Novel application of minimally-invasive in vivo Carbon-13 Magnetic Resonance Spectroscopy (MRS) on Brain Metabolism Alterations in Major Progressive Neurodegenerative Diseases

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Name of Fellow

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Finland

Title of project/programme

Novel application of minimally-invasive in vivo Carbon-13 Magnetic Resonance Spectroscopy (MRS) on Brain Metabolism Alterations in Major Progressive Neurodegenerative Diseases

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Research Abstract
As a result of international collaboration we are transfering carbon-13 magnetic resonance spectroscopy (13C-MRS) methodology into Finland (A.I.Virtanen Institute). The method is based on administration of harmless 13C-labeled substrate and following its conversion into observable 13C-labeled compounds. 13C-MRS can assess the concentrations of brain energy metabolites and neurotransmitters non-invasively which makes it a promising tool in the research of neurodegenerative diseases like epilepsy and Alzheimer’s disease. About 1% of people worldwide suffer from epilepsies while Alzheimer’s disease is most common cause for dementia. In epilepsy the excitatory-inhibitory imbalance and in Alzheimer’s the impaired glutamate neurotransmission are crucial features. We determine the alterations in brain metabolites both upon the disease progression and as a response to therapeutic ketogenic diet in rat models of epilepsy and Alzheimer’s. The method is directly transferable to the clinics.

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