Electroconvulsive Therapy Modulates Loudness Dependence of Auditory Evoked Potential: an MEG study

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Abstract

Objective

❖ Determine the effect of electroconvulsive therapy on serotonin (5-hydroxy-tryptamine, 5-HT) function within subjects with major depressive disorder (MDD).

ECT

❖ “Gold” standard of treatments for MDD
❖ Ultra brief pulse right unilateral protocol
❖ Stimulus strength exceeds threshold required to induce generalized seizure in anesthetized patients
❖ Alters several 5-HT-receptor subtypes’ functions in the central nervous system

Patient Characteristics

❖ 9 patients (6 females) with major depressive disorder
❖ Age = 68.1 ± 10.7
❖ Baseline HAMD24 = 37.2 ± 12.8
❖ Post ECT HAMD24 = 9.1 ± 7.6 (6 responders)

LDAEP

❖ Loudness Dependence of Auditory Evoked Potential: indicates change in amplitude of N100/P200 component as a function of sound intensity (dB)
❖ Correlate of central serotonergic neurotransmission (CSN)
❖ Concept: CSN modulates sensitivity of cortical neurons in PAC
❖ High LDAEP reflects low CSN; low LDAEP reflects high CSN

Data Processing

❖ Performed on Brainstorm 3 (channel removal, heartbeat/eyeblink detection, independent component analysis, signal space projection, bandpass/notch filter, linearly constrained minimum variance, z-score normalization)

Results

A. Baseline

B. Post ECT

Discussion

❖ Previous research has established an inverse relationship between LDAEP and CSN, ECT increases CSN
❖ We hypothesized ECT would decrease LDAEP
❖ Although ECT was successful in treating MDD, we found that it increases LDAEP
❖ Research also shows that LDAEP is positively correlated with dopamine neurotransmission
❖ Alternative hypothesis: the antidepressant effect of ECT may be mediated via increased dopamine neurotransmission