

Study of brain high-order interactions to evaluate therapy effects in migraine patients

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Monoclonal antibodies against calcitonin gene-related peptides (CGRP) such as Galcanezumab (GCA), have revolutionized the therapeutic scenario in migraine. Even though they are clinically effective, how anti-CGRP treatment reduces migraine attacks still remains unclear. We carried out an observational case-control study aimed at studying how the interaction between metabolic and electrical brain connectivity changes after 3 months of treatment with Galcanezumab in order to have a better insight on the GCA action and effects. Network representation is becoming increasingly popular for the description of brain connectivity, however the traditional methods to evaluate network links based on pairwise interaction measures cannot reveal high-order effects involving more than two nodes. High-order interactions are required across brain regions to perform specific functions. These functional interdependencies are described by synergistic information that can be obtained by combining the information from all the sources considered and redundant information that can be provided by any single source. We applied innovative graph theory methods to electroencephalographic (EEG) and functional near infrared spectroscopy (fNIRS) from 20 migraine patients and 10 controls by extending the concept of pairwise connectivity to higher-order interactions. Our results show how two nodes interact in a redundant or synergistic way with the rest of the network in migraine patients before and after 3 month of treatment with GCA giving important information on how GCA makes EEG and fNIRS hyperconnectivity due to migraine revert into normal ranges.

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Beyond Neural Connectivity: Exploring Higher Order Interactions in the Brain

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No

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