

# Pathway targeted deep brain stimulation for Parkinsons disease

<https://neurodegenerationresearch.eu/survey/pathway-targeted-deep-brain-stimulation-for-parkinsons-disease/>

## Principal Investigators

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### Country

USA

## Title of project or programme

Pathway targeted deep brain stimulation for Parkinsons disease

## Source of funding information

NIH (NINDS)

## Total sum awarded (Euro)

€ 3,121,925.69

## Start date of award

01/09/2013

## Total duration of award in years

2

## The project/programme is most relevant to:

Parkinson's disease & PD-related disorders

## Keywords

Deep Brain Stimulation, Parkinson Disease, Structure of subthalamic nucleus, Atlases, Electrodes

## Research Abstract

DESCRIPTION (provided by applicant): Subthalamic deep brain stimulation (DBS) is an effective for the treatment of Parkinson's disease (PD). However, little is known about the

specific neural pathway(s) responsible for therapeutic benefit. Direct stimulation of either the hyperdirect pathway and/or the subthalamopallidal pathway represents two of the most likely candidates as the “target”. Therefore, the goal of this project is to combine patient-specific 7T imaging and neurostimulation models together to enable probabilistic identification of the stimulation pathways linked to changes in clinical outcome measures recorded from subthalamic DBS patients. This study will rely on tractography-activation models (TAMs) to guide clinical testing on a cohort of 30 subthalamic DBS patients. Our multi-disciplinary approach will integrate the latest advances in neuroimaging, neurostimulation modeling, and quantitative clinical outcome measures to customize DBS to these patients. The first aim will acquire high- resolution 7T MRI data prior to their implant surgery. These images will provide unparalleled anatomical characterization of each patient. The second aim will create patient-specific TAMs for each subject. These models will enable us to define theoretically optimal settings for focused activation of either the hyperdirect pathway or the subthalamopallidal pathway. The third aim will quantify the clinical outcomes achieved with stimulation parameters defined by either the TAM or traditional clinical practice. These clinical results will be coupled with the TAM predictions to create a probabilistic tractography-activation atlas (PTAA) for the subthalamic region. The results of this study will help identify optimal implantation locations for DBS electrodes, and enable theoretical prediction of stimulation parameter settings that focus activation on the targeted pathways and/or avoid side-effect pathways.

### **Lay Summary**

**PUBLIC HEALTH RELEVANCE:** Deep brain stimulation (DBS) is a powerful clinical technology, positively impacting the lives of tens of thousands of patients. The goal of this project is to continue the evolution of DBS patient-specific computer models and use them to better understand the mechanisms of the therapy. Results from this project will enable more efficacious stimulation strategies for patients implanted with DBS systems.

### **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