# The application of Diffusion Tensor Imaging for hamstring injuries.

Published: 18-07-2016 Last updated: 17-04-2024

Primary objective: To evaluate if DTI is able to predict the convalescence period and detect (residual) injury to the hamstrings.

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

# Summary

### ID

NL-OMON50235

**Source** ToetsingOnline

**Brief title** The application of DTI for hamstring injuries.

### Condition

• Muscle disorders

**Synonym** hamstring injury, hamstring muscle tear

**Research involving** Human

### **Sponsors and support**

Primary sponsor: Academisch Medisch Centrum Source(s) of monetary or material Support: ZonMw

#### Intervention

Keyword: Athletes, DTI, Hamstring injury, Recovery

#### **Outcome measures**

#### **Primary outcome**

- DTI derived parameters and characterization of changes in affected muscles,

in the course of the hamstring injury on MRI.

- Correlation of DTI data with relapse injury data (follow-up for 1 year),

self-reports and clinical assessments.

- Time to return to full sports activity; match play or training. TRTS is

defined as the number of days from initial injury until the athlete is cleared

to

resume full unrestricted training.

#### Secondary outcome

- Re-injury within 1 year after the initial injury

- Clinical hamstring tests (including passive straight leg raising,

active knee extension, active slump test, taking shoe out sign)

- Patient reported Outcome outcome scores: Tegner activity score , hamstring

outcome score, Functional Assessment Scale for Acute Hamstring

Injuries, Hip And Groin Outcome Score (HAGOS)

- Prediction of patient and sports physician for time to return to sports
- Time course changes of recovery on MRI (Aspect of the injury on T1 and T2

weighted images shall be scored by a radiologist using a

standardized form.)

# **Study description**

#### **Background summary**

The Hamstrings is a collective term for a group of muscles located at the posterior side of the upper leg. The Hamstring Muscle complex (HMC) consists of 3 components: the semitendinosus, semimembranosus, the long and short heads of the biceps femoris muscle. Hamstring injuries are fairly frequent among athletes. These injuries usually occur during sprinting, high intensity running or sudden explosive movements such as jumping, twisting and turning. Hamstring trauma is usually found in the biceps femoris muscle as it undergoes the most stretch in comparison to the other components HMC.

Hamstring injury is known for its high recurrence rate; 22-34% of athletes will have a re-injury within 1 year following rehabilitation. Importantly, studies regarding potential prognostic markers for predicting the best time for \*return to play\* after a hamstring injury are scarce.

Although the available literature concerning prognostic factors for acute hamstring injuries is scarce, there are some studies who defined some. Verall et al. found that MRI and clinical assessment were relative accurate prognostic factors for the convalescent period.

MRI appeared to be more useful in predicting the rehabilitation of moderate to severe cases whereas clinical assessment showed to be more accurate in lighter and MRI negative injuries. Furthermore, Verral et all. observed that the likelihood of recurrence was increased by a factor 2.2 when the transverse size of the injury was greater than 55% of the muscle. Another supposed prognostic factor is the deficit in knee active range of motion (AROM) between both legs measured 48 hours following the injury. This was supposedly accurate in predicting the convalescent period.

Additional prognostic factors are described by Brooks et al: (1) injury to the proximal free tendon would require a longer convalescent period, (2) the relative distance of the palpable location of maximum pain from the ischial tuberosity would be associated with the rehabilitation time needed (with proximity to the ischial tuberosity generally meaning a longer recovery period) and finally (3) the area of both the length and cross-section of the injury depicted by MRI would be an accurate prognostic marker.

Despite the fact that MRI has improved our knowledge about this frequent injury, there are three limitations identified:

Prediction: There is no strong evidence for any MRI categorical and continuous parameters for predicting the time to return to sports.
Monitoring recovery : There is a lack of evidence for the value of MRI for

- Monitoring recovery : There is a lack of evidence for the value of monitoring recovery.

- Decision making: There is a lack of evidence for the value of MRI for guiding return to play decision making process.

This means that new and more accurate methods are needed in order for us to efficiently predict the convalescent period of an athlete after a hamstring injury. A relatively new and potentially more sensitive technique for assessing muscle injury is Diffusion tensor imaging (DTI). DTI is a MRI-based technique which measures the self-diffusion of water influenced by intra and extracellular structures and therefore provides information of tissue microstructure. Recent literature of skeletal muscle injuries showed DTI to be feasible in muscles. Froeling et all also showed that DTI has a sensitivity for muscle changes beyond capabilities of conventional imaging techniques. Although DTI seems promising, no long term follow-up study has yet been performed which correlated findings with clinical tests.

#### Study objective

Primary objective: To evaluate if DTI is able to predict the convalescence period and detect (residual) injury to the hamstrings.

#### Study design

This is a diagnostic propective cohort study. (single center)

#### Study burden and risks

Risks for subjects undergoing a MRI examination are negligible, provided precautions have been made to prevent examining individuals with contraindications. For this purpose, the routine MRI contra indications form of the AMC will be used.

With this innovative MRI technique, we expect to offer the patient a more sensitive MRI technique. All of the clinical tests are standard tests with no evident risks.

Findings in this study will not be used for management. A group-related benefit of this diagnostic study is that DTI potentially has clinical utility in providing a suitable method to illustrate and predict the convalescent period.

# 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**

Hamstring injury 16 years or older injury < 7 days old Athlete

### **Exclusion criteria**

younger than 16 Extrensic trauma as cause of the injury Chronic hamstring complaints

# Study design

# Design

Study type: Observational invasiveMasking:Open (masking not used)Control:UncontrolledPrimary purpose:Diagnostic

## Recruitment

NL	
Recruitment status:	Recruiting
Start date (anticipated):	05-10-2016
Enrollment:	200
Туре:	Actual

# **Ethics review**

Approved WMO	
Date:	18-07-2016
Application type:	First submission
Review commission:	METC Amsterdam UMC
Approved WMO	
Date:	26-07-2017
Application type:	Amendment
Review commission:	METC Amsterdam UMC
Approved WMO	
Date:	03-02-2021
Application type:	Amendment
Review commission:	METC Amsterdam UMC

# **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

ССМО

**ID** NL55671.018.16