

Distinct profiles of impaired associative memory and underlying cerebral networks in Alzheimer's disease

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Binding allows the integration of features within stimuli and the encoding of relations between distinct stimuli into complex memories. The current study investigated the impact of Alzheimer's disease (AD) on conjunctive and relational binding in long-term episodic memory. Thirty patients with mild Alzheimer's disease (AD) and 24 healthy older adults performed a source memory task where items were associated to a background color. In one condition, relational binding was promoted by the instruction to associate the item with another object of the same color as the background. In the other condition, color had to be integrated as an item feature (conjunctive binding). In the patients, performance in each condition was correlated with cerebral metabolism measured by fluorodeoxyglucose-positron emission tomography. The results showed that AD patients had an impaired capacity to remember the color associated to each item, with disproportionate deficit in conjunctive memory. Performance in each condition correlated with metabolic activity in distinct regions. Poor conjunctive memory was related to hypometabolism along the collateral sulcus. Functional connectivity analyses of resting-state functional magnetic resonance images in a subset of patients confirmed that these regions belong to an anterior medial temporal lobe-ventral visual network. In contrast, there was a correlation between relational memory scores and metabolism in the anterior medial prefrontal cortex, which was functionally connected to the posterior cingulate cortex in the default mode network. These findings point to heterogeneous alteration of relational and conjunctive long-term binding in Alzheimer's disease associated to the dysfunction of regions within distinct functional networks.

Keywords: relational memory, conjunctive memory, binding, Alzheimer's disease, FDG-PET, seed-voxel analyses, resting-state fMRI, default mode network.