Super-resolution of brain magnetic resonance images in deep brain stimulation for Parkinson*s disease

Published: 07-09-2022
Last updated: 07-06-2025

To develop a deep learned super-resolution model that predicts high-resolution images with a peak signal-to-noise ratio of 37dB or higher.

Ethical review	Approved WMO
Status	Completed
Health condition type	Nervous system, skull and spine therapeutic procedures
Study type	Observational non invasive

Summary

ID

NL-OMON53528

Source
ToetsingOnline

Brief title
SuperRes-DBS

Condition

- Nervous system, skull and spine therapeutic procedures

Synonym
Parkinson's disease

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universitair Medisch Centrum
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Deep Brain Stimulation, Magnetic Resonance Imaging, Parkinson's disease, Super-resolution

Outcome measures

Primary outcome

Peak signal-to-noise ratio measured in decibels.

Secondary outcome

N/A

Study description

Background summary

Better targeting of the subthalamic nucleus (STN) improves the outcome of deep brain stimulation (DBS) for Parkinson*s disease. Yet, the accuracy of delineating the STN, and therefore the targeting, is limited by the spatial resolution of the magnetic resonance (MR) imaging. The current study aims to acquire a high resolution (HR) MR dataset, tailored to visualise the STN, to train a super-resolution model to predict HR MR images based on lower resolution MR input. This model will aid delineating the STN and improve segmentation and targeting.

Study objective

To develop a deep learned super-resolution model that predicts high-resolution images with a peak signal-to-noise ratio of 37dB or higher.

Study design

Prospective observational study.

Study burden and risks

All subjects routinely undergo a preoperative MR scan under general anaesthesia. In this study, the extended scanning protocol results in an additional 45 minutes of general anaesthesia. The additional risk of extending the general anaesthesia by 30 minutes, before the actual surgical procedure

starts, is considered minimal by a dedicated neuroanaesthesiologist. No risks are associated with the extended scanning protocol itself. This study will not benefit participants directly.

Contacts

Public
Radboud Universitair Medisch Centrum

Geert Grooteplein Zuid 10
Nijmegen 6525GA
NL
Scientific
Radboud Universitair Medisch Centrum

Geert Grooteplein Zuid 10
Nijmegen 6525GA
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Being a patient eligible for bilateral subthalamic nucleus deep brain stimulation surgery for Parkinson's disease.
Having signed informed consent.

Exclusion criteria

Any significant intracranial abnormality that is not in line with Parkinson's disease progression.
Previous intracranial surgery.
A female that is pregnant at the time of enrollment.
Any significant medical condition that is likely to interfere with study procedures.
Participation in any other clinical trial (e.g. drug, device, or biologics) concurrently or within the preceding 30 days.

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Completed
Start date (anticipated):	28-03-2023
Enrollment:	20
Type:	Actual

Ethics review

Approved WMO Date:	07-09-2022
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)
Approved WMO Date:	24-04-2023
Application type:	Amendment

Review commission: CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL81286.091.22