

The nature of ipsilateral motor activity: a 7T fMRI study

Published: 16-05-2023

Last updated: 30-01-2025

To elucidate the nature of ipsilateral brain activity during hand movements.

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Other condition
Study type	Observational invasive

Summary

ID

NL-OMON54386

Source

ToetsingOnline

Brief title

Ipsilateral motor activity

Condition

- Other condition

Synonym

(Not applicable)

Health condition

(Niet van toepassing)

Research involving

Human

Sponsors and support

Primary sponsor: University Medical Center Utrecht

Source(s) of monetary or material Support: NWO

Intervention

Keyword: fMRI, Ipsilateral, Motor function

Outcome measures

Primary outcome

The primary research variables are:

- (1) Differences in the classification accuracy per lamina of the cortex between ipsilateral and contralateral hand movements based on brain activity as measured by fMRI.
- (2) The similarity of neuronal activity patterns in gestures and finger movements for the ipsilateral and contralateral hand.

Secondary outcome

Distinguishability of neuronal activity patterns of twenty different gestures to select a subset of gestures for the main study.

Study description

Background summary

In recent decades, the role of the contralateral hemisphere in making limb movements has well been established. However, recently it has been demonstrated that the ipsilateral sensorimotor cortex also shows activity during unilateral limb movements. For example, studies have shown that various hand gestures can be decoded solely based on activity in the ipsilateral motor cortex and that ipsilateral motor representations contain details up to at least the level of individual finger representations. This is rather surprising, as the number of white matter fibers in the brainstem that do not cross over to the side of the body is small. The nature of the ipsilateral activity is thus still unclear. We aim to better understand the function of ipsilateral activity by examining ipsilateral and contralateral activity patterns in detail. This allows us to distinguish between the ipsilateral activities arising from cortico-cortical or cortico-spinal projections by looking at activity in the different lamina of the cortex. In addition, we can establish if parallel motor programs play a

possible role, by examining differences and similarities in the activity patterns for ipsi and contralateral gestures and finger movements.

Study objective

To elucidate the nature of ipsilateral brain activity during hand movements.

Study design

This is an observational study using 7-Tesla fMRI to look neural activity patterns for ipsilateral and contralateral hand movements in healthy volunteers at a very high spatial resolution. This involves looking at the different lamina of the cortex, and at the topography of brain activity. We do these measurements with a surface-receiver-coil. This coil is not CE certified but has been investigated for safety (IMDD has been added to the METC protocol)

Study burden and risks

There are no known risks associated with fMRI acquisition. The technique does not use contrast agents or ionizing radiation. The Utrecht research group has extensive experience with fMRI scans (about 400 scans per year on the 7 Tesla MRI scanner). The fMRI procedure is painless, but some discomfort may occur due to stimulation of the peripheral nerves during scanning and by the requirement to lie still for long periods of time with part of the body and head in a tunnel-like device.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age

Adults (18-64 years)

Inclusion criteria

- Age 18 - 55 years
- Blank neurological history
- Right handedness
- Oral consent for the willingness to practice fMRI tasks at home

Exclusion criteria

- Noncompliance with MRI safety check list
- Claustrophobia
- Pregnancy
- Inability to hear the instructions presented orally in the scanner without a hearing aid

Study design

Design

Study type: Observational invasive

Masking: Open (masking not used)

Control: Uncontrolled

Primary purpose: Other

Recruitment

NL
Recruitment status: Recruiting
Start date (anticipated): 17-01-2024
Enrollment: 41
Type: Actual

Medical products/devices used

Generic name: 7 Tesla Rx32 Head Array coil
Registration: No

Ethics review

Approved WMO
Date: 16-05-2023
Application type: First submission
Review commission: METC NedMec
Approved WMO
Date: 01-11-2023
Application type: Amendment
Review commission: METC NedMec

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

CCMO

ID

NL79402.041.23