

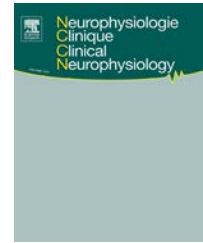


Disponible en ligne sur

**ScienceDirect**  
www.sciencedirect.com

Elsevier Masson France

EM|consulte  
www.em-consulte.com/en



ORIGINAL ARTICLE/ARTICLE ORIGINAL

# The effectiveness of neurofeedback on cognitive functioning in patients with Alzheimer's disease: Preliminary results



*L'efficacité du neurofeedback sur le fonctionnement cognitif chez les patients atteints de la maladie d'Alzheimer : résultats préliminaires*

Robin E. Luijmes<sup>a</sup>, Sjaak Pouwels<sup>b,\*</sup>, Jacko Boonman<sup>a</sup>

<sup>a</sup> Department of Medical Psychology, Catharina Hospital, Michelangelolaan 2, PO Box 1350, 5602 ZA Eindhoven, The Netherlands

<sup>b</sup> Department of Surgery, Catharina Hospital, Michelangelolaan 2, PO Box 1350, 5602 ZA Eindhoven, The Netherlands

Received 1st December 2015; accepted 20 May 2016

Available online 30 June 2016

## KEYWORDS

Alzheimer's disease;  
Cognition;  
Memory;  
Neurofeedback;  
Performance

## Summary

**Objectives.** – Alzheimer's disease (AD) is the most common form of dementia. In quantified EEG (qEEG), the AD patients have a greater amount of theta activity compared with normal elderly individuals. Little is known about the effect of neurofeedback in patients with dementia. The objective of this study was to examine whether neurofeedback has a positive effect on cognitive performance in patients with AD.

**Methods.** – Ten patients with qEEG meeting criteria for AD received neurofeedback training. Participants were aged between 61 and 90 years. All patients underwent the CAMCOG test designed to assess cognitive functioning pre- and post-treatment.

**Results.** – The individual results, analyzed with a reliable change index (RCI), showed that patients who received neurofeedback treatment had stable cognitive functions. These patients showed improvement in memory after neurofeedback and other cognitive functions were stable. In addition, an improvement was observed in recall of information and recognition.

\* Corresponding author. Tel.: +31 24 2399850; fax: +31 24 2399859.  
E-mail address: [sjaakpwl@gmail.com](mailto:sjaakpwl@gmail.com) (S. Pouwels).

**MOTS CLÉS**

Cognition ;  
 Maladie d'Alzheimer ;  
 Mémoire ;  
 Neurofeedback ;  
 Performance

*Conclusion.* – Patients with AD who received neurofeedback treatment had stable or improved cognitive performance. Future research should focus on the design of high quality randomized controlled trials to assess whether neurofeedback has a place in the treatment of AD.

© 2016 Elsevier Masson SAS. All rights reserved.

**Résumé**

*Objectifs.* – La maladie d'Alzheimer (MA) est la forme la plus commune de démence. En EEG quantifié (EEGq), les patients atteints de MA présentent une plus grande quantité d'activité thêta par rapport aux individus normaux de même âge. On connaît peu l'effet du neurofeedback chez les patients atteints de démence. L'objectif de cette étude était d'examiner si le neurofeedback pouvait avoir un effet positif sur la performance cognitive chez les patients atteints de MA.

*Méthodes.* – Dix patients, dont l'EEGq répond au modèle typique des patients atteints de MA, ont reçu une formation de neurofeedback. Les participants étaient âgés de 61 à 90 ans. Tous les patients ont passé le test CAMCOG conçu pour évaluer le fonctionnement cognitif avant et après traitement.

*Résultats.* – Les résultats individuels, analysés au moyen du « Reliable Change Index » (RCI), ont montré que les patients ayant reçu un traitement par neurofeedback avaient des fonctions cognitives tout à fait stables. Ces patients avaient de plus une amélioration de la mémoire après neurofeedback et les autres fonctions cognitives témoignaient d'une stabilité d'apprentissage. Enfin, les performances de rappel de l'information et de reconnaissance étaient également améliorées.

*Conclusion.* – Le neurofeedback a un effet positif sur les performances cognitives des patients atteints de MA. Les patients atteints de MA ayant reçu un traitement par neurofeedback ont stabilisé leurs fonctions cognitives ou amélioré certaines performances. Les recherches futures doivent se concentrer sur la conception d'essais contrôlés randomisés de grande qualité pour évaluer si le neurofeedback a une place dans le traitement de la MA.

© 2016 Elsevier Masson SAS. Tous droits réservés.

**Introduction**

Dementia is a syndrome characterized by progressive deterioration of cognitive function, most commonly of memory, but other domains such as language, praxis, visual perception and most notably executive function are also often affected. As cognitive function worsens, there is increasing interference with the patients' daily activities leading to loss of independence and eventually for some the need for nursing home care [23,24]. Dementia has an increasing incidence as people age. Dementia is a symptom of several clinical syndromes, of which Alzheimer's disease (AD) is the most common form. Seventy percent of all patients with dementia have AD. The diagnosis of 'probable' or 'possible' AD is made based on clinical criteria established by the National Institute of Neurologic and Communicative Disorders and Stroke—Alzheimer's disease and Related Disorders Association (NINCDS-ADRDA) [29]. Patients should have dysfunction of at least two or more areas of cognition (orientation to place and time, memory, language, praxis, attention, visual perception and problem solving skills), with progressive worsening of memory and other cognitive functions, no disturbance of consciousness and onset between ages 40 and 90, most often after the age of 65. Scales and inventories designed to screen for dementia contain orientation items, as these test functions that are sensitive to the most common dementing processes, such as both recent and remote memory, mental clarity, and some aspects of

attention. Other areas of common interest are fund of knowledge and language skills [27]. AD is associated with functional and structural alterations in a distributed network of brain regions supporting memory and other cognitive domains [2]. Current therapies to treat AD are minimally effective and do not alter the disease process [26]. They may ease symptoms by providing temporary improvement and reducing the rate of cognitive decline [9]. Although the available non-pharmacological therapies for dementia can help with the management of symptoms, there is a need to develop more effective interventions [19], of which neurofeedback is a promising one.

Neurofeedback refers to a form of operant conditioning in which desirable brain activity is rewarded and undesirable brain activity is inhibited [10]. Neurofeedback training works directly with the brain. Each participant trains at his or her own pace. Neurofeedback can facilitate changes in brain wave patterns. These brain wave patterns, or electrical activity, are registered with an electroencephalograph (EEG). The EEG bands are named according to frequency band as delta, theta, alpha and beta. Each brain wave frequency can be measured in terms of hertz and microvolts. Slower frequencies tend to have higher amplitudes than faster frequencies. Neurofeedback training is aimed at changing the amplitude of a selected frequency. Neurofeedback training has been successfully applied in the treatment of different disorders in adults and children. It has shown reliable positive effect in the treatment of

Download English Version:

<https://daneshyari.com/en/article/3081888>

Download Persian Version:

<https://daneshyari.com/article/3081888>

[Daneshyari.com](https://daneshyari.com)