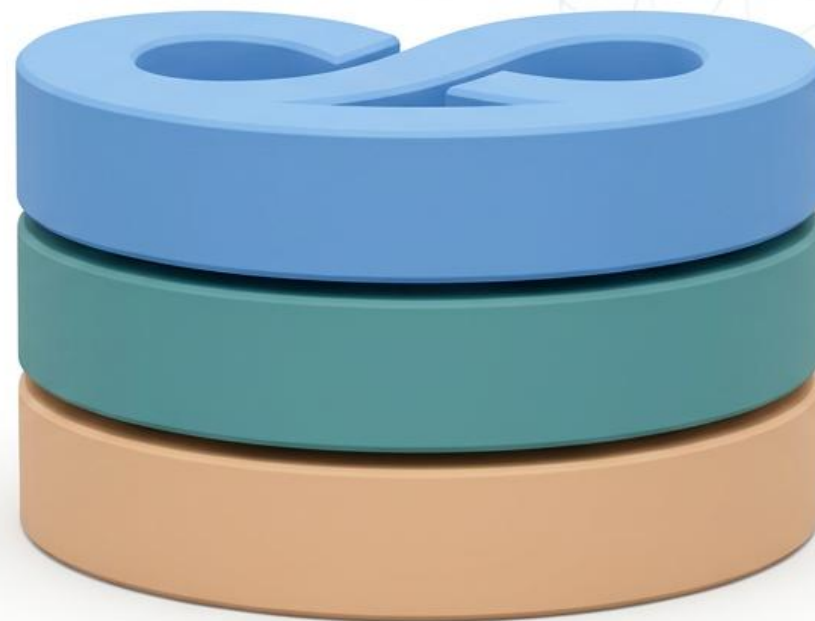


TMS Guidelines

TMS-kursus

Opbygning af nye TMS-enheder



KLAUS MARTINY

Professor, overlæge, dr.
med.

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PEDRO BARATA

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Privat Psykiatrisk Center
Maastricht University

