Global Collaborative Study for Depression and ECT

Akihiro Takamiya, MD
Department of Neuropsychiatry, Keio University School of Medicine, Tokyo, Japan
Laboratory for Translational Neuropsychiatry, Department of Neurosciences, KU Leuven, Leuven, Belgium

Abstract
Depression is a common, disabling, and debilitating psychiatric disorder; indeed, it is the leading cause of disability worldwide. First-line treatments, including antidepressant medications and psychotherapy, are effective only for two-thirds of depressed patients, and the remaining one-third of patients are categorized as treatment-resistant depression (TRD). Electroconvulsive therapy (ECT) is an established treatment that uses electricity to produce a seizure for therapeutic purposes under general anesthesia. ECT is the most effective and rapid antidepressant treatment for TRD. However, it still remains unclear how ECT exerts its antidepressant effect and what constitutes reliable predictors for ECT response.

Our group has been conducting a longitudinal MRI study to address these two questions. So far, we have reported that ECT increases volumes of the dentate gyrus only in remitted patients (Takamiya et al., 2019a), which is consistent with the results of previous animal studies. We also reported that changes in the right hippocampal functional connectivity with the prefrontal cortex were associated with clinical improvement (Takamiya et al., 2020 (under review)). In addition, pretreatment thalamic volume and resting-state activity predicted clinical outcomes after ECT (Takamiya et al., 2019b). Most recently, we have applied a machine learning approach to clinical and MRI datasets, and we have shown that our prediction model could predict clinical outcomes at an individual level (Takamiya et al., 2020).

However, longitudinal ECT studies have methodological challenges. Patients meeting the indications for ECT are often the most severe cases and are in need of urgent treatment. Therefore, most studies include only small sample sizes (e.g., 12–40 patients), which limits the generalizability of the results. To overcome this limitation, the Global ECT-MRI Research Collaboration (GEMRIC) was formed with the collaboration of more than 20 sites around the world. Our goal is to create a large database of multisite imaging data and clinical/behavioral/physiological data for investigating the neural mechanisms and predictors of ECT-related clinical response.