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Transcranial Magnetic Stimulation TMS

Application

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Digital therapeutic techniques can help patients with a range of psychiatric disorders and neuro-rehabilitation problems like recovery from stroke and chronic pain. By measuring and modulating brain activity, neuromodulation has the potential to offer faster and longer-lasting outcomes than standard treatments, all with no to very minimal side-effects.

MAG & More offers a range of TMS solutions to help you achieve better results in your therapeutic practice. We can support you with technology, equipment, advanced training, and further information. We also offer specific information to help your patients, your staff and further business advice.

Your clinical practice will benefit from neurocare's proven treatment protocols giving you, the practitioner, the ability to personalise for your individual patients and offer a more sustainable solution in mental health and rehabilitation. Seeking training, advice or partnership with neurocare will help your practice be at forefront of innovative health solutions, delivered professionally and following best practice.

Content

Imprint

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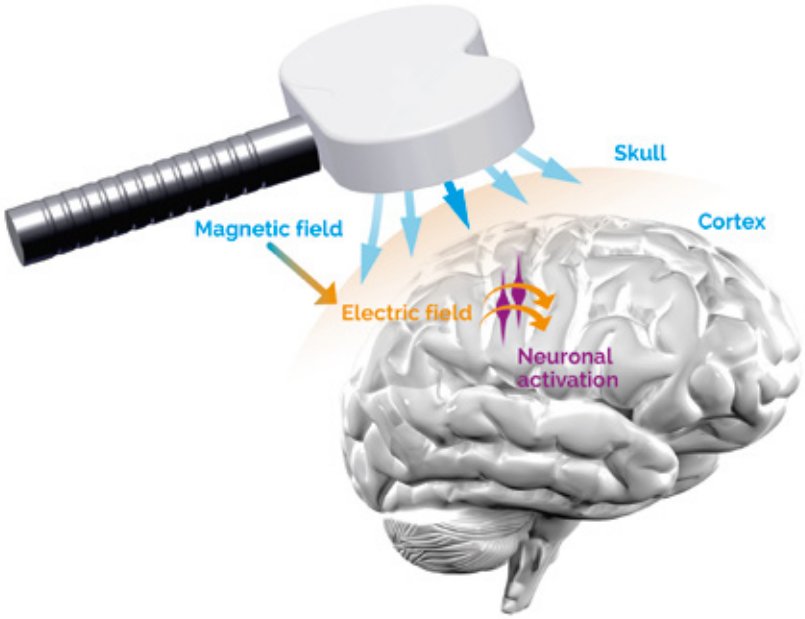
What is TMS?

