Electroconvulsive therapy (ECT) is one of the oldest forms of noninvasive brain stimulation, and is used to treat severe depression, catatonia, schizophrenia, and other conditions in clinics around the world. When electrodes are positioned to target fronto-temporal cortex, ECT is arguably the most effective treatment for severe major depression, with response rates and times superior to other available antidepressant therapies. A growing number of MRI studies also report remarkably consistent neuroplastic effects of ECT in depression, particularly increased gray matter in the hippocampi and surrounding tissue after acute treatment course. However, there is growing evidence that patterns of neuroplasticity differ in patients who respond to ECT, suggesting there may room for improvement in the application of ECT. In this talk, I will discuss MRI evidence that stimulation dose and seizure outcomes may influence neuroplasticity and antidepressant response in ECT, and explore how this information could be used to improve ECT and other brain stimulation therapies.