

The Molecular Communication Mechanism of Motor Neuron Survival and Synapse Maintenance

<https://www.neurodegenerationresearch.eu/survey/the-molecular-communication-mechanism-of-motor-neuron-survival-and-synapse-maintenance/>

Principal Investigators

Institution

Contact information of lead PI

Country

European Commission

Title of project or programme

The Molecular Communication Mechanism of Motor Neuron Survival and Synapse Maintenance

Source of funding information

European Commission FP7-Seventh Framework Programme

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€ 1,499,800

Start date of award

01/02/2013

Total duration of award in years

5.0

The project/programme is most relevant to:

Motor neurone diseases

Keywords

Research Abstract

In order to survive and maintain normal function, the cell depends on a dynamic system of spatial specificity and fidelity of signaling pathways that can respond to both internal and external changes over space and time. This cell-cell communication is mediated by ligand-receptor mechanisms. In the case of highly polarized cells such as neurons trafficking mechanisms mediated by motor proteins are used to achieve precise signal targeting. Alterations in the trafficking machinery may results in incorrect signaling, that in some cases leads to neurodegeneration. An example for such phenomenon may be found in Amyotrophic Lateral Sclerosis (ALS). ALS is a motor neuron disease characterized by a non-cell autonomous

neurodegeneration process, which involves neighboring cells via an unknown mechanism. This proposal focuses on the elucidation of basic cell-cell communication mechanisms by using the motor neuron degeneration process as a model. I aim to reveal critical communication mechanisms between the neuron and its environment for cell survival and synapse maintenance. My working hypothesis is that alterations in extrinsic and intrinsic signals may lead to the neurodegeneration seen in ALS. I will develop unique compartmental platforms mimicking the natural environment of the motor neuron. Then using differential “omics” approaches followed by functional assays I will reveal and characterized vital factors essential to neuron synapse integrity and neuron survival. Using state of the art live-cell imaging techniques I will reveal also the molecular mechanism for signals localization and targeting driven by the motor protein dynein. I will elucidate the molecular mechanism of neuronal communication with its diverse environment essential to its survival and proper function. The project will bring revolutionary new mechanistic insight to a truly fundamental problem in cell biology, how the cell communicates and how signals arrive at the right place at the right time?

Lay Summary

Further information available at:

Types:

Investments > €500k

Member States:

European Commission

Diseases:

Motor neurone diseases

Years:

2016

Database Categories:

N/A

Database Tags:

N/A