

International Clinical TMS Certification Course

Clinical TMS Protocols

Overview of recommended protocols

2025

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Clinical TMS protocols – overview

Psychiatry	Neurology
Depression	Neuropathic pain
Obsessive compulsive disorder (OCD)	Tinnitus
Post-traumatic stress disorder (PTSD)	Motor stroke
Schizophrenia	Fibromyalgia
Substance abuse, addiction and craving	Parkinson's disease (PD)
	Multiple sclerosis (MS)
	Aphasia
	Neglect
	Alzheimer's disease (AD)
	Epilepsy

Clinical TMS protocols – overview

Level A Definitely effective	Level B Probably effective		Level C Possibly effective		Promising
Depression HF-rTMS left DLPFC	Depression LF-rTMS right DLPFC	Fibromyalgia (pain) HF-rTMS left DLPFC	OCD LF-rTMS right DLPFC	Epilepsy LF-rTMS epileptic focus	Depression iTBS left DLPFC
Neuropathic pain Hf-rTMS contralateral M1	Depression LF-rTMS bilateral DLPFC	PD (motor symptoms) HF-rTMS bilateral M1	Alzheimer's disease Multisite HF-rTMS-COG	Cigarette craving & consumption HF-rTMS left DLPFC	OCD LF-rTMS bilateral pre-SMA
Motor Stroke LF-rTMS contralesional M1	PTSD HF-rTMS right DLPFC	PD (depression) HF-rTMS left DLPFC	Tinnitus LF-rTMS left auditory cortex	Neglect (post-stroke) cTBS contralesional PPC	OCD HF-rTMS bilateral DMPFC
Depression Deep HF-rTMS left DLPFC	Motor stroke HF-rTMS ipsilesional M1	MS (lower limb spacticity) iTBS contralateral leg area of M1	Schizophrenia (auditory-verbal hallucinations) LF-rTMS left TPC		Cocaine addiction HF-rTMS left DLPFC
	Fibromyalgia (quality of life) HF-rTMS left M1	Aphasia (nonfluent) LF-rTMS right IFG	Schizophrenia (negative symptoms) HF-rTMS left DLPFC		Substance abuse, addiction & craving HF-rTMS left DLPFC

Based on:

Lefaucheur JP, Aleman A, Baeken C, et al. Evidence-based guidelines on the therapeutic use of repetitive transcranial magnetic stimulation (rTMS): An update (2014-2018) Clin Neurophysiol. 2020 May;131(5):1168-1169. doi: 10.1016/j.clinph.2020.02.003

The Original Depression TMS Protocol

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC
5 cm anterior to motor hotspot

Number of Sessions

5 days a week
6 weeks of treatment
= 30 sessions

Stimulation Frequency

10Hz rTMS

Total Dosage

3,000 pulses per session
90,000 for entire treatment

Stimulation Intensity

120% resting motor threshold

- **Level A recommendation**
- **FDA/CE-approved protocol**

TMS Timing

4 seconds ON, 26 seconds OFF
75 trains → 37:04

The Updated Depression TMS Protocol(s)

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC

5/6/7 cm rule or electrode position F3

Number of Sessions

5 days a week

6 weeks of treatment

= 30 sessions

Stimulation Frequency

10Hz rTMS

Total Dosage

3,000 pulses per session

90,000 for entire treatment

Stimulation Intensity

120% resting motor threshold

TMS Timing

4 seconds ON, 11 seconds OFF

75 trains → 18:34

→ Level A recommendation

→ FDA/CE-approved protocol

Depression

Deep HF-rTMS left DLPFC

Stimulation Site

Deep-rTMS over left DLPFC
H1-coil

Stimulation Frequency

18Hz rTMS

Stimulation Intensity

120% resting motor threshold

TMS Timing

2 seconds ON, 20 seconds cognitive task
55 trains → 19:50

Number of Sessions

5 sessions/week for 4 weeks
(2 additional maintenance
sessions/week for 12 weeks)

