

Can transcranial photobiomodulation improve cognitive function in TBI patients? A systematic review

Introduction: Transcranial photobiomodulation (tPBM) is a non-invasive neuromodulation technology which has become a promising therapy for treating many brain diseases. Although it has been confirmed in studies targeting neurological diseases including Alzheimer's and Parkinson's that tPBM can improve cognitive function, the effectiveness of interventions targeting TBI patients remains to be determined. This systematic review examines the cognitive outcomes of clinical trials concerning tPBM in the treatment of traumatic brain injury (TBI).

Methods: We conducted a systematic literature review, following the PRISMA guidelines. The PubMed, Web of Science, Scopus, EMBASE, and Cochrane Library databases were searched before October 31, 2023.

Results: The initial search retrieved 131 articles, and a total of 6 studies were finally included for full text-analysis after

applying inclusion and exclusion criteria.

Conclusion: Results showed improvements in cognition for patients with chronic TBI after tPBM intervention. The mechanism may be that tPBM increases the volume of total cortical gray matter (GM), subcortical GM, and thalamic, improves cerebral blood flow (CBF), functional connectivity (FC), and cerebral oxygenation, improving brain function. However, due to the significant heterogeneity in application, we cannot summarize the optimal parameters for tPBM treatment of TBI. In addition, there is currently a lack of RCT studies in this field. Therefore, given this encouraging but uncertain finding, it is necessary to conduct randomized controlled clinical trials to further determine the role of tPBM in cognitive rehabilitation of TBI patients.

Keywords: brain function; cognitive function; parameters; transcranial photobiomodulation; traumatic brain injury.