# From muscle strength to power: assessment and underlying determining properties to understand muscle age related functional decline

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To develop a reproducible and valid method for measuring muscle power and to assess main underlying determinants, i.e. activation dynamics, fibre typing and controller function.

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

# Summary

### ID

NL-OMON35963

**Source** ToetsingOnline

#### **Brief title**

Assessment of muscle power and relationship with muscle ageing

### Condition

- Other condition
- Muscle disorders

**Synonym** muscle ageing, sarcopenia

#### **Health condition**

spierveroudering

### **Research involving**

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Human

### **Sponsors and support**

Primary sponsor: Leids Universitair Medisch Centrum Source(s) of monetary or material Support: Ministerie van OC&W

### Intervention

Keyword: functional decline, muscle ageing, muscle power

### **Outcome measures**

#### **Primary outcome**

The difference in maximal muscle power between young and old during both

release experiments and continuous movements.

### Secondary outcome

Power will be related to activation dynamics, short-range stiffness, controller

function, functional fibre typing (by

measuring short-range stiffness and activation dynamics) and handgrip strength.

Also test-retest reproducibility will be assessed.

# **Study description**

### **Background summary**

Sarcopenia is an age-related decrease in muscle mass associated with functional impairment, increased likelihood of falls, and loss of autonomy. Previous studies showed that not only muscle mass, but alterations in the overall neuromuscular control system determine health in the elderly. Main determinants may be changes in muscle architecture and muscle fibre type, i.e. number, size and composition, and deterioration of controller function and activation dynamics. The relation between main underlying determinants of muscle ageing and functional decline is yet unclear. Muscle power, i.e. the force that can be generated within a certain time, is strongly associated with functional decline and seems to be more vulnerable to the process of human ageing than muscle strength. The dependence of muscle power on both contractile force and velocity

may be responsible for that. However, measuring muscle power has several methodological dfficulties. Most of the currently existing methods do not fulfil minimal requirements for a proper power measurement and are not able to analyse the contribution of main underlying determinants to the loss of muscle power.

### Study objective

To develop a reproducible and valid method for measuring muscle power and to assess main underlying determinants, i.e. activation dynamics, fibre typing and controller function.

### Study design

A haptic wrist manipulator will be used for the assessment of muscle power, activation dynamics and short-range stiffness. Power assessment will be performed during continuous movement and release experiments, i.e. force generation guided by visual feedback and sudden release of the manipulator handle. Furthermore, test-retest reproducibility, anthropometrics, short physical performance battery, mini-mental state examination and handgrip strength will be measured.

#### Intervention

Use of haptic wrist manipulator to assess muscle power, activation dynamics and short-range stiffness.

### Study burden and risks

Measurements are non-invasive, have minimal risks and require minimal physical and mental effort of the subject. Results of the study are important for understanding the relation between ageing muscle and functional decline to finally be able to distinguish different clinical phenotypes and to develop targeted therapies.

# Contacts

### **Public** Leids Universitair Medisch Centrum

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# **Trial sites**

# **Listed location countries**

Netherlands

# **Eligibility criteria**

Age Adults (18-64 years) Elderly (65 years and older)

### **Inclusion criteria**

healthy young adults, age ranges 20 - 30 yrs eldery, age ranges 70 - 80 yrs, free living, ADL independent

### **Exclusion criteria**

MMSE (mini-mental state examination) < 23 SPPB (short-physical performance battery) < 10 sports on highly competitive level sedentary lifestyle co-morbidity: neurological disorders, metabolic disorders, arthritis, cancer medication: immunosuppressive drugs, insulin fracture last half year hip/knee replacement last two years

# Study design

# Design

Study type: Observational non invasive		
Masking:	Open (masking not used)	
Control:	Uncontrolled	
Primary purpose:	Basic science	

### Recruitment

КП

Recruitment status:	Recruitment stopped
Start date (anticipated):	02-05-2011
Enrollment:	30
Туре:	Actual

# **Ethics review**

Approved WMO	
Date:	31-03-2011
Application type:	First submission
Review commission:	METC Leids Universitair Medisch Centrum (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
 NL35763.058.11

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