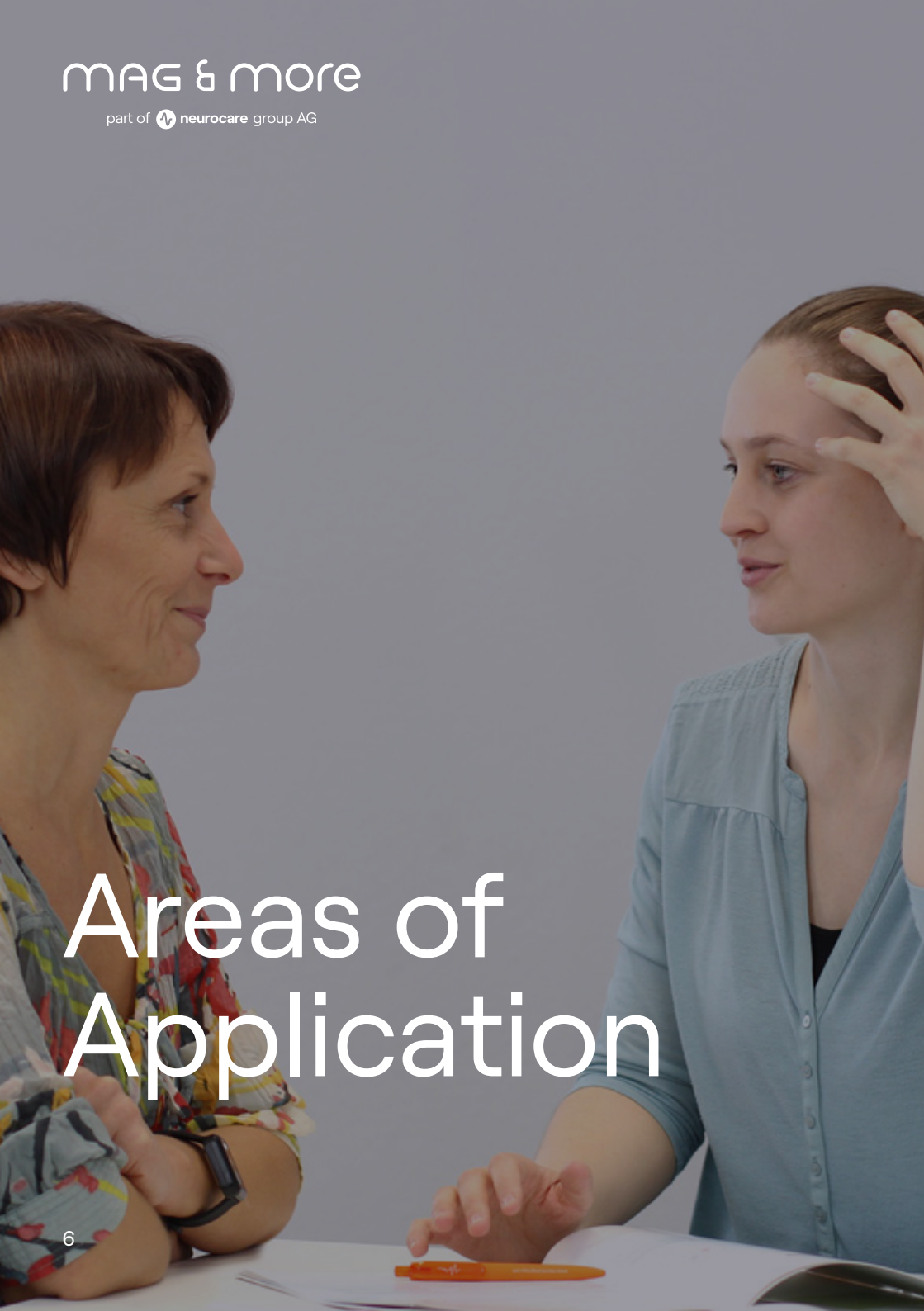
Transcranial magnetic stimulation (TMS) is a highly effective, non-invasive, and well tolerated method of therapy. Numerous studies have shown this treatment to be highly efficient and effective for a range of psychiatric and neurological conditions. TMS can also be used diagnostically in the field of neurology to examine the response of the central motor system.

To conduct a treatment, a practitioner will position a paddle with a magnetic coil on the surface of the patient's head delivering a light pulse of stimulation. The stimulation is very focused and adjust activity within the brain networks that regulate mood. With advanced navigation tools, this allows you to target the neural networks involved in depression, with high precision. Depending on the choice of treatment protocol, TMS can have an excitatory or inhibitory effect.



TMS offers decive advantages of other forms of treatments:

- **non-invasive, very few side effects**
- **painless and safe**
- **non-convulsive (not spasm inducing)**
- **outpatient or inpatient treatment is possible**
- **no anaesthesia or sedation required**
- **specifically stimulates selected regions of the brain**
- **tolerated well by patients**



Areas of Application

TMS in Psychiatry

TMS can help patients who have not responded to antidepressant medications or who struggle with its associated side effects. For those patients, TMS is a welcome, highly effective alternative. The effects of stimulation begin to show after a few treatments.

Combining TMS with psychotherapy further improves the effectiveness of the treatment. Studies have shown a response rate of 66 % and remission rates of 56 %*. In many patients, the success has been sustainable in the long term.