Total Dosage

1,980 pulses per session

→ **Level A recommendation**

→ **FDA-approved**

Protocol source:

Levkovitz, Y., Isserles, M., Padberg, F., et al. Efficacy and safety of deep transcranial magnetic stimulation for major depression: a prospective multicenter randomized controlled trial. 2015; World Psychiatry, 14: 64-73. <https://doi.org/10.1002/wps.20199>

Neuropathic pain

High-Freq. rTMS over M1

Stimulation Site

Primary motor cortex
Contralateral to pain

Stimulation Frequency

10Hz rTMS

Stimulation Intensity

80-90% resting motor threshold

TMS Timing

10 seconds ON, 20 seconds OFF
(e.g. for 10Hz = 30 trains → 14:40)

Number of Sessions

5-10 acute treatment sessions with
subsequent maintenance TMS

Total Dosage

3,000 pulses per session

→ **Level A recommendation**

→ **No consensus on exact protocol!**

Motor Stroke (hand motor recovery)

Low-Freq. rTMS over contralesional M1

Stimulation Site

Primary motor cortex
contralesional

Stimulation Frequency

1Hz rTMS

Stimulation Intensity

90% resting motor threshold

TMS Timing

Continuous rTMS for 25 minutes

Number of Sessions

5 days a week
4+ weeks of treatment
During postacute stage

Total Dosage

1,500 pulses per session

→ **Level A recommendation**

→ **No consensus on exact protocol!**

Depression

Low-Freq. rTMS over right DLPFC

Stimulation Site

Right DLPFC
5 cm rule / F4

Stimulation Frequency

1Hz rTMS

Stimulation Intensity

120% resting motor threshold

TMS Timing

Continuous rTMS for 25 minutes

Number of Sessions

5 days a week
6 weeks of treatment
= 30 sessions

Total Dosage

1,500 pulses per session
45,000 for entire treatment

→ **Level B recommendation**

Depression

Bilateral TMS over DLPFC

Stimulation Sites

First right then left DLPFC
5 cm anterior to motor hotspot

Stimulation Frequency

1Hz rTMS (right DLPFC)
10Hz rTMS (left DLPFC)

Stimulation Intensity

120% resting motor threshold

TMS Timing

1Hz: continuously for 10 minutes
(600 pulses)

10Hz: 3 seconds ON, 30 seconds OFF
50 trains (1500 pulses) → 27:00

Number of Sessions

5 days a week
6 weeks of treatment
= 30 sessions

Total Dosage

2,100 pulses per session
63,000 for entire treatment

→ **Level B recommendation**



PTSD

High-Freq. rTMS over right DLPFC

Stimulation Site

Right DLPFC
5 cm rule / F4

Stimulation Frequency

10Hz rTMS

Stimulation Intensity

120% resting motor threshold

TMS Timing

4 seconds ON, 26 seconds OFF
75 trains → 37:04

Number of Sessions

5 days a week
6 weeks of treatment

Total Dosage

3,000 pulses per session

- **Level B recommendation**
- **No established protocol!**
- *We advice to apply the HF-rTMS depression protocol*

Motor Stroke (hand motor recovery)

High-Freq. rTMS over ipsilesional M1

Stimulation Site

Primary motor cortex
Ipsilesional

Stimulation Frequency

10Hz rTMS

Stimulation Intensity

90% resting motor threshold

TMS Timing

10 seconds ON, 20 seconds OFF
10 trains → 4:40

Number of Sessions

5 days a week
2 weeks of treatment
During postacute stage

Total Dosage

1000 pulses per session

→ **Level B recommendation**

→ **No consensus on exact protocol!**

→ **In addition to standard rehabilitation therapies**

Fibromyalgia (quality of life)

