

University of Houston - Biomedical Engineering Seminar

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Via Zoom:

<https://uh-edu-cougarnet.zoom.us/j/97219977403?pwd=V0lRTGhJMTdDQ1dwUDRJcGhYNTVFZz09>

Transcranial near-infrared stimulation enhances cerebral metabolism, connectivity, and EEG powers in healthy humans



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Abstract

Transcranial photobiomodulation (tPBM) is a new non-invasive means to neuro-stimulate the human brain using near-infrared (NIR) light, which has been reported to improve cognition and memory. However, few objective measures to quantify underlying mechanism of tPBM have been reported. In recent studies, our group has demonstrated that tPBM with 1064-nm laser, when being delivered regionally on the human forehead for 8 min, can significantly enhance cerebral hemodynamic concentrations, metabolic activities, and electroencephalogram (EEG) powers at both alpha and beta rhythms across the entire scalp. Besides, we utilized a 111-channel functional near infrared spectroscopy (fNIRS) system to map cerebral hemodynamic responses over the whole head to the same tPBM. Our novel findings revealed that tPBM significantly increased topographical functional connectivity between the frontal stimulation site and the central as well as parietal regions.

Biosketch

Hanli Liu received her MS and PhD in physics from Wake Forest, followed by a postdoc at Penn. She is a Distinguished University Professor of Bioengineering at the University of Texas at Arlington. She is also a Fellow of AIMBE.

Her expertise lies in the field of near-infrared spectroscopy of tissues, functional optical brain imaging, transcranial photobiomodulation (tPBM), and their clinical applications. Dr. Liu has published over 130+ peer-reviewed journal papers and 140+ conference proceeding papers or abstracts. In recent years, Dr. Liu has led her team to the success of non-invasive quantification of cerebral hemodynamic and metabolic enhancement induced by tPBM with laser, facilitating tPBM as a clinical tool for cognition enhancement in healthy aging and in patients with brain disorders.