* Donse L. et al., 2017

TMS in neurology, rehabilitation and pain therapy

TMS shows clear analgesic effects for different types of pain. In neurological rehabilitation and treatment of neurodegenerative diseases, this therapy helps regain or maintain motor, speech, and cognitive functions. Combining conventional methods with TMS treatment can lead to a better outcome for the patient. Research has shown especially promising results in the areas of motor training and speech therapy.

In addition, TMS is a method for examining the central motor system. It supplements the diagnosis of evoked potentials with motor evoked potentials (MEP).

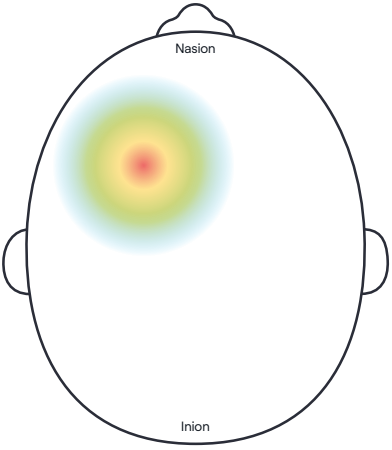
Depression

In depressed patients, neuronal activity is often reduced in the frontal area of the left hemisphere of the brain (the dorsolateral prefrontal cortex, DLPFC). TMS treatment increases the activity in the left DLPFC, which helps improve the patients' depressive symptoms.

TMS is particularly helpful for patients who have not responded successfully to medication. Unlike electroconvulsive therapy (ECT), TMS treatments are highly tolerable and can be delivered in an outpatient setting. This therapy has minimal side effects and can be applied without anaesthesia. The activity of the left DLPFC can be increased by using high-frequency TMS.

A **Evidence = Level A (definitely effective)**

position	left DLPFC (F3)
frequency **number of pulses** **intensity** **scope**	10 Hz 1500 110 – 120 % RMT* 15 – 30 sessions
duration	20 min
efficacy	●●●●●



source: Lefaucheur JP et al. 2020

Depression
TMS with Psychotherapy*

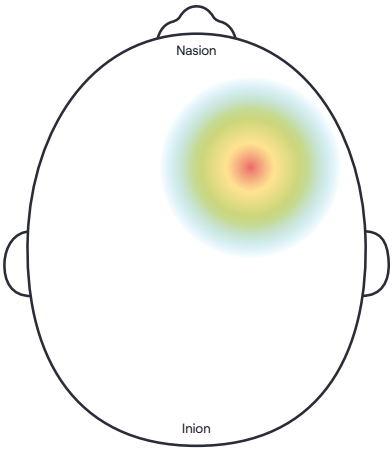
Psychotherapy aims to improve a patient's condition in the long term by changing negative behavioural and thought patterns whilst TMS can reduce depressive symptoms by stimulating neuronal activity.

Combining the two types of therapy is useful for patients who are not yet able to actively participate in psychotherapy. TMS can also increase the benefits a patient receives through psychotherapy. This may help motivate patients who are unsure if talk therapy will help them.

The percentage of patients who achieve remission is significantly higher when TMS is combined with behavioural therapy. A combination of psychotherapy and low frequency stimulation above the right DLPFC is proven successful.

B **Evidence = Level B (probably effective)**

position	right DLPFC (F4)
frequency **number of pulses** **intensity** **scope**	1 Hz 1200 110 – 120 % RMT 20 – 30 sessions
duration	45 min (incl. psychotherapy)
complem. therapy	psychotherapy
efficacy	●●●●○



source: Donse L et al. 2018

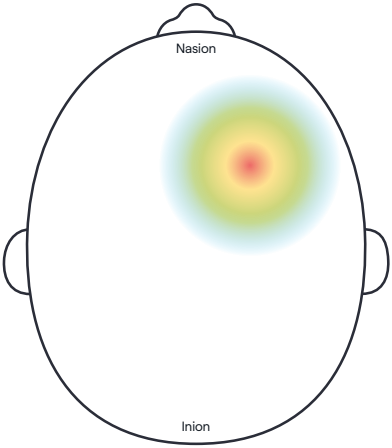
Post-Traumatic Stress Disorder

In many cases, post-traumatic stress disorder (PTSD) cannot be sufficiently treated. A high number of patients may never see a clinician or receive proper treatment. In addition, PTSD sufferers have a higher risk of addiction, depression, and other mental illnesses compared to the rest of the population.