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Psykiatrien



TMS-VEJLEDNING

TRANSKRANIEL MAGNETISK
STIMULATION I PSYKIATRI



2025



PEDRO CABRAL BARATA
SÓNIA PIMENTA
ANA LISA CARMO
KLAUS MARTINY
POUL VIDEBECH



TMS GUIDELINES

TRANSCRANIAL MAGNETIC
STIMULATION IN PSYCHIATRY

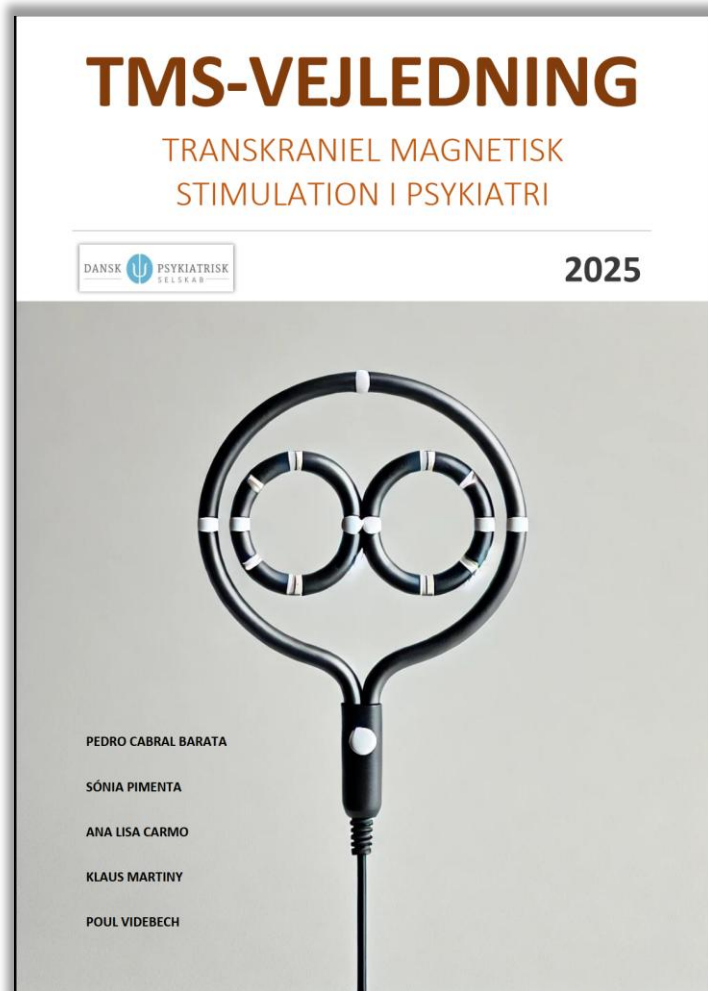


2025



PEDRO CABRAL BARATA
SÓNIA PIMENTA
ANA LISA CARMO
KLAUS MARTINY
POUL VIDEBECH







1. **Generelle indikationer for psykiatriske lidelser**
2. **TMS for unipolar depression: evidens og protokoller**
3. **Kontraindikationer**




DPS TMS Guidelines 2025

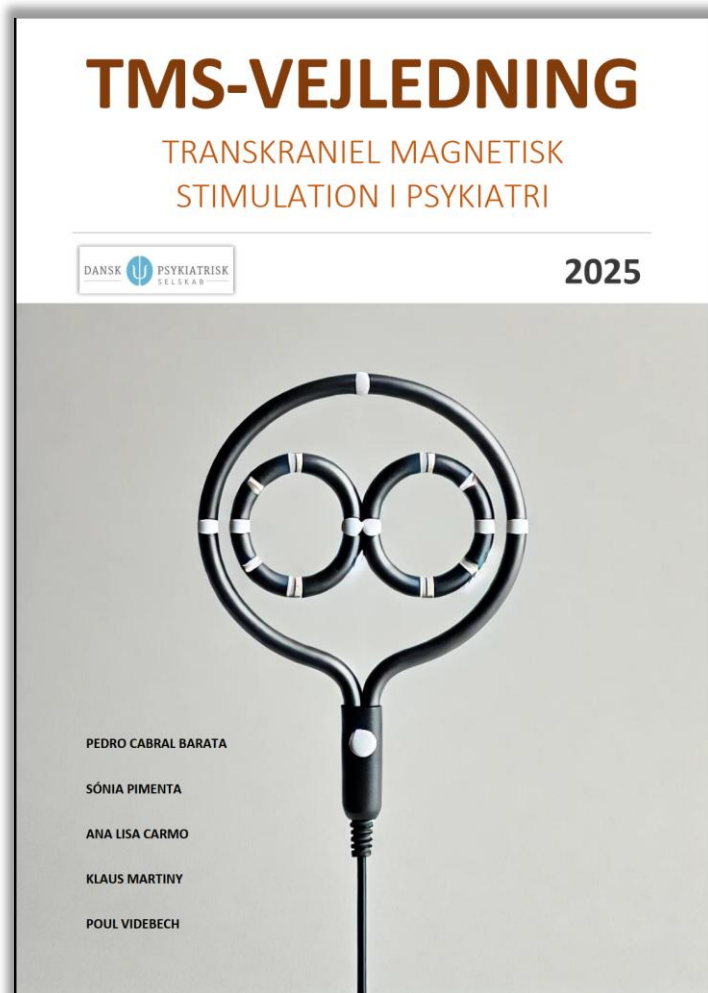
Generelle indikationer for psykiatriske lidelser

ANBEFALET:

-  **Unipolar Depression:** moderat til svær TRD uden psykotiske symptomer
-  **OCD:** moderat til svær OCD, hvor kombinationen af SSRI og KAT ikke har haft tilstrækkelig effekt

IKKE ANBEFALET som rutinebehandling:

-  Bipolar depression (kan overvejes ved insufficient effekt af medicin og ECT)
-  Skizofreni (kan overvejes ved clozapin-resistent skizofreni: hørelsehallucinationer/negative symptomer)
-  PTSD, misbrug og rygestop



1. **Generelle indikationer for psykiatriske lidelser**
2. **TMS for unipolar depression: evidens og protokoller**
3. **Kontraindikationer**

