

DBS vs TMS for treatment-resistant depression: A comparison

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Approximately 20% to 30% of patients with major depressive disorder do not respond to pharmacotherapy.¹ For patients with treatment-resistant depression (TRD)—typically defined as an inadequate response to at least 1 antidepressant trial of adequate dose and duration—neurostimulation may be an effective treatment option.

Two forms of neurostimulation used to treat TRD are deep brain stimulation (DBS) and transcranial magnetic stimulation (TMS). In DBS, electrodes are placed within the patient’s cranium and affixed to specific target locations. These electrodes are electrically stimulated at various frequencies. Transcranial magnetic stimulation is a noninvasive treatment in which a magnetic field is produced over a patient’s cranium, stimulating brain tissue via electromagnetic induction.

Media portrayals of most alternative therapies are inaccurate.² In addition, the negative cognitive changes seen in depression mean patients are less likely to effectively compare the advantages and disadvantages of alternative treatment options. Therefore, both patients and clinicians require education on these treatment options and their adverse effects.

In this article, I compare DBS and TMS, and offer suggestions for educating patients about the potential adverse effects and therapeutic outcomes of each modality.

Deep brain stimulation

Deep brain stimulation is FDA-approved for treating Parkinson’s disease, essential tremor, dystonia, and obsessive-compulsive disorder (OCD).³ It has been used

off-label for TRD, and some preliminary evidence suggests it is effective for this purpose. A review of 22 studies found that for patients with TRD, the rate of response to DBS (defined as >50% improvement on Hamilton Depression Rating Scale score) ranges from 40% to 70%.¹ Additional research, including larger, randomized, sham-controlled trials, is needed.

A consensus on the optimal target location for DBS has not yet been reached. Studies have had varying degrees of symptom improvement targeting the subgenual cingulate gyrus, posterior gyrus rectus, nucleus accumbens, ventral capsule/ventral striatum, inferior thalamic peduncle, and lateral habenula.¹

A worsening of depressive symptoms and increased risk of suicide have been reported in—but are not exclusive to—DBS. Patients treated with DBS may still meet the criteria for treatment resistance.

The lack of insurance coverage for DBS for treating depression is a deterrent to its use. Because DBS is not FDA-approved for treating depression, the costs (approximately \$65,000) that are not covered by a facility or study will fall on the patient.⁴

continued

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In studies of TMS for depression, response rates ranged from 47% to 58%

Patients may abandon hope for a positive therapeutic outcome if they must struggle with the financial responsibility for procedures and follow-up.⁴

Serious potential adverse events of DBS include infections, skin erosions, and postoperative seizure.⁴ Patients who are treated with DBS should be educated about these adverse effects, and how they may affect outcomes.

Transcranial magnetic stimulation

Transcranial magnetic stimulation is FDA-approved for treating depression, OCD, and migraine. Randomized, sham-controlled trials have found that TMS is effective for TRD.⁵ Studies have demonstrated varying degrees of efficacy, with response rates ranging from 47% to 58%.⁶

The most commonly used target area for TMS for patients with depression is the left dorsolateral prefrontal cortex.⁷ Potential adverse effects are relatively few and benign. The most serious adverse effect of TMS is a risk for seizure, which is reported to occur at a frequency of <0.1%.⁷

Although it varies by practice and location, the cost for an acute course of TMS (20 to 30 sessions) may range from \$6,000 to \$12,000.⁸ Most insurance companies cover TMS treatment for depression.

TMS: A more accessible option

Compared with DBS, TMS is a more affordable and accessible therapy for patients

with TRD. Further studies are needed to learn more about the therapeutic potential of DBS for TRD, and to develop methods that help decrease the risk of adverse effects. In addition, insurance coverage needs to be expanded to DBS to avoid having patients be responsible for the full costs of this treatment. Until then, TMS should be a recommended therapy for patients with TRD. If TRD persists in patients treated with TMS, consider electroconvulsive therapy.

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