Long-term neurodevelopmental outcome after perinatal arterial ischemic stroke

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Ethical review	Approved WMO
Status	Completed
Health condition type	Central nervous system vascular disorders
Study type	Observational non invasive

Summary

ID

NL-OMON55959

Source
ToetsingOnline

Brief title
LUNA

Condition

- Central nervous system vascular disorders
- Neonatal and perinatal conditions

Synonym
perinatal arterial ischemic stroke (PAIS); neonatal stroke

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Utrecht
Source(s) of monetary or material Support: WKZ fonds subsidie

Intervention

Keyword: brain, neonate, neurodevelopment, stroke

Outcome measures

Primary outcome

The primary endpoint will be neurodevelopmental, behavioral, executive, and language functioning after perinatal arterial ischemic stroke at 8-14 years of age.

Secondary outcome

Secondary endpoints will be brain growth and connectivity at school age after PAIS, the relation between neurodevelopmental outcomes and lesion topology, brain growth and connectivity, and changes in the rate of neurodevelopmental impairment after PAIS over time.

Study description

Background summary

Perinatal arterial ischemic stroke (PAIS) is a type of perinatal brain injury that occurs in ~1:5000 live births, and leads to major developmental disabilities including cerebral palsy, cognitive impairment, epilepsy, language disorders, and behavioral problems. To study the effect of PAIS in specific brain regions on developmental outcome, long-term follow-up data is needed. Therefore, our research group has set up the Neonatal Stroke Registry Utrecht (NSRU), where clinical characteristics, neuro-imaging data, and neurodevelopmental outcomes gathered during routine clinical follow-up are stored. However, clinical follow-up is usually performed until around five years of age, and studies that report neurodevelopmental outcomes in children with PAIS past early school age are scarce. Evidence from the preterm infant population suggests that children with neonatal brain injury might grow into their deficit, and that neurodevelopmental impairments only become apparent at a later age. Some studies suggest a similar finding for perinatal stroke, although evidence is limited. Therefore, this study aims to study the effect of PAIS on motor, cognitive, behavioral, executive, and language functioning in

children at 8-14 years of age, and to assess how brain development and connectivity after PAIS, evaluated by MRI, relates to neurodevelopmental outcome.

Study objective

The main goal of this study is to determine motor, cognitive, behavioral, executive, and language functioning of children with PAIS at school age. Furthermore, we will analyze the effect of PAIS on brain growth, development, and connectivity using advanced MRI. This will allow us to study long-term brain development in relation with school age-outcomes following PAIS, and to investigate whether the rate of neurodevelopmental impairment changes longitudinally.

Study design

In this observational, cross-sectional study, children will be invited for one testing day in the Wilhelmina Children*s Hospital (WKZ). Children will be subjected to advanced MRI scanning (including DTI and resting-state fMRI), an motor assessment by the physical therapist, and extensive neuropsychological testing using standardized developmental skill tests, such as the WISC (IQ), but also additional language, behavioral, and executive functioning assessments. Questionnaires on daily functioning, behavior, language, well-being and quality of life will be administered to parents, teachers, and children during, and/or after the testing day. With the data acquired during this study in combination with the data from the NSRU, we are able to generate an unique dataset with multiple MRI scans and neurodevelopmental outcome measures performed longitudinally.

Study burden and risks

Assessment of the motor and neurocognitive development will be non-invasive, and is routinely performed during clinical follow-up. Most children enjoy these assessments, since they are designed in a playful manner. To prevent the children from fatigue due to testing, multiple breaks will be scheduled. The children will undergo an MRI of the brain, which takes approximately 45 minutes. Sedative medication will not be used, nor will intravenous contrast. MRI in children is shown to be save and minimal invasive as it is not based on X-rays. Risks associated with participation are limited, if not negligible, as MRI has been performed for clinical purposes in almost all follow-up centres for many years. Therefore, considerable collective expertise has been gained in MRI techniques and associated practical issues in teenaged children (METC 01/229). It might however be frightening for children as the MRI tunnel is quite small and makes a lot of noise. We will prepare the children with an MRI video and explanation. Nevertheless, if there is too much anxiety or restlessness during scanning, the scan protocol can be shortened or stopped at

any moment.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)
Children (2-11 years)

Inclusion criteria

- Children admitted to the NICU of the WKZ between September 2009 and March 2016 (aged 8-14 years during study participation), and diagnosed with PAIS with MRI;
- Participant of the Neonatal Stroke Registry Utrecht;
- Born at >=34 weeks of gestation;
- A neonatal MRI was performed and is available for analysis.

Exclusion criteria

- Preterm-born infants born before 34 weeks of gestation;
- Other severe structural brain damage previously confirmed by neuro-imaging;
- Congenital brain abnormalities and/or other (chromosomal/metabolic) anomalies;
- Acquired brain injury due to trauma or infection

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Completed
Start date (anticipated):	15-11-2023
Enrollment:	50
Type:	Actual

Ethics review

Approved WMO Date:	12-09-2023
Application type:	First submission
Review commission:	METC NedMec
Approved WMO Date:	21-11-2023
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	ID
CCMO	NL84563.041.23