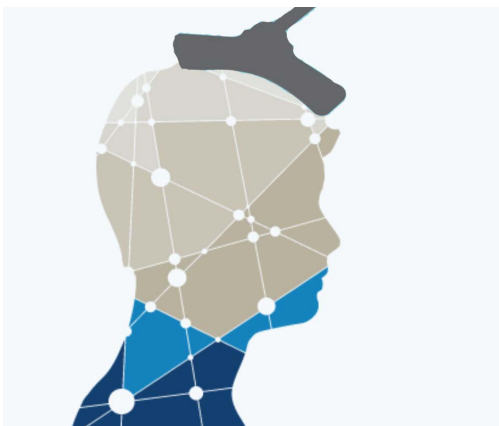


Transcranial Magnetic Stimulation (TMS) Therapy

How it's Used in the Treatment of Depression and Other Mood Disorders



What is transcranial magnetic stimulation (TMS)?

Transcranial magnetic stimulation (TMS) is an outpatient procedure that uses magnetic energy pulses to target the brain region responsible for mood regulation, improving communication between brain cells. Repetitive TMS (rTMS) involves delivering these pulses at regular intervals, resulting in lasting effects on brain function that can alleviate depression symptoms and enhance mood.

Magnetic stimulation applied to the brain may seem intimidating, leading some to draw parallels with electroconvulsive therapy. Nevertheless, the magnetic pulses utilized in TMS treatment mirror those in MRI machines, posing minimal risk. Unlike ECT, TMS does not necessitate sedation or recovery time, and does not result in memory or cognitive impairment. In reality, TMS often causes fewer side effects than traditional antidepressants for the majority of individuals.

What is TMS used for?

TMS therapy has received FDA approval for the treatment of major depressive disorder (MDD), obsessive-compulsive disorder (OCD), smoking cessation, anxious depression, and neuropathic pain. When standard treatments fail to provide satisfactory relief or when medication side effects are intolerable, TMS is often utilized. Unlike medications, TMS does not produce systemic side effects and has a high remission rate for depression. Additionally, TMS is approved for various common conditions in several European countries.

- Post-Traumatic Stress Disorder
- (PTSD) Stroke rehabilitation
- Schizophrenia
- Parkinson's disease
- Alzheimer's disease
- Chronic pain

TMS has even shown promise in off-label treatment (non FDA-approved) for conditions such as tinnitus, fibromyalgia, Tourette syndrome, autism spectrum disorder, early onset Alzheimer's disease, substance use disorders, personality disorders, cognitive enhancement, multiple sclerosis, and other conditions.

TMS for depression

Depression can significantly impact an individual's cognitive, emotional, and functional abilities on a daily basis. Despite attempts at self-help, therapy, or medication, some individuals may find it challenging to find relief, leading to a persistent feeling of hopelessness.

For those experiencing treatment-resistant major depression, transcranial magnetic stimulation (TMS) therapy could be a promising alternative. TMS targets the root cause of depression by utilizing magnetic fields to rebalance neurochemicals and neural pathways in the brain, similar to how antidepressants work chemically, but without all the debilitating side effects.

Types of TMS devices

A variety of TMS systems are available, including:

Surface transcranial magnetic stimulation (surface TMS) devices use a figure-of-8 magnetic coil which can penetrate 0.6 inches under the skull to reach specific brain regions.

Deep transcranial magnetic stimulation (dTMS) devices use a larger H-coil which allows the magnetic energy to penetrate deeper into the brain, up to 1.6 inches below the skull.

Rapid TBS (theta burst) therapy devices are considered just as safe and effective for the treatment of major depressive disorder as standard TMS, but these devices require sessions of just 3-6 minutes rather than the 20-40 minutes required by most TMS devices.

There are also simple brain stimulation devices that have been cleared by the FDA in the U.S. for use at home. However, these are not strictly TMS devices. Rather, they're classed as Cranial Electrotherapy Stimulation (CES) units which use electric currents instead of magnetic pulses to stimulate the brain. The effectiveness of these devices seems to be up for debate. As with any medical treatment for depression, it's important to discuss the best options with your doctor.

Effectiveness of TMS

The majority of clinical trials have shown positive outcomes in utilizing TMS for treating resistant depression. Approximately 70% of individuals with major depression who did not respond to medication see notable enhancements in their symptoms with TMS, with one-third achieving complete remission from depressive symptoms.

