NEUROCONTROL - ASSESSMENT AND STIMULATION: Visual information and motor control strategy *NEURAS-V*

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Movement disorders (incl parkinsonism)
Study type	Observational non invasive

Summary

ID

NL-OMON41143

Source
ToetsingOnline

Brief title
NEURAS-V

Condition

- Movement disorders (incl parkinsonism)

Synonym
Cerebro Vascular Accident, Stroke

Research involving
Human

Sponsors and support

Primary sponsor: Leids Universitair Medisch Centrum

Source(s) of monetary or material Support: Motek Medical Amsterdam,ZonMW

Intervention

Keyword: motor control, stroke, visual information

Outcome measures

Primary outcome

joint neuromechanical parameters, i.e., total impedance, stiffness, viscosity,

reflexive impedance, co-contraction

Secondary outcome

Kinematic measures of tracking performance, i.e. RMS of tracking error, amount

of corrective movements, % outside of tolerance range; and, in stroke patients,

pain and perceived strain during the experiment.

Study description

Background summary

A highly prevalent disease like stroke may affect key organ systems involved in motor control (e.g., the central nervous system, the musculoskeletal system, and the senses). The observed motor dysfunction in this condition results from an interplay between primary damage, secondary decline and development of compensatory strategies. Therefore, the clinical community is in great need for assessment methods that allow for high resolution quantitative and valid measures of factors contributing to motor dysfunction to guide selection of the optimal strategy for treatment. For moving and interacting with our environment, it is essential to properly adapt the motor control strategy to fluctuating environmental conditions and task demands. Against this background, emerging technologies such as haptic robots and virtual or augmented reality provide new opportunities to identify various contributors to movement disorders. For meaningful use of a virtual reality surrounding in a clinical setting (e.g., in stroke patients), however, it is essential to understand the extent and manner in which control strategy and task performance are influenced by visual information in healthy subjects

Study objective

The primary objective of this study is to determine if and how specific characteristics of visual information influence the motor control strategy adopted by healthy subjects during a visuomotor tracking task. Changes in wrist joint impedance (i.e., the resistance to movement) due to specific manipulations of the visual scenery related to task demands (i.e., tolerance, velocity, preview) and related to presentation of visual information (i.e., gain, optical flow density, preview) are quantified using System Identification and Parameter Estimation (SIPE) techniques in order to assess feed-forward and feedback motor control strategies. Secondary objective of this study is to evaluate whether the assessment can be used to examine the (expected lack of adaptability of) motor control strategy in stroke patients.

Study design

Observational study, single session. Subjects will perform a visuomotor tracking task (presented on a LED tv screen) under different visual conditions. In experiment 1, three features of the visual scenery will be manipulated to systematically vary the task demands: tolerance (3 levels), velocity (3 levels), preview (3 levels). In experiment 2, three features of the visual scenery will be manipulated to vary the visual presentation without changing the task demands: visual gain (3 levels), optical flow density (2 levels), preview (3 levels). During this visuomotor tracking task, which comprises very small movements (5 degrees flexion/extension of the wrist joint), a haptic manipulator applies small torque perturbations to the wrist, which allows for identification of motor control strategies using SIPE techniques. Neuromechanical properties of the wrist (e.g., joint stiffness, joint damping, and reflexes) and tracking performance will be compared between the abovementioned visual conditions.

Study burden and risks

Expected duration of the protocol is 60 minutes for healthy subjects and 75 minutes for stroke patients. Actual measurements will take no longer than 25 minutes. Active task performance is warranted, but will only involve submaximal effort and small movements. Additional rest periods will be offered if necessary. Perturbation torques will be adjusted to each individual participant in order to elicit angular perturbations of approximately 1°. For patients, if possible, the measurement will be combined with a regular visit to the LUMC outpatient clinic, such that no extra travelling is required.

The risks of the assessment are minimal. The haptic manipulator is safe guarded against displacements larger than the wrist ROM of each individual participant. The motor and other moving or fragile parts are sufficiently insulated and equipment will be certified according to local regulations.

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

Healthy controls
- 50 years or older
- have command of the Dutch language
- normal function of both arms
- normal or corrected to normal vision;Stroke patients
- 18 years or older
- have command of the Dutch language
- registered at the LUMC

Exclusion criteria

Healthy controls
- lesions or diseases of the central nervous system
- other conditions that interfere with normal hand/arm function ;Stroke patients
- additional neurological diseases and/or orthopedic problems interfering with hand/arm function
- unable to comply with the protocol, i.e. insufficient general fitness or cognitive/communicative inability to understand instructions and participate in the measurement

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):	04-07-2014
Enrollment:	22
Type:	Actual

Ethics review

Approved WMO

Date:	28-04-2014
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	NL48220.058.14