Activation of prefrontal cortex in elderly people from Okinawa in comparison to elderly from the Nederlands

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

Summary

ID

NL-OMON48651

Source
ToetsingOnline

Brief title
Brain activation in elderly from Okinawa

Condition

- Neurological disorders NEC

Synonym
cognition, Healthy ageing

Research involving
Human

Sponsors and support

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

Intervention

Keyword: Cognition, Elderly, fNIRS, Okinawa

Outcome measures

Primary outcome

1. Differences in frontal brain activation (at equal or better performance levels) on a verbal fluency task compared between Okinawan and Dutch elderly.

2. Differences in frontal brain activation (at equal or better performance levels) on memory processing of meaningless shapes between Okinawan and Dutch elderly.

3. Differences in leftward lateralisation (as young people do) for brain activation during a verbal fluency task between Okinawan and Dutch elderly.

Secondary outcome

Correlation of HbO levels and lateralization index with performance on cognitive tests, APOE4 gene variation, SFS scores and PASE scores .

Study description

Background summary

Aging is characterized by the decline of certain cognitive functions. More specifically, key cognitive functions such as memory and executive functioning (e.g., planning, mental flexibility, inhibition and working memory updating) have consistently been shown to decline with age (Ardila et al., 2000). Okinawan elderly have been reported to be in better health in comparison to elderly in Western Europe, the United States of America, or even in comparison to mainland Japan (Willcox & Willcox, 2014). That is, Okinawan elderly suffer significantly less from age-related diseases, including neurodegenerative disorders such as senile dementia (Ogura et al. 1995). Okinawa also counts with a disproportionate number of centenarians. Indeed, by several measures of health and longevity the Okinawans can claim to be the world's healthiest and longest-lived people (Willcox et al., 2016). This can be attributed in small

part to genetic differences and to a larger extent to environmental variables, such as diet (Willcox et al., 2016).
However, there is a lack of research studying functional brain characteristics of successful aging as found in Okinawan elderly. The current study is designed to take the first step in this regard. Specifically, we want to investigate brain activation during executive functioning in Okinawan elderly as compared to Western-European elderly (in this case, Dutch elderly).

Study objective

We aim to investigate, for the first time, differences in frontal activation between healthy elderly people from Okinawa and the Netherlands. We predict that the Western European elderly will show an "MCI-light" pattern, whereas the Okinawan elderly may have a more "youthful pattern" (i.e. need less activation to perform the task and the activation will be lateralised more to the left hemisphere during verbal fluency).
Another aim is to investigate memory functioning in the same groups, given its sensitivity to aging. Memory functioning has also been investigated in elderly people using fNIRS during memory encoding (Ferreri et al., 2014) and memory retrieval (Obayashi and Hara, 2013).Here we will investigate differences in the right PFC activation in elderly Western European and Okinawan subjects during this memory retrieval of meaningless shapes task.

Study design

Eighty healthy elderly adults (age 65-80) will participate in two research centra: Groningen (n=40) and Okinawa (n=40). They will perform two cognitive tasks while their brain activation is recorded over the dorsolateral prefrontal cortex (bilaterally) using fNIRS.
Cognitive tests
We will include a brief cognitive assessment to be able to characterise the sample in terms of neuropsychological functioning. This test battery will include the Digit Symbol Substition test (from the WAIS-I), the Trail Making Test A and B, the Stroop color-word test and a verbal memory test (WMS paired-associates). For all mentioned tests validated Dutch and Japanese versions are available. In addition, the Mini-Mental State Evaluation (MMSE) will be included as a screening measure for general cognitive functioning, and for sake of comparison with extant research on cognitive aging and dementia.

fNIRS
The fNIRS cap will be placed on the participant*s head. Concentration changes of oxygenated (oxyHb) and deoxygenated (Hb) haemoglobin will be recorded using NIRS with 8 source and 8 detector optodes. Sources and detectors will be distributed on the PFC and FC on the following positions of the international 10/20 EEG system: from F1 to F5 and F7 on the left and from F2 to F6 and F8 on the right side.

Tasks
During fNIRS recordings, patients will perform a verbal fluency category task (VFC) and episodic memory task.

Study burden and risks

The study will consist of two sessions: the first for explaining the study to the participant and screening whether the all inclusion criteria are met (and no exclusion criteria). This will usually not take longer than 30 min. The second session concerns the neuropsychological testing and NIRS measurements, with a total duration of 70 min. The experiment will not involve more than minimal risks for the participants. NIRS is a standard brain mapping technique with no known negative effects on health.
The study is not intended to benefit the participants directly. Participants will receive a compensation for their contribution.

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

aged between 65 and 80 years old

Exclusion criteria

1. Current diagnosis of psychiatric or neurological illness
2. MMSE<27
3. Alcohol or drug abuse
4. Not fluent in the Dutch language / Japanese

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):	01-10-2019
Enrollment:	40
Type:	Actual

Ethics review

Approved WMO

Date:	03-04-2019
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

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	NL66442.042.18