

TMS (transcranial magnetic stimulation) in clinical practice

lecturers:

1. **CHRIS BAEKEN (Belgium) – r-TMS in clinical setting**
Ghent University: Department of Head and Skin (UZGent), Ghent Experimental Psychiatry (GHEP) Lab, Belgium Free University Brussels: Department of Psychiatry (UZBrussel), Belgium Eindhoven University of Technology, president ESBS - The European Society for Brain Stimulation
2. **ANDREA ANTAL (Germany) – tDCS-tACS in the clinical setting**
Dept. of Neurology, University Medical Center Göttingen, Germany Group Leader Non-Invasive Brain Stimulation Laboratory, Dept. of Neurology
3. **IGOR FILIPČIĆ (Croatia) – deep TMS new knowledge in the clinical setting**
Head of Psychiatric Clinic, Sveti Ivan, School of medicine Zagreb School of dental medicine & health, Josip Juraj Strossmayer, Osijek, Croatia WPA representative of Zone 9 – Central Europe
4. **GEROME BRUNELIN (France) – TMS for schizophrenia in the clinical settings**
Researcher at PSYR2 Team, Lyon Neuroscience Research Center, Lyon, France Université Claude Bernard Lyon , Lyon University, France, Pôle EST, Centre Hospitalier Le Vinatier, Bron, France

Keywords: transcranial magnetic stimulation, r-TMS, d-TMS, t-DCS, depression, schizophrenia

Introduction: Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive brain stimulation therapy that uses a magnet to deliver repeated pulses to stimulate the brain. TMS has shown diagnostic and therapeutic potential in neurology and psychiatry disorders, and the best results are achieved in the treatment of mood disorders approved by the EMA & FDA. The stimulator generates a changing electric current within the coil which induces a magnetic field; this field then causes a second inductance of inverted electric charge within the brain itself. rTMS session lasts 20–40 minutes, a typical daily sessions 5 days per week for 4–6 weeks. TMS approaches for possible future avenues to treat depression, but also other indications, especially anxious depression, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD) negative symptoms in schizophrenia, alcohol addiction, as well as neurological conditions, including tinnitus, multiple sclerosis and post-CVI neuropathic pain. Accelerated rTMS protocols are being increasingly studied because of their potential to enhance treatment efficacy and shorten treatment time. This opinion review summarizes current knowledge in the field and addresses the future direction of rTMS treatment in MDD, facilitating the establishment of this clinical intervention method as a standard treatment option and continuing to improve response and remission rates, and taking the necessary steps to

personalize rTMS-based treatment approaches. According to current North American and European guidelines, TMS is an approved treatment for MDD in many countries and is considered a first-line treatment.

Learning Objectives: At the end of this course, participants should

1. know the general risks and potential TMS treatment benefits
2. be able to decide when TMS is indicated in a patient depending on the diagnosis
3. will learn the basics of application technique and mechanisms of action of TMS brain stimulation
4. be able to decide which type /device/ r-TMS, d-TMS, t-DCS for which patient and which TMS protocol is indicated in a patient depending on the diagnosis
5. be able to what are the possible side effects and how to avoid them
6. know all protocol possibilities (accelerated TMS) as well as which combinations to use (psycho pharmacotherapy, psychotherapy)
7. be able to decide to use therapy in new diagnoses (schizophrenia, gambling addiction, tinnitus, pain syndromes)

Methods: Interactive talk, presentations, case discussions in small groups and with all participants

References:

1. Baeken C, Arns M, Brunelin J, Chanes L, Filipčić I, Ganho-Ávila A, Hirnstein M, Rachid F, Sack AT, O'shea J, D'urso G, Antal A. European reclassification of non-invasive brain stimulation as class III medical devices: A call to action. *Brain Stimul.* 2023 Mar 2;16(2):564-566. doi: 10.1016/j.brs.2023.02.012. Epub ahead of print. PMID: 36870602.
2. Zangen A, Zibman S, Tendler A, Barnea-Ygael N, Alyagon U, Blumberger DM, Grammer G, Shalev H, Gulevski T, Vapnik T, Bystritsky A, Filipčić I, Feifel D, Stein A, Deutsch F, Roth Y, George MS. Pursuing personalized medicine for depression by targeting the lateral or medial prefrontal cortex with Deep TMS. *JCI Insight.* 2023 Feb 22;8(4):e165271. doi: 10.1172/jci.insight.165271. PMID: 36692954; PMCID: PMC9977507.
3. Filipčić I, Šimunović Filipčić I, Sučić S, Milovac Ž, Gereš N, Matić K, Čelić-Ružić M, Zečević Penić S, Orgulan I, Požgaj V, Bajić Ž. A pilot investigation of accelerated deep transcranial magnetic stimulation protocols in treatment-resistant depression. *Eur Arch Psychiatry Clin Neurosci.* 2021 Feb;271(1):49-59. doi: 10.1007/s00406-020-01141-y. Epub 2020 May 24. PMID: 32449010.
4. Baeken C, Brem AK, Arns M, Brunoni AR, Filipčić I, Ganho-Ávila A, Langguth B, Padberg F, Poulet E, Rachid F, Sack AT, Vanderhasselt MA, Bennabi D. Repetitive transcranial magnetic stimulation treatment for depressive disorders: current knowledge and future directions. *Curr Opin Psychiatry.* 2019 Sep;32(5):409-415. doi: 10.1097/YCO.0000000000000533. PMID: 31145145; PMCID: PMC6688778.

5. Antal A, Alekseichuk I, Bikson M, Brockmüller J, Brunoni AR, Chen R, Cohen LG, Dowthwaite G, Ellrich J, Flöel A, Fregni F, George MS, Hamilton R, Haueisen J, Herrmann CS, Hummel FC, Lefaucheur JP, Liebetanz D, Loo CK, McCaig CD, Miniussi C, Miranda PC, Moliadze V, Nitsche MA, Nowak R, Padberg F, Pascual-Leone A, Poppendieck W, Priori A, Rossi S, Rossini PM, Rothwell J, Rueger MA, Ruffini G, Schellhorn K, Siebner HR, Ugawa Y, Wexler A, Ziemann U, Hallett M, Paulus W. Low intensity transcranial electric stimulation: Safety, ethical, legal regulatory and application guidelines. *Clin Neurophysiol.* 2017 Sep;128(9):1774-1809. doi: 10.1016/j.clinph.2017.06.001. Epub 2017 Jun 19. PMID: 28709880; PMCID: PMC5985830.
6. Siegert A, Diedrich L, Antal A. New Methods, Old Brains-A Systematic Review on the Effects of tDCS on the Cognition of Elderly People. *Front Hum Neurosci.* 2021 Oct 27;15:730134. doi: 10.3389/fnhum.2021.730134. PMID: 34776903; PMCID: PMC8578968.
7. Haller N, Hasan A, Padberg F, Strube W, da Costa Lane Valiengo L, Brunoni AR, Brunelin J, Palm U. Transkranielle elektrische Hirnstimulationsverfahren zur Behandlung der Negativsymptomatik bei Schizophrenie [Transcranial electrical brain stimulation methods for treatment of negative symptoms in schizophrenia]. *Nervenarzt.* 2022 Jan;93(1):41-50. German. doi: 10.1007/s00115-021-01065-5. Epub 2021 Jan 25. PMID: 33492411; PMCID: PMC8763819.