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Abstract

IMMS, P., A. Clemente, M. Cook, W. D'Souza, P. H. Wilson, D. K., Jones & K. Caeyenberghs. Insights into traumatic brain injury from graph theory: A meta-analysis. NEUROSCI BIOBEHAV REV 95(1) XXX-XXX, 2018. - Although recent structural connectivity studies of traumatic brain injury (TBI) have used graph theory to evaluate alterations in global integration and functional segregation, pooled analysis is needed to examine the robust patterns of change in graph metrics across studies. Following a systematic search, 15 studies met the inclusion criteria for review. Of these, ten studies were included in a random-effects meta-analysis of global graph metrics, and subgroup analyses examined the confounding effects of severity and time since injury. The meta-analysis revealed significantly higher values of normalised clustering coefficient (g=1.445, CI=[0.512, 2.378], p=0.002) and longer characteristic path length (g=0.514, CI=[0.190, 0.838], p=0.002) in TBI patients compared with healthy controls. Our findings suggest that the TBI structural network has shifted away from the balanced small-world network towards a regular lattice. Therefore, these graph metrics may be useful markers of neurocognitive dysfunction in TBI. We conclude that the pattern of change revealed by our analysis should be used to guide hypothesis-driven research into the role of graph metrics as diagnostic and prognostic biomarkers.