DPS TMS Guidelines 2025

Unipolar depression: evidens



- Effekt ved TRD understøttet af forskellige RCTs and metaanalyser
- Omkostningseffektiv (Behandlingsrådet, 2024; Zemplényi, 2022)
- Anbefalet for TRD i flere kliniske retningslinjer (Hebel, 2022; Lam, 2024; Trapp, 2025)
- FDA-godkendt
- TRD: 15-32% remission, 33-49% respons (Blumberger, 2018; Bulteau, 2022)
- Ikke-TRD: højere remission (40-60%) og effect-size (0.83 vs. 0.42) (Lefaucheur, 2020; Lisanby, 2009)

DPS TMS Guidelines 2025

Unipolar Depression: anbefalede protokoller

Første valg

iTBS (v-DLPFC)

- 50 Hz
- 3 min 9 sec (2 on, 8 off)
- 600 impulser/session
- Tidseffektiv

Høj frekvens (v-DLPFC)

- 10 Hz
- 18 min 48 sec (4 on, 11 off)
- 3.000 impulser

Alternativ

Lav frekvens (h-DLPFC)

- 1 Hz
- 25 min
- 1.500 impulser
- Bedre toleranceprofil

DPS TMS Guidelines 2025

Unipolar Depression: anbefalede protokoller

Alternativ

Lav frekvens (højre-DLPFC)



- OR respons/remission > 2 på tværs af metaanalyser (Brunoni et al., 2017; Mutz et al., 2018)
- 1 Hz højre-DLPFC = 10 Hz v-DLPFC på metaanalyserne (Berlow et al., 2020; Cao et al., 2018)
- Anvendt i 50% af TMS-enheder i Danmark i 2023 (Cabral Barata et al, 2024)

DPS TMS Guidelines 2025

Unipolar Depression: anbefalede protokoller

Første valg

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Lav frekvens (h-DLPFC)

- 1 Hz
- 25 min
- 1.500 impulser
- Bedre toleranceprofil

DPS TMS Guidelines 2025

Unipolar Depression: anbefalede protokoller

Første valg

- ✓ 5 sessioner per uge (mandag-fredag)
- ✓ ≥ 30 sessions i ≥ 6 uger (færre ved tidlig remission)

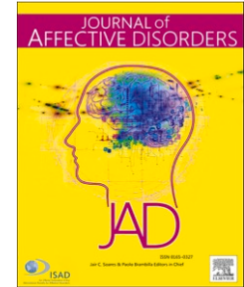
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- 25 min
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Contents lists available at [ScienceDirect](#)

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad



Research paper

Weekly trajectories of antidepressant response to transcranial magnetic stimulation - A retrospective cohort analysis

Pedro Cabral Barata^{a,b,*}, Bitu Daftari^b, Michael Bo Pedersen^b, Alexander T. Sack^a

^a Faculty of Psychology and Neuroscience, Maastricht University, Universiteitssingel 40, 6229 ER, Maastricht, Netherlands

^b Regionspsykiatrien Gødstrup, Psychiatry in Central Jutland Region, Hospitalsparken 15, 7400, Herning, Denmark

Each additional week of TMS treatment increased MDI response and remission odds >1.5 fold. HAM-D17 weekly response odds were > 2; remission odds were non-significant.