High-Freq. rTMS over left M1

Stimulation Site

Left M1

Stimulation Frequency

10 Hz rTMS

Stimulation Intensity

80% resting motor threshold

TMS Timing

10 seconds ON, 20 seconds OFF
30 trains → 14:40

Number of Sessions

5-10 acute treatment sessions with
subsequent maintenance TMS

Total Dosage

3,000 pulses per session

- **Level B recommendation**
- **No consensus on exact protocol!**
- **No evidence for pain relief!**

Fibromyalgia (pain)

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC
F3

Number of Sessions

20 acute treatment sessions
(e.g. 5/week)

Stimulation Frequency

10 Hz rTMS

Total Dosage

3,000 pulses per session

Stimulation Intensity

120 % resting motor threshold

→ **Level B recommendation**

→ Possibility for improvement of
fatigue

TMS Timing

4 seconds ON, 11 seconds OFF
75 trains → 18:45

→ **No consensus on exact protocol!**

Parkinson's disease (motor symptoms)

High-Freq. rTMS over bilateral M1

Stimulation Site

Bilateral M1
Leg area

Number of Sessions

10+ sessions

Stimulation Frequency

10Hz rTMS

Total Dosage

2,000 pulses per session

Stimulation Intensity

90% resting motor threshold

→ **Level B recommendation**

→ **No consensus on exact protocol!**

TMS Timing

10 seconds ON, 20 seconds OFF
20 trains → 9:40

Parkinson's disease (depression)

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC

Number of Sessions

10+ sessions

Stimulation Frequency

10Hz rTMS

Total Dosage

3,000 pulses per session

Stimulation Intensity

120% resting motor threshold

→ **Level B recommendation**

→ **No consensus on exact protocol**

TMS Timing

4 seconds ON, 11 seconds OFF

75 trains → 18:40

Multiple sclerosis (lower limb spasticity)

iTBS over contralateral leg area of M1

Stimulation Site

Contralateral leg area of M1

Number of Sessions

5 sessions/week for 2 weeks

Stimulation Frequency

iTBS

10 bursts (5Hz) of 3 stimuli (50Hz)

Total Dosage

600 pulses per session

Stimulation Intensity

80% active motor threshold

→ **Level B recommendation**

→ **No consensus on exact protocol!**

TMS Timing

2 seconds ON, 8 seconds OFF

20 trains → 03:12

Post-stroke aphasia (nonfluent)

Low-Freq. rTMS over right IFG

Stimulation Site

Right IFG (BA45)

Stimulation Frequency

1Hz rTMS

Stimulation Intensity

90% resting motor threshold

TMS Timing

Continuous rTMS for 20 minutes

Number of Sessions

10 sessions

During chronic stage

Total Dosage

1200 pulses per session

→ **Level B recommendation**

→ **No consensus on exact protocol**

→ ***Likely better efficacy when combined with speech and language therapy***



OCD

Low-Freq. TMS over right DLPFC

Stimulation Site

Right DLPFC
5 cm rule / F4

Number of Sessions

5 days a week
4+ weeks of treatment

Stimulation Frequency

1Hz rTMS

Total Dosage

1,500 pulses per session

Stimulation Intensity

120% resting motor threshold

→ **Level C recommendation**

→ **No established protocol!**

TMS Timing

Continuous rTMS for 25 minutes

→ *We advice to apply the LF-rTMS depression protocol*

Alzheimer's disease

Multisite rTMS-COG

Stimulation Site

rTMS over different cortical targets to prime cognitive training tasks
3 target sites per session (alternating)

Stimulation Frequency

10Hz rTMS

Stimulation Intensity

90% - 110% resting motor threshold

TMS Timing

2 seconds ON, 40 seconds cognitive task
20 trains → 13:20

Number of Sessions

30 sessions (5 sessions/week for 6 weeks)

Total Dosage

1,200 pulses per session

Cortical targets

Broca's, Wernicke's, both DLPFCs, both PSACs

→ **Level C recommendation**

→ **No consensus on exact protocol!**

→ **Best efficacy at mild/early stage AD**

Protocol source:

