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A feasibility study of real-time displays of brain activity as a treatment for symptoms in Huntington's disease

Submission date
27/01/2020

Recruitment status
No longer recruiting

Registration date
28/01/2020

Overall study status
Completed

Last Edited
28/02/2023

Condition category
Nervous System Diseases

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Huntington's disease (HD) is a condition that stops parts of the brain working properly over time. It's passed on (inherited) from a person's parents. It gets gradually worse over time and is usually fatal after a period of up to 20 years. The symptoms usually start at 30 to 50 years of age, but can begin much earlier or later.
Recent advances in brain imaging technology now provide us with the opportunity to not only monitor disease-related changes in HD, but to also develop non-invasive interventions, such as neurofeedback training using real-time functional MRI (rt-fMRI), aiming at helping patients better manage their disease symptoms. Participants learn to regulate their own brain activity in selected regions and networks.

The aim of the current study is two-fold: firstly it is to employ neurofeedback training using real-time fMRI in order to train early stage HD patients and pre-symptomatic gene carriers to regulate their brain activation and manage their disease symptoms. Secondly, it is to assess the effects of neurofeedback training using real-time fMRI in early stage HD patients and pre-symptomatic gene carriers.

Who can participate?
Patients aged 18 years or above, with early stage HD or HD gene carriers without symptoms.

What does the study involve?
Participants will be randomly allocated to receive actual or sham neurofeedback training for controlling symptoms of HD. The participants take part in one baseline visit, four training visits and three post-training follow-up visits. Participation will involve MRI scans at each visit.

What are the possible benefits and risks of participating?
This study involves MRI. This is a painless, non-invasive and safe technique that can obtain detailed images of the brain structure and function. It uses strong magnetic fields to generate the images and, unlike X-ray techniques, there is no ionising radiation. MRI scans are not done on people with certain metal implants (such as pacemakers) and prior to enrolment in the study we

will go through a series of questions to ensure that a participant is safe to take part in the study. Neurofeedback training using MRI is non-invasive and only involves the use of advanced brain imaging equipment to accurately measure and present the participant's brain activation. Changes in brain plasticity are driven by each person's internal capacity to improve their behaviour through feedback. No side-effects have ever been reported in the literature and it can be used in combination with other medical treatments. The uniqueness of the proposed approach is that the feedback provided is the brain activity of each person, providing direct access to how the brain responds to disease-related changes and ultimately the ability to regulate this response in order to improve behaviour.

It is important to note that this intervention does not offer a cure for the disease. This is the first time this approach will be used in HD patients, so the degree of symptom improvement, if any, following this method is currently unknown.

Where is the study run from?
University College London (UK)

When is the study starting and how long is it expected to run for?
February 2016 to November 2019

Who is funding the study?
Medical Research Council (UK)

Who is the main contact?
Dr Marina Papoutsi
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Contact information

Type(s)
Scientific

Contact name
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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

Integrated Research Application System (IRAS)
160463

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
05/N046, IRAS 160463

Study information

Scientific Title
Evaluating the feasibility of real-time fMRI neurofeedback training as a treatment for cognitive symptoms in Huntington's disease

Acronym
HD-BrainTrain

Study objectives
The aim of our project is to develop and test neurofeedback training as a method to induce plasticity in Huntington's disease (HD), with the aim of improving cognitive and motor symptoms.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 05/11/2012, London - Queen Square Research Ethics Committee (Manchester HRA Head Office, 3rd Floor Barlow House
4 Minshull Street, Manchester, M1 3DZ; +44 (0)207 104 8345; NRESCommittee.London-QueenSquare@nhs.net), ref: 05/Q0512/74

Study design
Single-centre interventional randomized controlled trial

Primary study design
Interventional

Study type(s)
Quality of life

Health condition(s) or problem(s) studied
Huntington's disease

Interventions
The study tests real-time fMRI neurofeedback training (NFT).

Participants are randomized into four groups, two treatment groups, one receiving neurofeedback derived from the activity of the Supplementary Motor Area (SMA), and another receiving neurofeedback based on the correlation of SMA and left striatum activity (connectivity NFT), and two sham control groups, matched to each of the treatment groups.

Participants are randomized into the four groups based on the UHDRS total motor score.

The participants take part in one baseline visit, four NFT visits and three post-training follow-up visits. The baseline and follow-up visits include advanced structural and functional MRI scanning up to two months post-training.

Intervention Type
Other

Primary outcome(s)
Participants' ability to upregulate NFT target levels without feedback (near transfer) measured using fMRI at baseline and follow up (two months after training)

Key secondary outcome(s))
Measures of cognitive and psychomotor function at baseline and follow-up (two months after training):
1. Stroop word reading
2. Symbol Digit Modalities Task
3. Emotion Recognition
4. Circle Tracing
5. Paced and Speeded Tapping

Completion date
18/11/2019

Eligibility

Key inclusion criteria
1. > 18 years old
2. Pre-symptomatic gene-carriers, i.e. they will carry the HD gene, but will not have been clinically diagnosed (UHDRS diagnostic score of 4 or less) at the time of enrolment, OR
3. Early-stage 1 HD patients, i.e. patients with Total Functional Capacity (TFC) score between 11-13

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
All

Key exclusion criteria
Cannot be scanned in the MRI scanner

Date of first enrolment
12/02/2016

Date of final enrolment
15/06/2017

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
University College London
UCL Huntington's Disease Centre
2nd Floor Russell Square House
10-12 Russell Square
London
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WC1B 5EH

Sponsor information

Organisation
University College London Hospitals NHS Foundation Trust

ROR
https://ror.org/042fqyp44

Funder(s)

Funder type
Research council

Funder Name

Medical Research Council

Alternative Name(s)
Medical Research Council (United Kingdom), UK Medical Research Council, Medical Research Committee and Advisory Council, MRC

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/03/2018	28/01/2020	Yes	No
Results article		23/04/2020	28/02/2023	Yes	No