novel noninvasive molecular imaging modalities for ischemia in peripheral arterial disease

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

Summary

ID

NL-OMON42178

Source
ToetsingOnline

Brief title
MR modalities for PAD

Condition

- Muscle disorders
- Arteriosclerosis, stenosis, vascular insufficiency and necrosis

Synonym
exertional leg pain, peripheral arterial disease

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: Astellas Pharma,uit de gelden van de

afdeling vasculaire geneeskunde van het AMC;waaraan ook industrieën bijdragen.

Intervention

Keyword: atherosclerosis, BOLD-MRI, MRS, oxygenation

Outcome measures

Primary outcome

31P MRS:

- PCr recovery rate after exercise or induced ischemia

- time to lowest PCr concentration after exercise or induced ischemia

BOLD-MRI:

- signal intensity (SI) after exercise or induced ischemia

- time to peak (TTP) after exercise or induced ischemia

1H MRS:

- decay or loss of deoxymyoglobine signal after exercise or induced ischemia

intraclass coefficient (ICC) for all the abovementioned parameters.

Secondary outcome

- to demonstrate a correlation between 31P MRS and BOLD-MRI and/or 1H MRS

- to demonstrate a correlation between 31P MRS and clinical symptoms

- to demonstrate a correlation between BOLD-MRI or 1H MRS and clinical symptoms

- to derive a dynamic pH-curve from the inorganic phosphate peak detected by

dynamic 31P MRS and correlate these changes with clinical symptoms (pain)

Study description

Background summary

Peripheral arterial disease, like exertional and rest pain of the legs, is caused by atherosclerosis. This chronic and progressive disease eventually results in lipid-rich atherosclerotic plaques in the arterial wall that narrow the lumen and thereby causing reduced blood flow to distal tissues. Exertional and rest pain of the legs, persistent skin infections and ischemic tissue loss are disabling symptoms of this process and may necessitate limb amputation. In current clinical practice diagnostic tests are informative about lumen size, blood pressure and blood flow, which is only useful to demonstrate end stage disease. In addition, their diagnostic reliability and reproducibility are limited and they did not affect clinical outcome. They also lack information about tissue oxygenation. Novel imaging modalities like 31P MRS, BOLD-MRI and 1H MRS are very promising because they provide noninvasive, functional, dynamic and in situ information about tissue oxygenation. Because these imaging modalities are acquired with MR, detailed anatomical images can be obtained as well. These noninvasive, molecular imaging techniques have the potential to (1) replace current diagnostic tests; (2) demonstrate a clear and univocal relation between narrowing of arterial lumen and clinical symptoms of peripheral arterial disease; (3) quantify the functional consequences of narrowing of arterial lumen and an impaired oxygen supply to distal tissues. In addition, they can contribute to new insights in pathophysiology of atherosclerosis.

Study objective

The main objective of this pilot study is to determine if 31P MRS and BOLD-MRI or 1H MRS can be used as diagnostic tests to discriminate between ischemic muscle and normally oxygenized muscle and to assess their reproducibility.

Study design

This is a pilot study designed as a single center observational case-control study. After screening for eligibility all subjects will undergo cardiovascular risk assessment. Subsequently, all subjects will undergo 31P MRS and BOLD-MRI or 1H MRS of the lower leg in a single scan session in our Philips Ingenia 3 Tesla MRI. The scan session will be repeated in healthy subjects for reproducibility and patients with peripheral arterial disease planned for intervention will undergo a second scan session after intervention.

Study burden and risks

The maximum estimated time patients spend at the AMC will be two visits of 1,5

hour. The risk involved while participating in this pilot study are very low.

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

patients:
- ongoing reversible exertional pain in the lower right and/or left leg (Fontaine 2b)
- ongoing rest pain in the lower right and/or left leg (Fontaine 3) (if possible)
- age 40 years or older;healthy volunteers:
- no history of cardiovascular disease
- no cardiovascular risk factors

Exclusion criteria

for all groups:
- history of muscular diseases
- diabetes mellitus
- metabolic diseases
- (locomotor) neurologic abnormalities or diseases
- known systemic disorders
- standard contraindications for MRI;healthy controls: use of any cardiovascular medication, including but not limited to lipid-lowering therapy, antihypertensive drugs, antidiabetic drugs, platelet aggregation inhibitors and anticoagulants

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:	Diagnostic

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	31-01-2015
Enrollment:	50
Type:	Actual

Ethics review

Approved WMO

Date:	17-03-2015
Application type:	First submission
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	ID
CCMO	NL52059.018.14