

Cortical Auditory Evoked Potentials in subjects with Mild Cognitive Impairment and Alzheimer's disease: a cross-sectional study taking hearing loss into account

Vandenbroeke T (1), Gommeren H(1,2), Bosmans J (1,3), Carp G (1), Wouters K (1), Cardon E (1), Mertens G (1,2), Cras P (1,4), Engelborghs S (5,6), Van Ombergen A (1), Gilles A (1,2,7), Lammers M. J. W. (1,2), Van Rompaey V (1,2)

(1) Resonant Labs Antwerp, Department of Translational Neurosciences, Faculty of Medicine and Health Science, University of Antwerp, Antwerp, Belgium.

(2) Department of Otorhinolaryngology-Head and Neck Surgery, Antwerp University Hospital, Edegem, Belgium.

(3) Department of Brain and Cognition, KU Leuven, Leuven, Belgium.

(4) Department of Neurology, Antwerp University Hospital and Institute Born-Bunge, University of Antwerp, Antwerp, Belgium.

(5) Department of Neurology, Universitair Ziekenhuis Brussel and NEUR Research Group, Center for Neurosciences (C4N), Vrije Universiteit Brussel (VUB), Brussels, Belgium.

(6) Department of Biomedical Sciences, University of Antwerp, Antwerp, Belgium.

(7) Department of Education, Health & Social Work, University College Ghent, Ghent, Belgium.

Alzheimer's disease (AD) is the most common cause of dementia, accounting for 60-70% of all dementia cases. Early diagnosis and follow-up of disease progression are important for timely interventions. Cortical Auditory Evoked Potentials (CAEPs) have shown promising results as an early indicator for cognitive decline and disease progression. CAEPs represent the neural activity in response to auditory stimuli and can be extracted from the ongoing electroencephalography (EEG) signal. These measurements offer several advantages, such as being non-invasive, cost-effective, and language-independent. However, it is important to note that hearing loss alters CAEP morphology similarly to cognitive impairment, i.e. prolonged peak latencies and reduced peak amplitudes. Hearing loss is common among older adults and a known risk factor for the development of dementia. Nevertheless, studies investigating the effect of both cognitive impairment and hearing loss on CAEP morphology are lacking. In this study, we aimed to evaluate the effect of cognitive impairment on CAEP components while correcting for hearing loss. This cross-sectional study included 54 subjects with mild cognitive impairment (MCI) or AD and 54 cognitively healthy control subjects matched for sex, age, and hearing levels. CAEPs were evoked using a classic auditory oddball paradigm, consisting of a frequent stimulus (1000Hz tone) with a probability of 80% and a rare stimulus (2000Hz tone) with a probability of 20%. The CAEP waveforms were compared between cognitively impaired and cognitively healthy subjects. In this study, no significant alterations in CAEP morphology were observed in subjects with MCI or AD when the effect of hearing loss was considered. Additional CAEP studies investigating the effect of both cognitive impairment and hearing loss are needed to confirm these findings and to investigate the effect of both on CAEP morphology.