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Transcranial Magnetic Stimulation (TMS): Information for Individuals and Families

Image credit: Neuromodulation Lab, Royal

Summary: Transcranial magnetic stimulation (TMS) is a treatment for brain conditions (such as depression) that uses magnetic fields to improve symptoms. It involves placing an electromagnetic coil against your scalp near the forehead. It is painless, non-invasive, and can be useful when other treatments have not helped or as an alternative to medication.

What is TMS?

TMS is a treatment that directs magnetic energy pulses at specific parts of the brain that are involved in brain conditions such as depression.

It is felt that in conditions such as depression, there is an imbalance in brain activity.

Magnetic pulses pass painlessly through the skull, and stimulate brain cells, helping with ‘neuromodulation’, i.e. rebalancing healthy patterns of activity.

TMS is a relatively new treatment compared to other treatments and requires special equipment. TMS is usually used when other usual treatments have been tried without success (e.g. talking therapy, medication or other treatments) (MacMaster, 2019; Voigt, 2019).

Terms

Because the magnetic pulses in TMS are repetitive, it is also known as repetitive TMS (rTMS).

What Does TMS Help With?

In Canada, TMS is a Health Canada-approved treatment for major depressive disorder. Similarly in the USA, TMS is FDA-approved for the treatment of major depressive disorder.
TMS is also being studied for other conditions such as eating disorders, obsessive-compulsive disorder (OCD), chronic pain, migraines, fibromyalgia, Tourette syndrome, autism spectrum disorder (ASD), multiple sclerosis and others.

What Does TMS Treatment Look Like?

TMS is delivered by trained personnel (e.g. nurses, technicians) in a clinic, doctor’s office or hospital that has a TMS device.

You start by seeing a clinic that offers TMS.
At the first appointment, the doctor will do an assessment which may include:

- Asking about symptoms such as depression to see if it might be helpful for you;
- Medical history such as:
  - Whether or not you are pregnant or thinking of becoming pregnant;
  - Presence of any metal or implanted medical devices in your body. Due to the strong magnetic field produced during TMS, the procedure is not recommended for some people who have metallic devices close to the stimulation site such as aneurysm clips or coils; stents; implanted stimulators such as vagus nerve or deep brain stimulators, pacemakers, medication pumps; cochlear implants; any magnetic implants; bullet fragments or any metal or objects in your body.
  - Any medications you are taking;
  - Family history of seizures or a family history of epilepsy.
  - Any past brain damage from illness or injury, such as a brain tumour, a stroke or a traumatic brain injury.
  - Any problems with frequent or severe headaches.

During Each Treatment Session

Treatment sessions involve sitting in a comfortable chair, with earplugs, with a magnetic coil placed against your head, and you will be awake during the whole time. When the machine is activated, you will hear clicking sounds and feel tapping on your forehead.
Typically, treatment involves 40-min. sessions, done once daily, five days a week (Mon-Fri), for 4-6 weeks.
Newer TMS technologies, such as theta-burst stimulation (TBS) are much quicker, involving only 3-4 min. Daily sessions are done five days a week (Mon-Fri) for 4-6 weeks. This requires newer versions of TMS devices.
After treatment, you can resume normal activities, including working and driving as usual.

Will It Work For Me?

About half of people who receive TMS for depression at the University Health Network (UHN) in Toronto show significant improvement in their symptoms (Chandler J, 2016).

How Long Does It Take to Work?

If TMS works for you, you will hopefully see an improvement in your symptoms within a few weeks. And over the full course of 4-6 weeks, you will hopefully see significant improvement -- and ideally, the depression will completely resolve.

How Much Does It Cost?

TMS is covered in Canada by provincial health plans in Quebec, Saskatchewan and the Yukon, which means you do not have to pay in these provinces.
TMS is not yet covered in other provinces, which means you may have to pay for the service out of pocket.
However:

- If you have an extended health plan, it may cover some of the costs.
- Some health care centres do offer the service for free even if it is not covered.
- Centres that conduct research (such as CAMH in Toronto, the Royal Ottawa Mental Health Centre in Ottawa) may be able to offer state-of-the-art treatment for free if you are involved in a clinical trial.

Any Side Effects?

Most people have only mild side effects if any. With the longer duration TMS, there may be scalp pain during treatment, similar to the feeling of static electricity (Chandler, 2016). Some patients will take ibuprufen (Advil) or

acetaminophen (Tylenol) before treatment to deal with this.

Summary of Advantages / Disadvantages of TMS

Advantages of TMS compared to other treatments:

- It is a safe, well-tolerated and painless procedure.
- There are no side effects on memory or cognitive/intellectual function.
- Unlike electroconvulsive therapy (ECT), it does not require anesthesia, nor does it require someone to drive you home afterwards.
- Unlike medications, there are much fewer side effects.
- It works relatively quickly (e.g. within a matter of weeks).
- You can resume your usual daily activity (e.g. driving/work) between sessions.

Disadvantages of TMS are:

- In many cases, patients may have to pay for TMS because it is not yet covered by most provincial health insurance plans. The average range is a few thousand dollars however this is within the same range that a course of psychotherapy of 10-20 visits might cost as well.
- It requires daily weekday visits to the hospital or clinic for TMS, for 4-6 weeks.
- Unlike psychotherapy, you do not learn skills and coping strategies.
- The most serious risk is inducing a seizure (about 1 in 10,000 cases), but fortunately, this is quite rare.

About this Article

Written by Sara Tremblay, Ph.D., Royal Ottawa and the eMentalHealth.ca Team. Special thanks to our colleagues at CHEO and uOttawa for reviewing this article.
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