Are the sensorimotor mechanisms of balance control related to a reduced capacity to maintain balance in elderly people?

In this study we will use the BalRoom and the Radboud Falls Simulator to investigate the hypothesis that reduced balance capacity in elderly is related to deficient sensory and motor systems involved in balance control.

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

Summary

ID

NL-OMON42380

Source
ToetsingOnline

Brief title
Sensorimotor mechanisms related to deficient balance capacity

Condition

- Other condition

Synonym
Fall risk, history of falls

Health condition

geen, alle deelnemers zijn gezonde ouderen en jongeren. Echter, de helft van de geïncludeerde ouderen heeft een valhistorie, maar is wel gezond.

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit van Twente
Source(s) of monetary or material Support: Technologiestichting STW,Europese Unie

Intervention

Keyword: Balance, Coordination, Elderly

Outcome measures

Primary outcome

The main parameter to assess balance capacity is stepping threshold which is

defined as the highest platform acceleration that can be overcome with a

feet-in-place response. The main parameters to assess the sensorimotor

mechanisms involved in balance control the frequency response functions, which

quantify 1) the gain or magnitude of the response to the perturbation and 2)

the phase lag between the response and the perturbation.

Secondary outcome

The secundary parameter to assess balance capacity is limit-of-stability which

is defined as the highest platform acceleration that can be overcome with a

maximum of one step. The secondary parameters to investigate sensorimotor

mechanisms are obtained with a mathematical balance control model, which was

developed at the University of Twente, en which will be fitted on the frequency

response functions with optimization algorithms. The most important secondary

parameters that will be estimated are: passive stiffness, passive damping,

active stiffness, active damping, neural time delay and sensory reweighting

factor for proprioceptive visual and vestibular information.

Study description

Background summary

Falling in elderly often leads to severe injuries such as fractures. The capacity to restore balance in response to an internal or external perturbation is essential to prevent falls in daily life situations. This balance capacity can be assessed using the Radboud Falls Simulator. However, sensorimotor impairments and compensatory mechanisms underlying reduced balance capacity are interrelated and poorly understood. The BalRoom can be used to unravel these complex sensorimotor interrelations by applying continuous sensory and mechanical perturbations while also recording the body*s response.

Study objective

In this study we will use the BalRoom and the Radboud Falls Simulator to investigate the hypothesis that reduced balance capacity in elderly is related to deficient sensory and motor systems involved in balance control.

Study design

Cross-sectional measurement design.

Study burden and risks

Included subjects will undergo an intake, consisting of several questionnaires and clinical balance tests. This intake is followed by a balance assessment with the Radboud Falls Simulator to assess balance capacity and a balance assessment with the BalRoom device to identify the sensory and motor systems involved in balance control with small visual scene rotations, support surface rotations and/or push-pull perturbations at hip and shoulder level. During both balance assessments participants will wear a safety harness to prevent falling. Further risks of physical injury are negligible. The total duration of the intake and the two balance assessments will be 3 to 4 hours. Participants do not have a direct benefit from this study. Their participation will contribute to improved identification of potential fallers and improved diagnosis of patients with balance disorders.

Contacts

Public
Universiteit van Twente

Drienerlolaan 5
Enschede 7522NB
NL
Scientific
Universiteit van Twente

Drienerlolaan 5
Enschede 7522NB
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

- Elderly: Age 65 years and older
o Elderly with history of falls: reporting at least one fall in the past year
o Elderly without history of falls: reporting no fall in the past year
- Healthy young: Age between 18 and 30 years
- Ability to stand for at least 5 consecutive minutes
- Able to walk independently or under supervision as indicated by a score of 4 on the
Functional Ambulations Category (FAC)
- Able to provide written informed consent

Exclusion criteria

- Orthopaedic problems, including recent fractures which are currently not completely healed, history of hip or knee replacement, or limb amputation
- Neurological disorders, including stroke, Parkinson*s disease and traumatic brain injury
- Back pain: Participants with past or current back pain resulting from intervertebral disc herniation, spondylolisthesis/ spondylolistholysis or (osteoporotic) vertebral fracture will be excluded. Participants with a history of non-specific low back pain will be excluded if they currently experience pain
- Visual impairments, including cataract. Participants who wear glasses or contact lenses to correct for myopia (short-sightedness) or hyperopia (far-sightedness) will not be excluded.
- Inability to follow simple verbal instructions as indicated by a score < 4 on the Utrecht Communication Observation Scale.
- Any medical condition in which exercise is contra-indicated.

Study design

Design

Study type: Observational non invasive

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

Recruitment

NL
Recruitment status:	Recruitment stopped
Start date (anticipated):	13-08-2015
Enrollment:	60
Type:	Actual

Ethics review

Approved WMO
Date:	28-05-2015
Application type:	First submission
Review commission:	METC Twente (Enschede)

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	NL52632.044.15