Neural network changes in schizophrenia

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Aim of this proposal is to unravel the changes in functional neural networks in healthy human brain and in schizophrenia at 7T. We hypothesize a difference in brain changes between healthy individuals and patients with schizophrenia and abnormal...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Schizophrenia and other psychotic disorders
Study type	Observational invasive

Summary

ID

NL-OMON35397

Source ToetsingOnline

Brief title Neural network changes in schizophrenia

Condition

• Schizophrenia and other psychotic disorders

Synonym schizophrenia

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: 7T MRI, Connectivity, Schizophrenia, Twin study

Outcome measures

Primary outcome

Brain differences between healthy individuals and patients with schizophrenia.

Secondary outcome

Normal variation in the adult brain.

Study description

Background summary

Neural networks in human brain change throughout life, most likely to allow for adaptation to the environment. A neural network represents several distal gray matter areas (neurons) and their connecting white matter (axons), together forming a structural and functional entity. Schizophrenia, a severe psychiatric disease characterized by hallucinations and delusions, involves abnormalities in neural network structure. Indeed, while our Magnetic Resonance Imaging (MRI) studies show continued growth of healthy human brain tissue in adulthood, in schizophrenia and their family-members we find progressive decreases in connected brain areas. However, the underlying (patho-)physiology is unknown. This requires study of neural network functioning and detailed assessment of the areas showing progressive brain volume loss. At the ultra high field strength of the 7 Tesla MRI scanners this is now possible. Gray matter activation can be measured using functional MRI. We showed functionally connected networks of brain regions with highly synchronized intrinsic neuronal activation during the resting state (rs-fMRI). White matter activation could not be measured. However, we developed a method which measures white matter activation along fiber tracts (functional DTI), which allows us to investigate for the first time whether or not neural network structural changes (in schizophrenia and their family-members) are directly associated with (aberrant) neural network functioning. Combined with structural MRI for identification of cortical layers, MR spectroscopy for chemical properties, and magnetic transfer imaging for myelin properties, at 7 Tesla we can now study these networks.

Study objective

Aim of this proposal is to unravel the changes in functional neural networks in healthy human brain and in schizophrenia at 7T. We hypothesize a difference in brain changes between healthy individuals and patients with schizophrenia and abnormal neural networks in schizophrenia.

Study design

The rs-fMRI, MRS, and fDTI methods are refined at 7T and its dynamics studied in repeated brain scans of healthy subjects. Next, these MRI methods are applied in studies comparing patients with schizophrenia and healthy subjects, including monozygotic and dizygotic twin-pairs for assessment of genetic and environmental influences.

Study burden and risks

The experiment takes 3 hours (for healthy volunteers) or 4 hours (for patients and twin pairs) in total. Volunteers will be subjected to a number of psychological and cognitive tests and interviews. The MRI-scan takes up to 50 minutes. 4 tubes of blood will be drawn, each of 10 ml, for DNA and RNA analysis. Subjects can indicate on the informed consent whether or not they agree with blood withdrawal.

To date, there are no known harmfull effects of MRI.

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

18-70 years oldWritten informed consentPatients: DSM-IV diagnosis of schizophrenia or related disorders

Exclusion criteria

Ferrous objects in/around the body Drug/alcohol abuse over a period of 6 months prior to the experiment History of closed or open head injury History of neurological illness/endocrinological dysfunction Claustrophobia Major medical history Incapability of giving informed consent Women: pregnancy Healthy volunteers: history of psychiatric illness, 1st-degree family members with psychiatric illness, chronic use of medication, symptoms indicative for schizophrenia

Study design

Design

Study type:	Observational 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):	01-06-2011
Enrollment:	410
Туре:	Actual

Ethics review

Approved WMO	
Date:	10-06-2010
Application type:	First submission
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 NL26762.041.09