Transcranial magnetic stimulation (TMS) is a non-invasive technique used to stimulate the human brain \textit{in vivo} using very strong, pulsed magnetic fields. Magnets exist in the natural world in a very weak form, and technologic advances in the last 2 decades have made it possible for magnetic stimulators to produce sufficient electric current in the brain to cause neuronal depolarization.

Repetitive TMS (rTMS) is rapidly developing as a powerful, non-invasive tool for studying the human brain,\textsuperscript{1} and also as a novel treatment for neuropsychiatric disorders.\textsuperscript{2} The magnetic field strength used clinically (about 2 T) is about 40,000 times the earth’s magnetic field. Clinically, rTMS has been applied to treat mood and anxiety disorders, schizophrenia, movement disorders, and epilepsy. rTMS was first reported to have antidepressant efficacy in 6 medication-resistant patients with depression.\textsuperscript{3} Subsequently, there were many open and controlled studies of this novel therapy.

In a systematic review of data from 14 randomized controlled trials in patients with depression who received or did not receive rTMS, an effect in favor of rTMS was evident: after 2 weeks\textsuperscript{1} treatment, the standardized mean difference in Hamilton Rating Scale for Depression (HAM-D) score between the rTMS and control group was $-0.35$ (95\% confidence interval [CI] $-0.66$, $-0.04$); however, the standardized mean difference at a 2-week follow-up visit was not statistically significant ($-0.33$; 95\% CI, $-0.84$, 0.17).\textsuperscript{4} The authors suggested that studies were of low quality and provided insufficient evidence to support the use of rTMS in the treatment of depression.\textsuperscript{4} Further, in a randomized controlled comparison of electroconvulsive therapy (ECT) with rTMS in severe and resistant, nonpsychotic, major depression, the response rate was almost the same between the 2 groups.\textsuperscript{5} However, as rTMS is non-invasive and has only few, mild, adverse effects compared with ECT, it is highly acceptable to both patients and therapists.

In this issue of the journal, Huang et al\textsuperscript{6} report an open trial of rTMS as add-on therapy to antidepressants in 11 patients with medication-resistant depression. This is the first rTMS study in psychiatric patients in Taiwan. The patients, 3 males and 8 females (mean age, $40.6 \pm 11.7$ years), received a 2-week regimen of rTMS (100\% of motor threshold; 5 Hz; 8 sec; 40 trains/20 mins/day; 10 weekdays) besides their original antidepressant therapy. In 10 patients who completed the trial, the response rate (50\% reduction of HAM-D score) was 50\%, and 2 patients experienced complete remission (HAM-D score $\leq 7$). One patient withdrew from the trial because of intolerable headache after the third rTMS session. Mild headache immediately after rTMS was frequently reported, but no other adverse effects were reported. From this preliminary study, the authors suggested that rTMS might improve mood in Taiwanese patients with medication-resistant depression.\textsuperscript{6}

The mechanisms by which rTMS may treat depression remain unclear. In animal studies, rTMS was reported to induce ECT-like changes in rat brain monoamines, $\beta$-adrenergic receptor binding, and gene induction.\textsuperscript{2} In humans, most results have come from neuroimaging studies; indeed, TMS combined with positron-emission tomography or functional magnetic resonance imaging may permit precise elucidation of changes in brain biochemistry and physiology.\textsuperscript{7} Importantly, as rTMS appears to be highly acceptable to patients with depression, the acquisition of clinical experience with this novel therapy is now warranted here in Taiwan.

*Correspondence to: Dr. Shih-Ku Lin, Department of Adult Psychiatry, Taipei City Psychiatric Center, 309, Sung-Te Road, Taipei 110, Taiwan, R.O.C.
E-mail: sklin@tpech.gov.tw • Received: November 30, 2004 • Accepted: December 28, 2004
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