# Cerebrovascular lesions and vascular risk factors in patients with Alzheimer's disease

**Article** *in* Alzheimer's & dementia: the journal of the Alzheimer's Association · July 2012

DOI: 10.1016/j.jalz.2012.05.1410



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Depression-aMCI interactive effects were associated with global GM volume loss involving cortical and MTL structures ($P < 0.05$ FDR corrected; Figure 1). Depressive symptoms were negatively correlated and episodic memory performances were positively associated with GMV in similar brain regions as observed with LLD and aMCI respectively. Depressive symptoms, memory deficit interactive effects, were also seen globally, especially in the DMN and MTL regions. **Conclusions:** The interactive effects of LLD and aMCI are associated with GMV loss in crucial cognition and mood regulation structures. The co-existence of these clinical phenotypes may be a marker of AD.

## P3-189 TRAINING-RELATED CHANGES IN PATIENTS WITH MILD COGNITIVE IMPAIRMENT: AN FMRI STUDY

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**Background:** Mild cognitive impairment is known as a high risk factor for later developing dementia. Although there is a lack of pharmacological treatment possibilities, there are some studies that report a benefit in memory functions and activities of daily living due to cognitive and/or motor training intervention. So far only one study investigated whether there are related functional changes. **Methods:** The present study included 38 patients with amnestic MCI who ran a 12-week combined motor-cognitive intervention and did a memory task in functional MRI (1,5T) before and after the training intervention. Cognitve functions were assessed due to neuropsychological testing. **Results:** Significant changes were observed in both behavioral parameters (improvement of verbal learning parameters) and functional structures. **Conclusions:** Thus we could demonstrate that due to a cognitive and motor intervention, not only memory function improves, but that there are also corresponding brain structures that show a change of activation pattern that can be related to the memory improvement.

## P3-190 CEREBROVASCULAR LESIONS AND VASCULAR RISK FACTORS IN PATIENTS WITH ALZHEIMER'S DISEASE

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**Background:** Since the Nun Study in which cerebrovascular lesions (CVLs) were closely associated with the presence and severity of clinical symptoms in Alzheimer's disease (AD), vascular lesions have been drawing attention in understanding the pathophysiology underlying AD patients, especially elderly AD cases. The present study was conducted to elucidate the relationship between the CVLs and vascular risk factors (VRFs) in elderly AD patients. **Methods:** The present study was based on 120 cases (41 men and 79 women) who were diagnosed as having probable AD cases according to the NINCDS-ADRDA criteria. Their mean age was 75.6 years. All subjects underwent 1.5 Tesla MRI, neuropsychological evaluation and laboratory tests including brain natriuretic peptide (BNP) and ApoE. Hypertension, diabetes mellitus (DM), dyslipidemia (DL), congestive heart failure (CHF), coronary artery disease (CAD), atrial fibrillation (AF) and hypotension were regarded as VRFs. The subjects were divided into two age groups: young-old group (YOG) consisting of 55 cases who were younger than 75 years and old-old group (OOG) consisting of 65 cases who were 75 years or older. **Results:** Seventeen cases (14.2%) had 1 VRF, 46 cases (38.3%) had 2 VRF2, 37 cases (30.8%) had 3 VRFs and 15 cases (12.5%) had 4 VRFs. 69 cases (57.5%) had APOE-ε4. On MRI findings, only 10 cases (8.3%) showed brain atrophy without CVLs, 61 cases (50.8%) showed lacunar lesions, 46 cases (38.3%) showed leuko-araiosis in addition to the brain atrophy, and 3 cases (2.5%) were diagnosed as having a superficial siderosis. Forty-three cases (66.2%) showed lacunar lesions in OOG, whereas only 18 cases (32.7%) showed lacunar lesions in YOG. Thalamic lacunar lesions were detected in 18 cases (15.0%) and basal ganglionic lacunar lesions were seen in 64 cases (54.2%). Old microbleeds (OMBs) were detected in 13 of 51 (17.5%) cases with APOE-ε4, whereas only 7 of 69 (10.1%) cases without APOE-ε4 showed OMBs. More marked leuko-araiosis was observed in OOG and in YOG. **Conclusions:** As the severity of CVLs was associated with age number of VRF in our AD patients, VRFs may modify the pathophysiology and clinical presentation in elderly AD patients.

## P3-191 MULTISCALE PERMUTATION ENTROPY ANALYSIS OF EEG IN MILD PROBABLE ALZHEIMER'S PATIENTS DURING AN EPISODIC MEMORY PARADIGM

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**Background:** Previous studies have shown that nonlinear analysis methods based on information theory can be useful for characterising the nature of differences in the complexity of the EEG background activity between patients with Alzheimer's disease (AD) and controls. It is currently not known whether this method can be meaningfully applied to the EEG of subjects during task execution. Here we utilize the Multiscale Permutation Entropy (MPE), an algorithm designed to explore the local order structure of a dynamical time series and output a quantitative measure of its irregularity. This is applied to the EEG of mild AD patients and controls in the context of a cross-modal episodic memory paradigm over both spatial and temporal scales. **Methods:** The memory task was completed by 63 non-medicated, newly diagnosed AD patients (MMSE: mean = 23.69, SD = 2.65) and 73 healthy age-matched controls (MMSE: mean = 28.7, SD = 1.64). For each trial corresponding to a correct response, we performed a fine-to-coarse multiscale method that decomposes the signal into 8 temporal scales using a sample averaging technique. For each scale we then calculated the entropy of the distribution of ordinal patterns contained within the time series, and calculated a trim mean for each channel. The channels were grouped into 5 broad anatomical regions, frontal, left and right centro-temporal, central, and parieto-occipital. **Results:** The results showed differences between patient and control groups in the EEG while performing a task, at left and right centro-temporal electrode regions. Specifically, AD patients had significantly lower EEG complexity in the temporal scales 5 to 7 than controls ($P$-values $< 0.005$). No significant differences in EEG complexity between groups were found in smaller scales. **Conclusions:** The findings demonstrate a difference in complexity of the brain signal over multiple scales between mild AD and control groups during task execution. Specifically, this manifests as a decrease in complexity in the AD group, which is most evident when contrasted with the control group in centro-temporal regions over coarser temporal scales. These findings suggest that the MPE may be a useful marker indicating deficits in task specific processing of information in mild AD.

## P3-192 RESISTANCE TRAINING PROMOTES COGNITIVE FUNCTIONS AND FUNCTIONAL PLASTICITY IN SENIOR WOMEN WITH PROBABLE MILD COGNITIVE IMPAIRMENT: A SIX-MONTH RANDOMIZED CONTROLLED TRIAL

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