

Neural networks mapped in dementia patients

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Different types of dementia show dissimilar changes in brain activity. A network mapping technique described in the open access journal *BMC Neuroscience* has been applied to EEG data obtained from patients with Alzheimer's disease (AD) and frontotemporal lobar degeneration (FTLD, a less common type of dementia with more prominent behavioral symptoms).

Willem de Haan and a team of researchers from VU University Medical Center in Amsterdam, The Netherlands, used a mathematical technique called graph theory to evaluate the communication between brain areas in patients with [dementia](#). He said, "By applying concepts from this theory to brain recordings, we can study the dynamic and distributed nature of mental activities. The underlying idea is that cognitive dysfunction can be illustrated by, and perhaps even explained by, a disturbed functional organization of the whole brain network".

The researchers found that the brain activity networks of those with AD had become more random and unstructured, a deviation from the optimal balance between local specialization and global integration that was seen in individuals without dementia. Speaking about these results, de Haan said, "We expected to find something along these lines, since in a recent magnetoencephalography (MEG) study with AD patients we found similar changes". The researchers claim that these results support the 'disconnection syndrome' hypothesis of AD; deterioration of cognition due to loss of functional connectivity and organization.

Contrary to the researchers' expectations, patients with FTLD developed a more ordered network organization, possibly reflecting a very different underlying disease process. According to de Haan, "This is intriguing, especially since diagnosing FTLD can be difficult. We expect that this approach can be further developed to gain more insight into the different types of dementia and into the relation between [brain](#) damage and cognitive problems in general".

More information: Functional neural network analysis in frontotemporal dementia and Alzheimer's disease using EEG and graph theory; Willem de Haan, Yolande A L Pijnenburg, Rob L M Strijers, Yolande van der Made, Wiesje M van der Flier, Philip Scheltens and Cornelis J Stam; [BMC Neuroscience](#) (in press), www.biomedcentral.com/bmcneurosci/

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