TMS treatments above the right DLPFC can significantly reduce a range of symptoms, including anxiety and other indicators of depression. Patients report having a more positive experience of themselves and see improvement in work and relationships. TMS has a lasting effect beyond the duration of the therapy.

B **Evidence = Level B (probably effective)**

position	right DLPFC (F4)
frequency **number of pulses** **intensity** **scope**	20 Hz 1600 – 2400 80 – 100 % RMT 10 sessions
duration	20 – 30 min
efficacy	●●●●○



source: Boggio PS et al. 2010, Ahmadizadeh MJ & Rezaei M 2018,

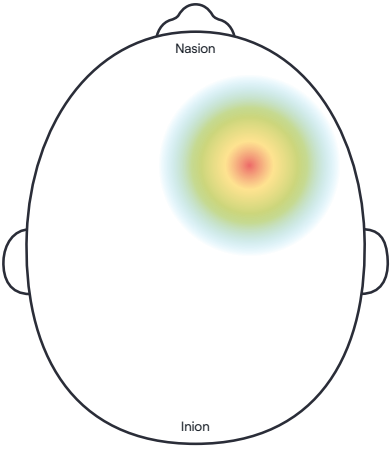
Obsessive-Compulsive Disorder

Obsessive-compulsive disorder (OCD) is often deemed to be a chronic condition. A large proportion of patients respond inadequately to therapies such as cognitive-behavioural therapy or medication. TMS can help some of these patients.

The long-term changes in the metabolic activity of the brain initiated by TMS is important for the effective treatment of OCD. The treatment not only affects a focal location of stimulation, but it also reaches more distant areas of the brain as neural networks transmit the effect. Especially for chronic OCD patients, TMS can be life-changing by laying the foundation for a more balanced and positive outlook.

C **Evidence = Level C (possibly effective)**

position	right DLPFC (F4)
frequency **Number of pulses** **intensity** **scope**	1 Hz 1200 – 2000 100 % RMT* 10 – 15 sessions
duration	20 – 35 min
efficacy	●●●○○



source: Elbeh KAM et al. 2016, Seo HJ et al. 2016

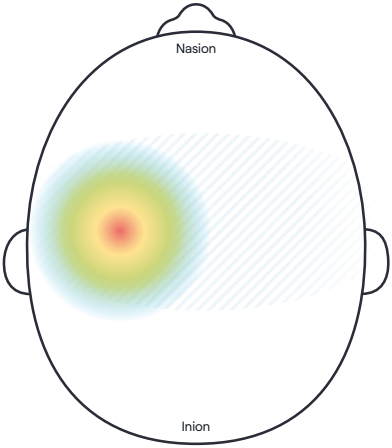
Neuropathic Pain

Neuropathic pain is the result of a nerve injury. Pain-related changes in the central nervous system cause the pain to persist long after its cause has been eliminated. For many patients, drugs do not sufficiently relieve the pain. They are left suffering long-term pain, which can lead to depression and/or anxiety. In turn, these mental health problems can increase the pain resulting in a negative cycle of health effects.

TMS can reduce both the pain and its accompanying symptoms, such as fatigue. Patients may then experience relief leading to a more active lifestyle. Many experience their pain as less agonizing. At the same time, the quality of their sleep can improve which in turn has positive rehabilitative effects. Early TMS treatment, within the first five years after the onset of pain, can lead to particularly good results.

