Quantitative MR Imaging of skeletal muscle in Duchenne and Becker muscular dystrophy

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To compare quantitative muscle MRI measurements between DMD and BMD patients and healthy controls. Comparisons will be made cross-sectionally and longitudinally. In addition, dystrophin expression in two different leg muscles will be studied in BMD...

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

Summary

ID

NL-OMON47455

Source
ToetsingOnline

Brief title
Quantitative MRI in DMD and BMD

Condition

- Muscle disorders

Synonym
Duchenne muscular dystrophy

Research involving
Human

Sponsors and support

Primary sponsor: Radiologie
Source(s) of monetary or material Support: ZonMW

Intervention

Keyword: MRI, Muscular dystrophy, Natural history, Skeletal muscle

Outcome measures

Primary outcome

The key aspect of our project is that we will apply the same MRI measurement techniques in both DMD and BMD patients, in order to develop an MRI outcome parameter that can be used to assess therapy efficacy in clinical trials.

We have the following objectives:

1. to assess the reproducibility of quantitative MRI measurements representing muscle volume, fatty infiltration, edema, fiber architecture and metabolism in diseased muscle

2. to compare the result of these quantitative MRI measurements cross-sectionally between DMD and BMD patients and healthy controls

3. to relate the MRI parameters of the three groups to muscle strength and function

4. to study the usefulness of quantitative MRI in monitoring disease progression by repeating the measurements after 12 months

Secondary outcome

nvt.

Study description

Background summary

Rationale: Duchenne (DMD) and Becker (BMD) muscular dystrophy are characterized by progressive muscle weakness. Potential therapies aim to turn the DMD

phenotype into a BMD phenotype. Outcome parameters used in current clinical trials are muscle strength, functional tests and muscle biopsies. They carry important disadvantages. Muscle biopsies are invasive and unattractive to apply repeatedly, especially in children. They provide only limited information, because only a small part of one muscle is sampled, while in DMD and BMD various muscles are affected to different degrees. Functional tests like the 6 minute walking test have a relatively large variability and do not provide information on muscle quality. Finally, too few patients are available for large clinical trials testing new drugs for a subset of DMD patients with rare mutations in the near future. Therefore, non-invasive, objective, and sensitive methods to assess therapy efficacy are imperative.
Magnetic resonance imaging (MRI) is safe, non-invasive, provides good soft tissue contrast over a large volume and can easily be applied repeatedly. The technique can quantitatively assess important aspects that influence muscle quality in DMD and BMD, namely hypertrophy or atrophy, fatty infiltration, edema, fiber architecture and energy metabolism. Previous MRI studies have assessed DMD patients cross-sectionally, and compared them to healthy controls. However, as developing therapies aim to turn the severe DMD phenotype into the less severe BMD phenotype, it is essential compare MRI readouts of DMD patients to both BMD patients and healthy controls.

Study objective

To compare quantitative muscle MRI measurements between DMD and BMD patients and healthy controls. Comparisons will be made cross-sectionally and longitudinally. In addition, dystrophin expression in two different leg muscles will be studied in BMD patients.

Study design

Observational and case control study

Study burden and risks

There are no known risks associated with participating in an MRI study. Subjects with intracranial or intraocular metal, a pacemaker, and claustrophobia will be excluded because of potential contraindications of MRI in such subjects. The Nederlandse Vereniging voor Kindergeneeskunde (NVK) code of conduct *Gedragscode verzet bij minderjarigen die deelnemen aan medisch-wetenschappelijk onderzoek* will be applied in this study.

Contacts

Public

Selecteer

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Scientific
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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)
Children (2-11 years)
Elderly (65 years and older)

Inclusion criteria

DMD and BMD patients of 5 years and older with typical muscle weakness and a known genetic mutation in the dystrophin gene.
Healthy age-matched males of 5 years or older form the control group.

Exclusion criteria

General exclusion criteria are:
- Claustrophobia
- Pacemakers and defibrillators
- Nerve stimulators
- Intracranial clips
- Intraorbital or intraocular metallic fragments

- Cochlear implants
- Ferromagnetic implants (e.g. thoracic implant for scoliosis)
- Inability to lie supine during less than 60 minutes;Exclusion criteria for healthy controls
- any muscle disease
- recent muscle trauma

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):	30-07-2013
Enrollment:	74
Type:	Actual

Ethics review

Approved WMO Date:	04-02-2013
Application type:	First submission
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
Approved WMO Date:	02-12-2013
Application type:	Amendment
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
Approved WMO	

Date:	14-10-2015
Application type:	Amendment
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
Approved WMO Date:	10-06-2016
Application type:	Amendment
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
Approved WMO Date:	23-05-2018
Application type:	Amendment
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
Approved WMO Date:	10-10-2019
Application type:	Amendment
Review commission:	METC Leiden-Den Haag-Delft (Leiden)

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	NL42012.058.12

Study results

Date completed:	08-07-2020

Results posted:	21-02-2018
Actual enrolment:	74

Summary results
Trial is onging in other countries

First publication
21-02-2018