Lee J, Choi BH, Oh E, Sohn EH, Lee AY. Treatment of Alzheimer's Disease with Repetitive Transcranial Magnetic Stimulation Combined with Cognitive Training: A Prospective, Randomized, Double-Blind, Placebo-Controlled Study. *J Clin Neurol*. 2016;12(1):57-64. [doi:10.3988/jcn.2016.12.1.57](https://doi.org/10.3988/jcn.2016.12.1.57)

Tinnitus

Low-Freq. rTMS over Auditory Cortex

Stimulation Site

Left auditory cortex
(or dominant tinnitus side)

From C3/C4 move 2.5cm towards vertex,
then 1.5cm posterior (horizontally)

Stimulation Frequency

1Hz rTMS

Stimulation Intensity

110% resting motor threshold

TMS Timing

Continuous rTMS for 25 minutes

Number of Sessions

10+ sessions

Total Dosage

1,500 pulses per session

→ **Level C recommendation**

→ **No consensus on exact protocol!**

Target site calculation:

Langguth, B., Zowe, M., Landgrebe, M., Sand, P., Kleinjung, T., Binder, H., ... & Eichhammer, P. (2006). Transcranial magnetic stimulation for the treatment of tinnitus: a new coil positioning method and first results. *Brain topography*, 18(4), 241-247.

Schizophrenia (auditory-verbal hallucinations)

Low-Freq. rTMS over left TPC

Stimulation Site

Left TPC
Including STG and TPJ
Between T3 and P3

Stimulation Frequency

1Hz rTMS

Stimulation Intensity

90% resting motor threshold

TMS Timing

Continuous rTMS for 20 minutes

Number of Sessions

12 sessions in 6 days
Minimum of 5 hours between sessions

Total Dosage

1,200 pulses per session

→ **Level C recommendation**

→ **No consensus on exact protocol!**

Protocol source:

Vercammen A, Knegtering H, Bruggeman R, et al. Effects of bilateral repetitive transcranial magnetic stimulation on treatment resistant auditory-verbal hallucinations in schizophrenia: a randomized controlled trial. *Schizophr Res.* 2009;114(1-3):172-179.

[doi:10.1016/j.schres.2009.07.013](https://doi.org/10.1016/j.schres.2009.07.013)

Schizophrenia (negative symptoms)

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC
Similar to depression protocol

Stimulation Frequency

10Hz rTMS

Stimulation Intensity

110% resting motor threshold

TMS Timing

10 seconds ON, 30 seconds OFF
20 trains → 12:50

Number of Sessions

5 sessions/week for 3 weeks

Total Dosage

2,000 pulses per session

- **Level C recommendation**
- **No consensus on exact protocol!**
- **Alternative: HF-rTMS left DLPFC protocol for depression**

Protocol source:

Prikryl R, Ustohal L, Prikrylova Kucerova H, et al. A detailed analysis of the effect of repetitive transcranial magnetic stimulation on negative symptoms of schizophrenia: a double-blind trial. *Schizophr Res.* 2013;149(1-3):167-173. [doi:10.1016/j.schres.2013.06.015](https://doi.org/10.1016/j.schres.2013.06.015)

Epilepsy

Low-Freq. rTMS over epileptic focus

Stimulation Site

Area of epileptic focus

Number of Sessions

20 subacute sessions

Stimulation Frequency

1Hz rTMS

Total Dosage

1,500 pulses per session

Stimulation Intensity

90% resting motor threshold

→ **Level C recommendation**

→ **No consensus on exact protocol!**

TMS Timing

Continuous rTMS for 25 minutes

Cigarette craving and consumption

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC

Number of Sessions

10 sessions in 2 weeks

Stimulation Frequency

10Hz rTMS

Total Dosage

1,000 pulses per session

Stimulation Intensity

100% resting motor threshold

→ **Level C recommendation**

→ **No consensus on exact protocol!**

TMS Timing

5 seconds ON, 15 seconds OFF
20 trains → 6:25

Protocol source:

