

Repetitive Transcranial Magnetic Stimulation (rTMS) for Tinnitus

What is rTMS?

rTMS is a non-invasive focal brain stimulation treatment that involves passing small electromagnetic currents through targeted areas of the brain. Targeting is by way of a specially designed coil held near the scalp. The energy applied acts to modify nerve cell activity in that brain region.

rTMS exerts its effect via a myriad of complex pathways, but all work to modify (and improve) the electrical activity of the brain area it targets. As there are different connections with the brain it can also repair and improve the electrical activity in more distant connected brain areas.

How does rTMS work in managing tinnitus?

In tinnitus, an area of the brain called the auditory (hearing) cortex is typically targeted. The auditory cortex is the part of the brain responsible for processing information related to hearing. In tinnitus there is altered neural activity along the auditory pathway with hyperactivity of nerve signaling occurring in the auditory, but also non-auditory areas. rTMS may help to reduce this hyperactivity and in turn reduce the tinnitus perception level and/or make it less intense.

rTMS for tinnitus is an off-label treatment. This is similar to many of the current medication options used to treat tinnitus, meaning it is yet to be approved as an accepted treatment for tinnitus with the Therapeutic Goods Administration (TGA).

Are there any side effects?

rTMS is a safe and well-tolerated treatment with no serious side effects. It does not affect memory or brain functioning. rTMS has been used to treat thousands of people and only a small percentage of people discontinue treatment because of side effects. Some uncommon side effects include:

- **Headache:** this is the most common side effect and occurs in about half of the patients treated with rTMS. Headaches are usually minor and resolve over the course of treatment. Paracetamol is usually sufficient to treat these headaches, but they are self-resolving
- **Scalp discomfort:** this is usually minor and occurs in about 1/3rd of patients. This occurs where the coil is placed over the scalp and often resolves by the 3rd treatment.

Adjustments can be made to the coil position and stimulation settings to reduce discomfort

- **Seizures:** this is an extremely rare side effect and typically occurs in people at risk of seizures. Patients are screened prior to treatment to ensure they do not fall in this at-risk category. The chances of having a seizure during an rTMS treatment is lower than the chance of having a seizure while taking an antidepressant drug.

It is important to note that all patients are monitored during each treatment session by specially trained medical and nursing staff. Any side effects will be managed and are reversible once the rTMS treatment stops. As rTMS is a relatively new treatment, there may be unforeseeable risks that are not currently recognized.

Are there any patients who should not receive rTMS?

A medical practitioner who has expertise in rTMS treatment will complete a thorough assessment prior to treatment to ensure safety and suitability. In general, a history of epileptic seizures or those who have metal in their heads should not receive rTMS. This can include (not exhaustive):

- Metal stents in the neck or brain
- Deep brain stimulators
- Aneurysm clips or coils
- Metallic implants in your head, ears, eyes or neck
- Facial tattoos with metallic ink
- Other metal objects around your head region

Patients with non-epileptic seizures are generally safe to have rTMS treatment.

What happens during a rTMS treatment?

Before treatment commences patients will have completed a thorough assessment with a specialist physician that also includes an MRI brain scan. This helps to determine treatment suitability and ensure correct targeting of the brain area.

During each treatment patients will be asked to remove any magnetic related objects (e.g. jewelry, mobile phones) as these can interfere with the rTMS machine. Patients can wear earplugs during the treatment for their comfort as the rTMS machine can produce a clicking sound (similar to an MRI, but usually quieter). You will be seated during the treatment.

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The first rTMS session is a dosing treatment where several measures are made to ensure the rTMS coil is in the correct position and the right level of stimulation is applied. This involves applying the rTMS coil over the scalp and several brief pulses are applied to establish what is called the motor threshold. The motor threshold is the minimum amount of energy needed to elicit a twitch in the thumb muscles. This level varies between individuals, but ensures the right amount of energy is used to stimulate the brain cells. Once this level has been established treatment can then be commenced. The motor threshold is not checked at every treatment, but may be reassessed if there is a concern this has changed.

During the treatment patients will hear a series of clicking sounds and feel a tapping sensation on the scalp adjacent to where the coil is applied. Patients will have regular observations taken from nursing staff.

The patient can stop a treatment at any time by asking the staff member present.

Who administers rTMS?

The rTMS treatment will be prescribed by a specialist physician who is trained in the use of rTMS. The treatment itself is then administered by an experienced nursing technician under the supervision of the treating specialist physician. The rTMS nurse and a physician will always be present to monitor the patient during the treatment.

How long is an rTMS treatment?

The exact length of rTMS treatment for tinnitus can vary between patients, but in general 10 treatments will be required. Some patients may require up to 30 sessions, particularly if their tinnitus is associated with depression. This will be assessed on an ongoing basis. Each treatment session can also vary, but a typical treatment will last around 20 minutes. rTMS treatment occurs 5 days per week Monday to Friday.

Will I need to be hospitalized for rTMS treatment?

rTMS can be conducted in the outpatient setting. No sedation or anaesthesia is required and the patient is fully awake and aware during their treatment. There is no specific recovery time, so patients can drive after their treatment and resume their normal activity.

Will I need to do anything before the treatment?

In most cases there is no specific preparation before the treatment. Patients will have been assessed by their doctor and an MRI brain organized. The MRI brain images will be uploaded to the rTMS program and used to guide the treatment.

How long will the benefit last?

A positive response to rTMS varies between patients. A reduction in tinnitus intensity is just one measure of success. Other areas include improvement in function, psychological and emotional wellbeing, improvement to sleep and quality of life, and reduction in medication requirements. Duration of benefit can also vary between patients. Some studies have shown benefit for up to 6 months, with others 2-3 months. It may be that "top up" sessions are needed to maintain the benefit. You can expect to receive one treatment every month for a period of 6 months to consider rTMS a worthwhile treatment.

How can I get rTMS treatment?

rTMS is a medical treatment that requires an assessment by a trained medical practitioner. Modalis has several specialist physicians who can assist with a treatment plan. You will need a referral from your GP or other medical practitioner to Modalis who will then arrange an assessment session.

Is there anything else I need to be aware of?

rTMS as an outpatient is not currently funded by Medicare or any of the private health funds. Patients can expect to pay \$240 for the initial prescribing session and \$185 for each treatment thereafter. Department of Veteran Affairs (DVA) and third-party insurance (Worker's Compensation or Motor Vehicle Insurance) patients may be able to have their treatment costs covered.

The rTMS treating doctor may arrange a follow up appointment after treatment to assess response and to arrange any long-term maintenance sessions if required.

If you have any further queries please do not hesitate to contact one of our friendly reception staff on **(08) 6166 3733** or email **tms@modalis.com.au**. Our reception is open Monday-Friday between 9:00am and 4:30pm.