That doesn't mean that TMS is a cure for depression and that your depression symptoms won't return, though. In fact, the positive results from TMS tend to last for an average of about 10-12 months post-treatment. However, it's important to remember that depression is not just the result of a chemical imbalance but is caused by a combination of biological, psychological, and social factors. In other words, your lifestyle choices, control over negative thoughts and behaviors, and your coping skills also contribute to your depression. Therefore, you can use the improvements in your energy and drive following TMS therapy to begin making lifestyle changes—such as improving your diet, exercising, and building your support network—that can help preserve your state of remission from depression. Psychotherapy is encouraged, especially for those who struggle to maintain positive thoughts or those who may be in certain circumstances or situations that make it more challenging for them to receive the support they need. This will be beneficial to your outcome and the longevity of your remission.

What to expect during TMS treatment

TMS is a relatively short, noninvasive, non-drug, brief treatment typically done in the convenience of the doctor's office or clinic setting. That means it doesn't involve surgery, sedation, or anesthesia, and no down time is needed afterwards. You stay awake and alert throughout the treatment. TMS therapy is also non-systemic, which means that it has no effect on other areas of your body or cause any systemic side effects, like most antidepressant medications.

A typical TMS treatment course for depression includes daily sessions (5 times per week) for approximately 6 weeks, followed by a taper of six additional treatment sessions over a period of 3 weeks. Some people find it helpful to occasionally return for maintenance treatments following the initial treatment course to help maintain their state of remission. A TMS session generally lasts about 20 minutes. Some treatment devices or TMS systems allow for the treatment to be done in as little as 3 minutes (instead of a 19-minute treatment).

During TMS treatment

During your TMS treatment, the clinician will seat you in a comfortable chair, provide you with earplugs, and then place a magnetic coil on your head, near the area of the brain to be treated. In the case of depression, this area is called the left dorsolateral prefrontal cortex just above the left eyebrow. If being treated for other conditions, the treatment location may be different and is determined by the doctor or nurse practitioner in the initial treatment session, referred to as the 'mapping' session. During a typical treatment session:

Short electromagnetic pulses are administered through the coil. The magnetic pulses easily pass through your skull and cause small electrical currents that stimulate nerve cells.

- You'll hear clicking sounds and feel a tapping or tingling sensation on your head during each treatment
- You may feel some scalp discomfort during the treatment and for a short time afterward, but this typically subsides after the first few treatments as the scalp desensitizes.

After TMS treatment

Upon completion of your treatment, you're able to go straight back into your day, drive back to work or home, and continue on as normal.

TMS risks and side effects

Unlike the oldest brain stimulation therapy, electroconvulsive therapy (ECT), TMS has no effect on memory or mental clarity, and does not cause muscle aches or spasms or other undesired side effects. It also avoids the negative side effects of sedation required for ECT. The only side effects associated with TMS include temporary scalp discomfort and headaches. While about 1 in 15 TMS patients report a slight headache, it is typically relieved with over-the-counter medications and tends to diminish over the course of treatment.

About 1 in 15 patients report painful scalp sensations or facial twitching during the magnetic pulses, which also tend to diminish over the course of the treatment.

Repositioning the coil and adjusting the stimulation settings can also help to reduce these mild side effects.

The most serious risk of TMS is the possibility of producing a seizure—but the risk is very small at around .001%. There have only been a few documented cases of seizures occurring due to TMS treatment, which is generally due to a person having a low seizure threshold. If you have a high risk of seizure, such as with epilepsy, head injury, anorexia, or alcohol use disorder for example—then you're unlikely to be a candidate for TMS.

Long-term effects

TMS was FDA approved in the U.S. in 2008, and so far, there are no reported lasting negative effects associated with the treatment.

With time and continued research, TMS researchers will gain a better understanding on the long-term effects of TMS therapy.

Who cannot get TMS

In addition to those with epilepsy, TMS is not suitable for several other types of patients. Since TMS uses magnetic energy, people who have metal in or within 30 centimeters of the head are not able to receive TMS, with the exception of braces or dental fillings.

Examples of metal objects that would prevent TMS treatment include:

- Aneurism clips
- Stents
- Deep brain stimulators
- Metallic ear/eye implants
- Shrapnel or bullet fragments
- Pacemakers (a patient with a pacemaker should seek medical clearance)

Other factors that may preclude you from receiving TMS therapy include:

- A history of other mental health disorders, such as substance misuse or psychosis.
- Brain damage from illness or injury, such as a brain tumor, traumatic brain injury, or stroke.