Amiaz, R., Levy, D., Vainiger, D., Grunhaus, L. and Zangen, A. (2009), Repeated high-frequency transcranial magnetic stimulation over the dorsolateral prefrontal cortex reduces cigarette craving and consumption. *Addiction*, 104: 653-660. [https://doi-org.mu.idm.oclc.org/10.1111/j.1360-0443.2008.02448.x](https://doi.org/mu.idm.oclc.org/10.1111/j.1360-0443.2008.02448.x)

Hemispatial neglect (post-stroke)

cTBS over contralesional PPC

Stimulation Site

Contralesional PPC
(e.g., P3 or P5)

Number of Sessions

5 sessions/week for 2 weeks
During postacute stage

Stimulation Frequency

Adapted cTBS
(3-pulse bursts (30Hz) repeated at 5Hz)

Total Dosage

2x 600 pulses per session

Stimulation Intensity

90% resting motor threshold

→ **Level C recommendation**

→ **No consensus on exact protocol!**

TMS Timing

2 cTBS trains (40 seconds)
15 minutes interval

Protocol source:

Koch G, Bonni S, Giacobbe V, et al. θ -burst stimulation of the left hemisphere accelerates recovery of hemispatial neglect. *Neurology*. 2012;78(1):24-30.
[doi:10.1212/WNL.0b013e31823ed08f](https://doi.org/10.1212/WNL.0b013e31823ed08f)

Depression

iTBS over left DLPFC

Stimulation Site

Left DLPFC
(electrode position F3)

Stimulation Frequency

50Hz triplets, 5Hz rhythm

Stimulation Intensity

120% resting motor threshold

TMS Timing

2 seconds ON; 8 seconds OFF
20 trains → 03:12

Number of Sessions

5 days a week
6 weeks of treatment
= 30 sessions

Total Dosage

600 pulses per session
18,000 for entire treatment

→ FDA/CE-approved protocol

→ Replicated in 2022 –
Recommendation coming soon



OCD

Low-Freq. rTMS over bilateral pre-SMA

Stimulation Site

Bilateral Pre-SMA
15% anterior to Cz
(on the nasion-inion line)

Stimulation Frequency

1Hz rTMS

Stimulation Intensity

120% resting motor threshold

TMS Timing

continuous rTMS for 25 minutes

Number of Sessions

5 days a week
4+ weeks of treatment

Total Dosage

1,500 pulses per session

- **No recommendation yet**
- *Protocol is considered very promising*



OCD

High-Freq. rTMS over bilateral DMPFC

Stimulation Site

Bilateral dorsomedial prefrontal cortex
25% nasion-to-inion distance

Stimulation Frequency

20Hz rTMS

Stimulation Intensity

100% resting leg motor threshold

TMS Timing

2 seconds ON, 20 seconds OFF
50 trains → 18 minutes

Number of Sessions

5 days a week
6 weeks of treatment
= 30 sessions

Total Dosage

2,000 pulses per session

→ FDA/CE-approved protocol

→ No recommendation yet



Cocaine addiction

High-Freq. rTMS over left DLPFC

Stimulation Site

Left DLPFC
F3 or MRI-based
(MNI coordinates [x= -50, y=30, z=36])

Number of Sessions

Daily TMS in week 1
Continue with weekly sessions
Option to do 2 sessions per day

Stimulation Frequency

15Hz rTMS

Total Dosage

2,400 pulses per session

Stimulation Intensity

100% resting motor threshold

→ **CE-approved protocol**

→ **No recommendation yet**

TMS Timing

4 seconds ON, 15 seconds OFF
40 trains → 12:25



Substance abuse, addiction and craving

Alcohol craving → no recommendation

Drug craving → no recommendation

Eating disorders → no recommendation

Gambling disorder → no recommendation

mostly high-freq.
rTMS over left DLPFC