

# Functional connectivity and recognition of familiar faces in Alzheimer's disease

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**Background:** Previous studies have reported that Alzheimer patients experience difficulties to recognize their own face on recent photographs. To date, few studies have explored the neural correlates of own face recognition abilities in Alzheimer patients, whereas, in healthy adults, neuroimaging studies related these abilities to a bilateral fronto-parieto-occipital network. The aim of our study was to explore the relationship between functional cerebral connectivity of key regions within this network and face recognition abilities.

**Methods:** 20 moderate Alzheimer patients (Mean age: 74.2±6.2, MMSE: 19.1±5.7) and 20 healthy elderly matched controls (Mean age: 74.3±6.0, MMSE: 28.9±1.1) had to complete a behavioral face recognition task where they discriminated between their own face, the face of a close relative and unknown faces on the basis of photographs from different life periods (from age 20 to current age). The patient group also underwent a resting-state fMRI acquisition. Behavioral results were analyzed by using non-parametric statistic tests. Regarding fMRI, group independent component analyses (ICA) was used to identify brain networks in Alzheimer patients. Seed to voxel analyses were then performed to measure connectivity of a given seed region and other regions of the brain using regions of interest (ROIs) from the literature. Correlations between connectivity maps and behavioral recognition scores were then performed.

**Results:** At the behavioral level, Mann-Whitney tests revealed that patients had significantly poorer performance than their healthy elderly matched controls for recognizing their own face and the face of a relative on photographs. More particularly, difficulties were evidenced when patients had to recognize themselves on photographs taken at recent periods of their life (65 years and more). fMRI results showed highly significant negative correlations between each recognition score (self recognition, recent self recognition and relatives recognition) and connectivity between the medial prefrontal cortex and the right superior frontal gyrus.

**Conclusions:** These results suggest that the higher the connectivity between the medial-prefrontal cortex and the right superior-frontal gyrus, the lower the self and relatives face recognition scores. In previous studies, the superior frontal region has been linked to control processes rather than face recognition processes and these results might thus reflect less segregation and more interference between networks in Alzheimer's disease. In other words, the association between increased connectivity and poorer recognition scores found in our study could reflect functional de-differentiation of specific brain regions in Alzheimer patients.

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