

Quantitative mapping of substantia nigra iron in Parkinsons Disease

<https://neurodegenerationresearch.eu/survey/quantitative-mapping-of-substantia-nigra-iron-in-parkinsons-disease/>

Principal Investigators

WANG, YI

Institution

WEILL MEDICAL COLL OF CORNELL UNIV

Contact information of lead PI

Country

USA

Title of project or programme

Quantitative mapping of substantia nigra iron in Parkinsons Disease

Source of funding information

NIH (NINDS)

Total sum awarded (Euro)

€ 2,779,636.70

Start date of award

01/04/2016

Total duration of award in years

5

The project/programme is most relevant to:

Parkinson's disease & PD-related disorders

Keywords

Substantia nigra structure, Iron, iron chelation therapy, Parkinson Disease, Maps

Research Abstract

? DESCRIPTION (provided by applicant): The long term objective of this project is to develop noninvasive, robust, sensitive and accurate midbrain iron mapping for Parkinson's disease. PD is a neurodegenerative disorder characterized by loss of dopaminergic neuron loss in substantia

nigra pars compacta (SNc) and consequent motor disorders. While the neurodegenerative processes in PD may be multifactorial, prooxidant iron elevation in the SNc is evidently an invariable feature of both sporadic and familial PD forms, contributing to oxidative stress and mitochondrial dysfunction and presenting as a tractable target for a disease modifying therapy. Therefore, noninvasive quantitative nigral iron mapping would be useful for diagnosing PD, assessing PD progression and monitoring PD therapy. Noninvasive magnetic resonance imaging (MRI) is regarded to be the most sensitive method for detecting small amounts of highly paramagnetic iron in midbrain tissue. We have developed quantitative susceptibility mapping (QSM) that enables a quantitative extraction of tissue magnetic susceptibility from gradient echo MRI data by deconvolving phase data with a dipole kernel. Estimation of iron from magnetic susceptibility must account for contributions of calcification, the other major susceptibility source in basal ganglia that can also be estimated using recently developed ultrashort echo time MRI technique. Accordingly, we propose to develop noninvasive accurate midbrain iron mapping using the QSM approach with the following specific aims. Aim 1: Develop a noninvasive and accurate midbrain iron mapping based on QSM approach. Aim 2: Validate noninvasive measurement of substantia nigra iron using elemental analysis and immunohistochemistry. Aim 3: Establish that QSM is more sensitive than $R2^*$ for nigral iron mapping in monitoring PD iron chelation therapy.

Lay Summary

PUBLIC HEALTH RELEVANCE: The long term objective of this proposed research is to reliable, sensitive and accurate quantitative midbrain iron mapping using noninvasive magnetic resonance imaging, which can be used as an imaging biomarker for assessing progression and monitoring therapy of Parkinson's disease.

Further information available at:

Types:

Investments > €500k

Member States:

United States of America

Diseases:

Parkinson's disease & PD-related disorders

Years:

2016

Database Categories:

N/A

Database Tags:

N/A