

Subdivisions of the working memory system: a high resolution fMRI study

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The main objective of this study is to determine whether the working memory system works according to a domain specific subdivision and/or a function specific subdivision, and which brain areas play an important role in these subdivisions.

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

Summary

ID

NL-OMON33477

Source

ToetsingOnline

Brief title

the subdivisions of the working memory system

Condition

- Other condition
- Psychiatric disorders NEC

Synonym

n.a.

Health condition

Het is onderzoek is basaal en betreft alleen gezonde proefpersonen

Research involving

Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Utrecht

Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: fMRI, subdivision, working memory

Outcome measures

Primary outcome

The change in BOLD response during task performance between various conditions differing in the type of information during working memory processes

Secondary outcome

n.a.

Study description

Background summary

The working memory (WM) system is a system that is able to maintain and integrate sensory information, long term memory and internal motivational states in order to flexibly select the appropriate response for a given task or situation. Many studies have tried to model the way this system works in terms of regional brain activity, but literature disagrees. In general the discussion boils down to a domain-specific hypothesis in which the working memory is organised in domains like verbal, spatial, auditory and object information, and a function-specific hypothesis, which argues for a subdivision in functions like maintenance of information, encoding, planning and response selection. Imaging studies have implicated the prefrontal cortex and some parietal regions in these working memory processes, and mainly the dorsolateral prefrontal cortex is active in all working memory tasks. Until recently the imaging techniques were unable to provide insight in the more detailed workings of this system though, but with time MRI scanners have improved in spatial and temporal resolution. Better insights in the origin of the BOLD response in combination with improved experimental design make it possible to map processes within the range of milliseconds. For this research we will use high resolution fMRI technology on a 7T scanner

Study objective

The main objective of this study is to determine whether the working memory system works according to a domain specific subdivision and/or a function specific subdivision, and which brain areas play an important role in these subdivisions.

Study design

This is a case-study assessing working memory using high resolution functional MRI. Subjects perform a computerized task while functional MRI images are acquired.

Study burden and risks

There are no known risks associated with fMRI acquisition. The technique does not require administration of any contrast agent or ionizing radiation. The fMRI procedure is painless and not uncomfortable, although it does require the subject to lie still with the head and part of the body confined in a tunnel-like device. The Utrecht group has ample experience with fMRI scanning (400 sessions per year, including children and adolescents). If the subject is uncomfortable with any aspect of the procedure the study will be terminated. If the study is terminated, every effort will be taken to ensure that the experience for the subject is still a positive one.

Subjects will visit once and will participate for about three hours. The time in the scanner will be a maximum of one hour. The subject is provided with earplugs to protect him from the scanner noise. Also MR proof clothing is provided for the time in the scanner. An intercom is available in the MR scanner to remain in contact with the subject during the whole session and an emergency button is placed with the subject with which he can indicate to stop the procedure immediately. The MR scanner is handled by trained personnel and subjects are screened for metal before entering the scanner.

This study will provide insight in the way the working memory system works in human subjects. Finding out the way this WM system works will improve our understanding of conscious control and can provide insight in diseases in which WM is impaired like Parkinson's disease, Alzheimer, schizophrenia and ADHD.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age

Adults (18-64 years)

Elderly (65 years and older)

Inclusion criteria

age between 18 and 45

righthandedness

native dutch speaker

Exclusion criteria

hearing impairment

colorblindness

Current or past clinical significant abnormalities

Claustrophobia

Metal objects in or around the body (braces, pacemaker, metal fragments)

Women who are pregnant

Study design

Design

Study type: Observational invasive

Masking: Open (masking not used)

Control: Uncontrolled

Primary purpose: Other

Recruitment

NL

Recruitment status: Recruitment stopped

Start date (anticipated): 01-12-2009

Enrollment: 14

Type: Actual

Ethics review

Approved WMO

Date: 27-10-2009

Application type: First submission

Review commission: METC Universitair Medisch Centrum Utrecht (Utrecht)

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	NL29027.041.09