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Review

Relationship between neuronal network architecture and naming performance in temporal lobe epilepsy: A connectome based approach using machine learning

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Abstract

Impaired confrontation naming is a common symptom of temporal lobe epilepsy (TLE). The neurobiological mech
indicate a structural d
naming ability. Import
by contrasting the neu
become possible to e
evaluate the neuronal networks that support naming in TLE by using a machine learning algorithm intended to predict naming performance in subjects with medication refractory TLE using only the structural brain connectome reconstructed from diffusion tensor imaging. A connectome-based prediction framework was developed using network properties from anatomically defined brain regions across the entire brain, which were used in a multi-task machine learning algorithm followed by support vector regression. Nodal eigenvector centrality, a measure of regional network integration, predicted approximately 60% of the

variance in naming. The nodes with the highest regression weight were bilaterally distributed among perilimbic sub-networks involving mainly the medial and lateral temporal lobe regions. In the context of emerging evidence regarding the role of large structural networks that support language processing, our results suggest intact naming relies on the integration of sub-networks, as opposed to being dependent on isolated brain areas. In the case of TLE, these sub-networks may be disproportionately indicative naming processes that are dependent semantic integration from memory and lexical retrieval, as opposed to multi-modal perception or motor speech production.

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