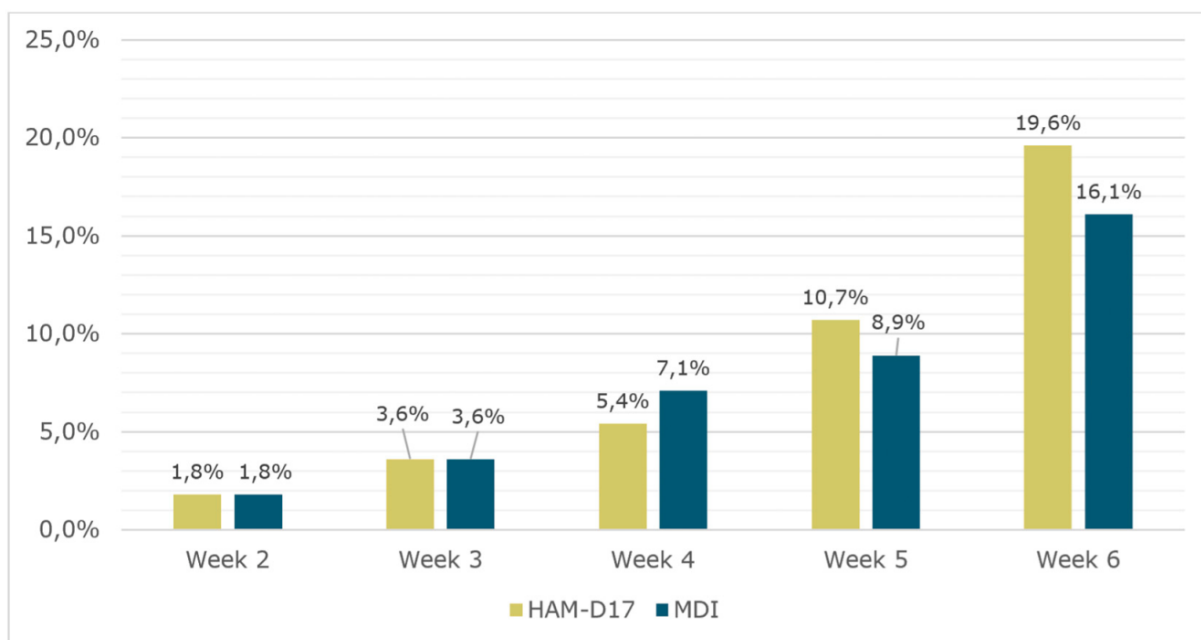


Fig. 3. HAM-D17 and MDI weekly response rates (HAM-D17, n = 56; MDI, n = 52).

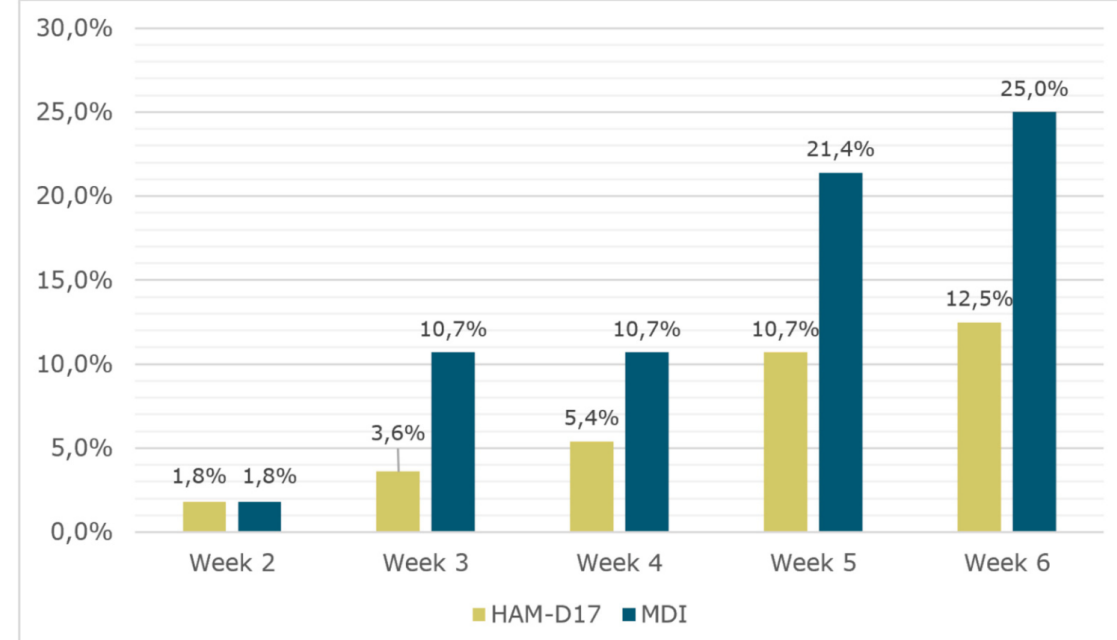



Fig. 4. HAM-D17 and MDI weekly remission rates (HAM-D17, n = 56; MDI, n = 52).

