor the activity of optogenetically identified cholinergic and GABAergic neurons while mice are performing a psychometric learning task. I will also apply optogenetic stimulation and suppression with precise timing to reveal the causal relationship between basal forebrain activity and learning. I will then test whether injecting the physiological activity patterns of cholinergic neurons by electrical stimulation in a mouse model of Alzheimer’s disease is capable of rescuing cognitive deficits. These experiments are expected to shed new light on the role of basal forebrain cholinergic and GABAergic neurons in learning and potentially suggest new avenues for future therapies of neurodegenerative diseases.

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