

Further Evidence of the Usefulness of MRI-Based Neuronavigation for the Treatment of Depression by rTMS

To the Editor: Repetitive transcranial magnetic stimulation (rTMS) is known to have therapeutic effects in drug-resistant depression when it is applied over the dorsolateral prefrontal cortex (DLPFC), both for high-frequency, left-sided rTMS and low-frequency, right-sided rTMS.¹ The DLPFC, or “area 9/46,” is a large cortical area traditionally comprising both brodmann areas (BA) 9 and 46.² Although rTMS is considered a promising therapy, its therapeutic effects remain modest. This may result from the fact that imaging studies to date have failed to identify which of the two subregions gives the optimal antidepressive effects.² Furthermore, the “5-cm method,” the method used in almost all rTMS depression studies to date to target the DLPFC, may not be precise enough.³ We report, here, the case of a patient who recovered from a major drug-resistant depressive episode thanks to low-frequency rTMS with targeting of the BA 9, using MRI-based neuronavigation.

Case Report

A 50-year-old man, suffering from a major drug-resistant depressive episode that had evolved over 2 years in a context of unipolar depression, was referred to our

department for rTMS therapy. For this patient, we decided to deliver 1-Hz rTMS sessions (360 pulses per session, 120% motor threshold) 1 week after all psychotropic drugs were stopped. MRI-based neuronavigation was used to localize the cortical site of stimulation (eXimia NBS Navigation System). We first used the “5-cm method” to target the DLPFC, which consists in localizing the motor cortical site that stimulates the abductor pollicis brevis muscle of the contralateral hand, and then measuring 5 cm anteriorly along the scalp surface in order to target the DLPFC.³ However, in our patient, as this method gave a cortical site outside BA 9 (in fact, in BA 8), the coil was moved to 6 cm anterior to the primary motor cortex in order to target BA 9 (figure 1). After the patient had received daily rTMS sessions from monday through friday for 6 weeks and then two rTMS sessions per week for 4 weeks, the Montgomery-Asberg Depression Rating Scale and the Hamilton Rating Scale for Depression scores, initially evaluated at 32/60 and 23/63, dropped to 8/60 and 05/63.

Discussion

This case shows the importance of MRI-based neuronavigation to localize the DLPFC. First, MRI-based neuronavigation takes into account variations in individual brain anatomy and gives precise data which are not available with the “5-cm method.” In our patient, the “5-cm method” gave a target posterior to the DLPFC, as was the

case in Herwig’s study, in which 15 of the 22 subjects studied had the target placed too far back to reach the DLPFC.⁴ Second, using MRI-based neuronavigation, various areas of DLPFC subregions such as BA 9 and BA 46 can be easily individualized. The choice to stimulate either area can increase the efficacy of the rTMS therapy. As in our case, targeting the BA with MRI-based neuronavigation can lead to clinical remission of drug-resistant depressive episodes. Thus, BA 9 appears to be a promising area to target in rTMS therapy.

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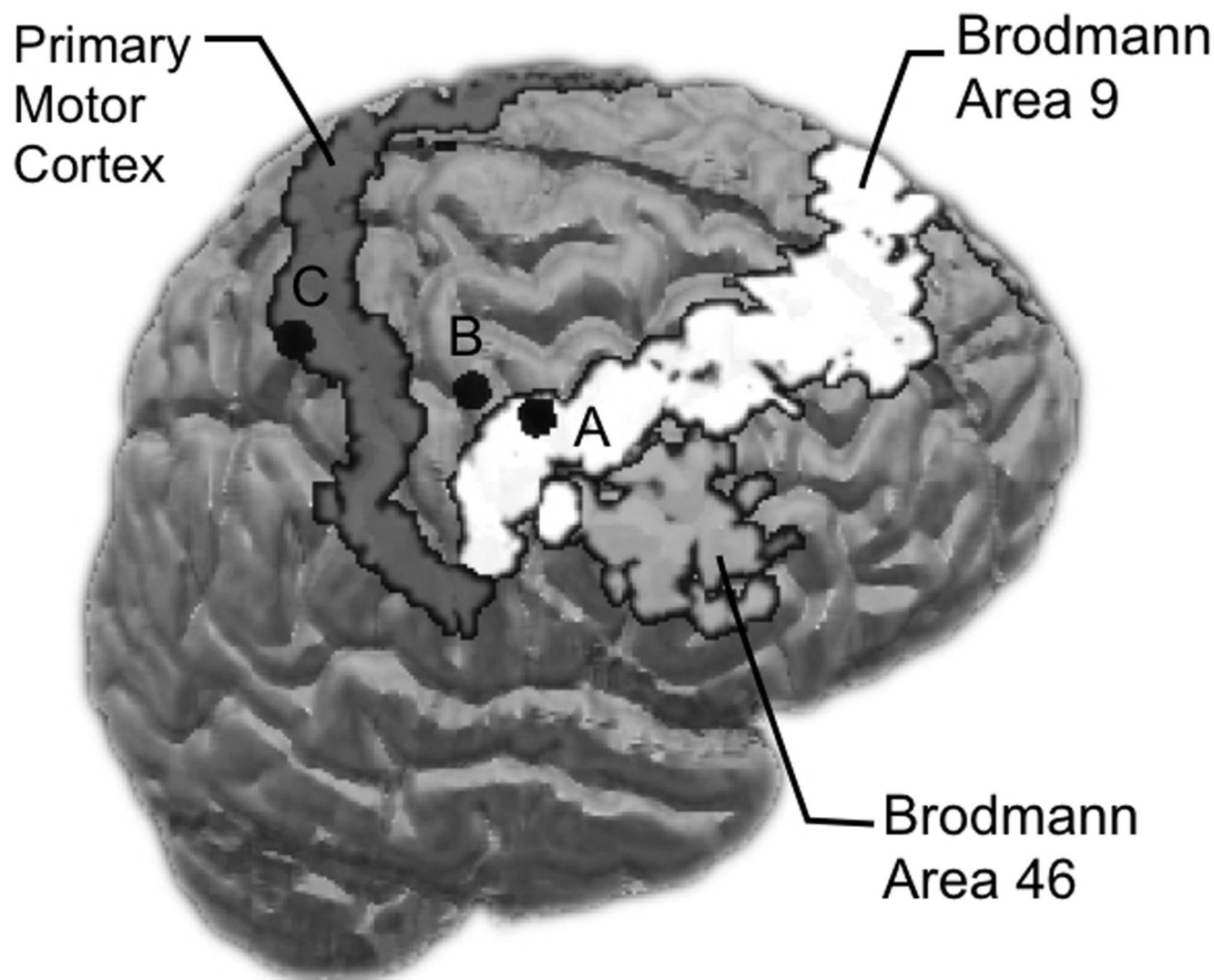
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FIGURE 1. Areas to Receive Repetitive Transcranial Magnetic Stimulation (rTMS)

Further evidence of the interest of using MRI-based neuronavigation for the treatment of depression by rTMS

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[A] Cortical target 6 cm. anterior to motor cortex; [B] Cortical target defined by the "5-cm. method;" [C] Cortical site that stimulates the thumb.