A **Evidence = Level A (definitely effective)**

position	motor cortex, contralateral to side of pain*
frequency	10 Hz
number of pulses	1500
intensity	80 – 90 % RMT*
scope	10 sessions
duration	20 min
efficacy	●●●●●



source: Lefaucheur JP et al. 2020, Ma SM et al. 2015, Khedr EM et al. 2015

* example: stimulation above C3 with pain on the right side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Motor Disorders of the hand after a stroke

A brain that has been damaged by a stroke needs to learn to reorganise itself through repeated practice, for example in physiotherapy. However, the brain of an adult is not best prepared for this constant practicing and learning.

TMS can activate damaged areas of the brain and inhibit activity in other areas which compensate for damaged parts. This is how the treatment makes it easier for the patient to form new neural networks. As a result, patients find it easier to complete therapeutic exercises.

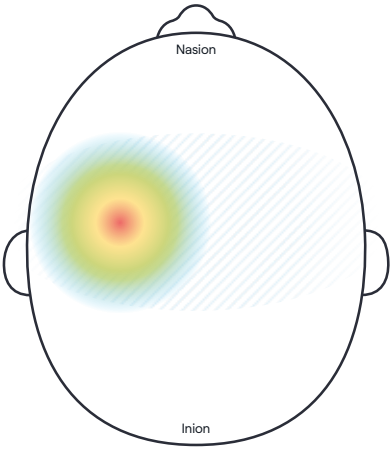
Clinicians use TMS in the post-acute or chronic stage after a stroke. Magnetic stimulation in combination with motor training of the upper or lower extremities has proven to be particularly effective.

A **Evidence = Level A (definitely effective) - post-acute**

position	motor cortex contra lesional*
frequency **number of pulses** **intensity** **scope**	1 Hz 900 – 1800 90 – 120 % RMT* > 5 sessions
duration **complem. therapy**	15 – 30 min 30 – 60 min motoric training
efficacy	●●●●●

source: Lüdemann-Podubecká J et al. 2015, Zheng C et al. 2015, Du et al. 2016

C **Evidence = Level C (possibly effective) - chronic**



* example:
stimulation above C3 with lesion on the right side

Multiple Sclerosis

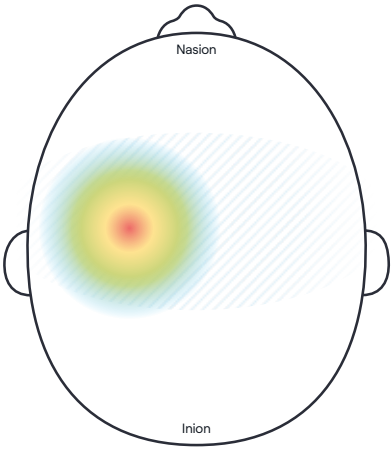
Multiple sclerosis (MS) often leads to a decrease in the body's functionality and restricts independent living. In addition, fatigue, pain, and depressive moods can impair the quality of life of a patient.

It is possible to reduce fatigue and pain with TMS. Patients report increased confidence in the effectiveness of treatments as well as overall improved quality of life. In addition, motor function can be enhanced.

Treatment protocols can be personalised depending on individual symptoms. After repeated stimulation, the effects last for up to several months. The effectiveness of TMS has been proven for both relapsing-remitting and secondary progressive MS.

B **Evidence = Level B (probably effective)**

position	motor cortex area for hand/leg*
frequency	iTBS** (motor skills) 20 Hz (pain, fatigue)
number of pulses	600 – 1200
intensity	80 % AMT***
scope	10 sessions
efficacy	●●●●○



** Intermittent Theta-Burst-Stimulation
*** Active Motor Threshold

source: Azin M et al. 2016, Korzhova J et al. 2019

* example:
stimulation above C3 for the right hand

TMS is a non-invasive method of brain stimulation with low side effects. Some patients have reported temporary muscle twitching and tension headaches which can be remedied with a light painkiller. Others complained about fatigue and nausea. In very rare cases, an epileptic seizure may be triggered.

Contraindications

- absence of capacity to consent
- cardiac pacemaker
- brain pacemaker
- intracerebral metal implants (electrodes, plates, clips or similar)
- decreased seizure threshold or epileptic seizures in the history
- pregnancy or breastfeeding period

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Safety and side effects

"When I started at neurocare after 17 years of working in the field of brain injury rehabilitation, I was not sure what to expect of rTMS. After an intensive training course of two days and additional hands-on training, I was able to start using the therapy with my own patients.

