Mapping the galactosemic brain: Finding the neural correlates of language impairments

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To identify affected functional networks and underlying structural pathology of the cognition problems in galactosemia.

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Metabolic and nutritional disorders congenital
Study type	Observational non invasive

Summary

ID

NL-OMON36086

Source
ToetsingOnline

Brief title
Mapping the speaking galactosemic brain

Condition

- Metabolic and nutritional disorders congenital
- Inborn errors of metabolism

Synonym
Classic galactosemia; inherited metabolic disorder

Research involving
Human

Sponsors and support

Primary sponsor: Medisch Universitair Ziekenhuis Maastricht
Source(s) of monetary or material Support: Galactosemie Onderzoek Fonds (GOF)

Intervention

Keyword: Classic galactosemia, Inherited metabolic disorders, Language, MRI

Outcome measures

Primary outcome

The main parameters are measures derived from 1) structural MRI scans (i.e. lesions in white matter, cortical thickness), 2) functional MRI during a language task and during rest (i.e. % of BOLD change in selected regions of interest; ROIs, Granger causality correlations), 3) DTI (i.e. fractional anisotropy; FA, and mean diffusity; MD, and DTI tractography), 4) the behavioral paradigm (i.e. number of errors, voice onset latencies).

Secondary outcome

These contain the more general measures that will be used to obtain more information about the participants. In the analyses, these parameters will be used descriptively, as covariate or in a correlation analysis:

- Speech therapy treatment, physical therapy or special education
- Relevant medical history
- Comorbidity ADHD
- Metabolic information, such as GALT mutation, GALT enzyme activity, urine galactose and galactitol
- Nutrition parameters, such as soy, vitamin and trace elements intake

Study description

Background summary

Classic galactosemia is a hereditary disorder caused by the body*s inability to breakdown galactose, a sugar mainly found in milk. A galactose-restricted diet (soy diet) is the basis of therapy. This, however, does not prevent the emergence of long-term complications. Patients have a history of affected language and speech. Previous and ongoing research performed by this project group shows that syntax is a major problem in these children. Syntax was examined using electroencephalography (EEG). Results showed major differences in behavioral measures (errors and voice onset time latencies) and in the event-related potentials (ERPs) derived from the EEG. Former research revealed an abnormal white matter pattern in these patients. Complementary to our EEG study, this project will examine language production using advanced magnetic resonance (MR) imaging methods, aiming to elucidate the neural correlates of the language problems. A detailed examination of the brain and its (mal)function during language is imperative to deducing the (neural) cause of these problems, ultimately leading to the designing of successful treatment approaches with a better outcome. Further, this study will add to the growing, but limited knowledge on pathophysiological mechanisms underlying the complications. Developments in cognitive theories and neuroimaging allow identification of neural networks and integrity of white matter bundles and exploration of the functional connectivity between these networks during task performance.

Study objective

To identify affected functional networks and underlying structural pathology of the cognition problems in galactosemia.

Study design

Observational case control design using an MR imaging protocol, consisting of multiple sequences: a structural scan, functional MRI and diffusion tensor imaging (DTI).

Study burden and risks

The participants will be asked to visit the Maastricht University Medical Centre. The session will have a duration of approximately 2,5 hours. They are expected to lie in the MR scanner and perform a behavioural task during one MR sequence. The total scanning time will be approximately 1 hour. The scanning might be experienced as slightly unpleasant because of the small space inside the scan and the loud noise associated with the recordings. To decrease the anxiety, participants will be familiarized with the scanner by means of a dummy scanner. The noise level will be decreased by means of ear plugs. Also, participants will be put at ease by playing a video during the time that they are not required to perform a task.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)
Adolescents (16-17 years)
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

A diagnosis of classic galactosemia as assessed by GALT enzyme activity assay or GALT-gene mutation analysis (information obtained from treating physician)
Age between 14 and 20 years old

Exclusion criteria

Any other disorder or disease that could affect cognitive functioning independently of classic galactosemia (an exception is made for the diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD), because this disorder is common in this group)

Study design

Design

Study type:	Observational non invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	13-01-2012
Enrollment:	30
Type:	Actual

Ethics review

Approved WMO Date:	13-06-2011
Application type:	First submission
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)

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	NL36362.068.11