I have found it to be an invaluable tool, especially for depressed patients who had proven to be therapy-resistant to medication and psychotherapy before coming to us. For them, rTMS is often the last option before they having to consider invasive ECT treatments with sometimes severe side-effects. Some of these patients had been suffering from depression for more than 20 to 30 years, and it's wonderful to see them react and improve.

I have also used rTMS successfully on patients with OCD, pain, and motor stroke. Even a complex symptom like depersonalisation reacted positively to rTMS.

One of the best things of rTMS is that is has no severe side-effects and that patients don't develop treatment resistance and tolerance effects for it. If patients have proven to respond to the treatment, they will respond again if they experience a relapse."

Joris van Neijenhof
Clinical Neuropsychologist

Experiences

„I have been using rTMS devices for four years focused on treating adults of all ages with therapy-resistant symptoms of depression. My treatment approach is a combination of TMS and psychotherapy. This treatment plan can be completed with or without medication.

In my therapeutic experience, the combination of TMS and psychotherapy has enabled impressively fast and positive effects.

TMS therapy is particularly suitable for patients who do not - or not sufficiently - respond to medication, or those who suffer from severe side effects."

Annika Simlacher
Psychological Psychotherapist

Apollo TMS Therapy System

The Apollo TMS Therapy System impresses with its successful concept of design and usability. The elegant design provides a pleasant treatment environment, which has a supportive effect on the therapy. The clear menu navigation of the operating software allows the therapist to concentrate fully on the patient during the entire process.

- wide range of corporate design options
- touch screen interface with „Stimware"
- automatic MT-threshold determination
- EMG for physiological MT determination
- patient and protocol management
- safety management (Rossi criteria)
- information package for patients


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PowerMAG Touch

The PowerMAG Touch consists of a high-performance stimulator and a state-of-the-art stimulation coil with innovative cooling technology.

Advanced protocols such as TBS (Theta Burst) make up the key features of our stimulator. Neuronavigation, new stimulation protocols and coil design can be easily combined with and implemented in the PowerMAG Therapy as well.

Quality "Made in Germany" guarantees for top class engineering and a long lifetime.

- reliable, very powerful stimulator (30Hz @ 100 % MSO)
- all clinical protocols in one device (rTMS, TBS, Trains)
- research version also suitable for online TMS & EEG as well as biphasic ppTMS
- including stimware application software
- attractive financing options

Apollo View!

Apollo View! is an optically guided navigation system tailored to the exact needs of the PowerMAG user. It enables the user to precisely and reproducibly position all PowerMAG rTMS treatment coils.

PowerMAG View! is fully integrated into the TMS equipment cart – the flexible articulated arm allows optimal alignment of the 3D camera. Intelligent tracker solutions ensure easy and fast setup of the desired TMS setup.

Integrated system solution: 3D navigation and TMS system from one source – sales and service directly by the German manufacturer.

- 3D neuronavigation of TMS coils
- positioning on the basis of individual MR-Scans (anatomical and functional data)
- planing of stimulation sites
- reproducible positioning during the daily therapy
- "Parking aid" for coils


CTD: 10
BTD: 0
ADX: 2.0
ADY: -3.9
ADZ: -4.0

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Learn how to apply TMS
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Professionals who seek training through neurocare academy join a global network of professionals delivering best-practice neuromodulation. With online courses and practical workshops held each year throughout the world, the neurocare academy offers training in a range of applications included TMS, tDCS, Advanced Neurostimulation techniques, Neurofeedback and applications of EEG.

Our new online learning platform means more practitioners from all over the world can access insights and know-how from a range of leading practitioners and scientists in the field. Professionals can register for instant access to learning modules and resources with the flexibility to complete a course at their own pace. This can then be followed by a practical workshop at one of our training centres worldwide.

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