DPS TMS Guidelines 2025


Unipolar Depression: anbefalede protokoller

Første valg

iTBS (v-DLPFC) 

Høj frekvens (v-DLPFC) 

Alternativ





Lav frekvens (h-DLPFC) 

DPS TMS Guidelines 2025

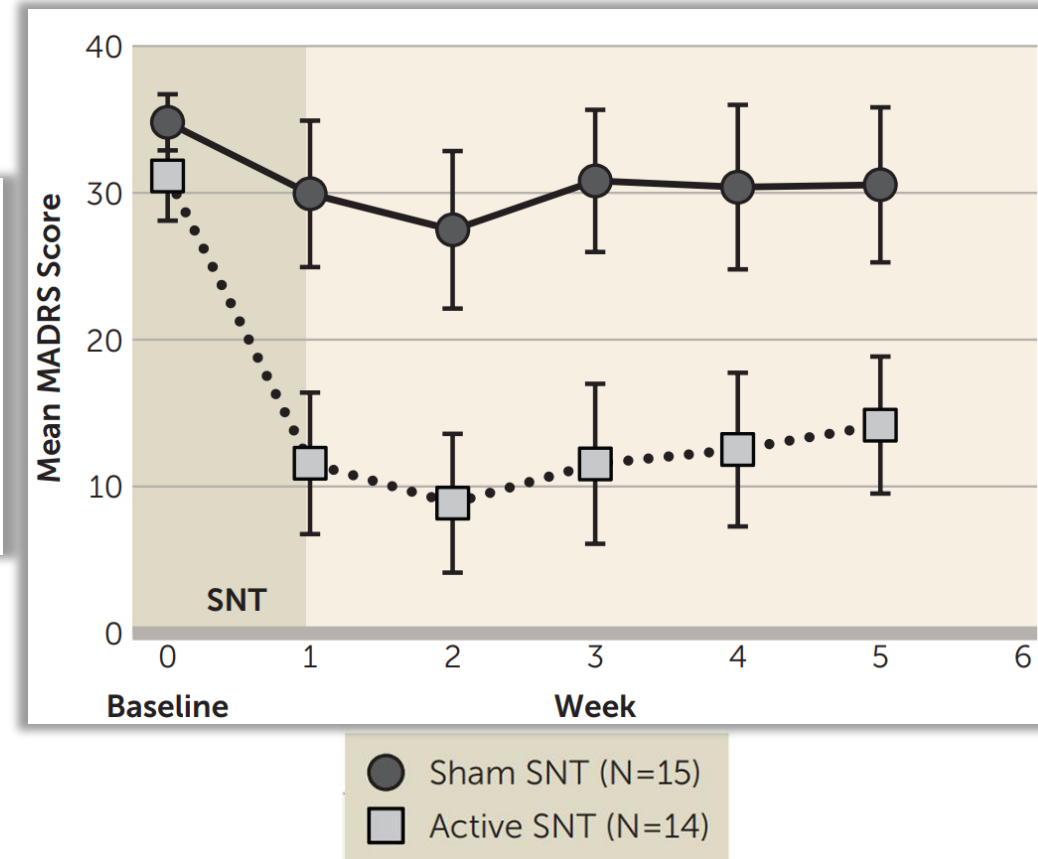
Unipolar Depression: SAINT/SNT protokol

FULL ACCESS | Articles | Publication Date: 29 October 2021

Stanford Neuromodulation Therapy (SNT): A Double-Blind Randomized Controlled Trial

Eleanor J. Cole, Ph.D. , Angela L. Phillips, Ph.D., Brandon S. Bentzley, M.D., Ph.D. , Katy H. Stimpson, B.S., Romina Nejad, M.S., Fahim Barmak, M.D., Clive Veerapal, B.S., ... [SHOW ALL](#) ..., and Nolan R. Williams, M.D.   | [AUTHORS INFO & AFFILIATIONS](#)

Publication: American Journal of Psychiatry • Volume 179, Number 2 • <https://doi.org/10.1176/appi.ajp.2021.20101429>



DPS TMS Guidelines 2025

Unipolar Depression: SAINT

Meget effektiv, men...

- Er 10 behandlinger om dagen nødvendige, eller kan det forkortes, så det passer til en 8 timers arbejdsdag?
- Er fMRI-neuronavigation nødvendig?
- Hvordan sammenlignes SAINT med "standard" rTMS?
- Hvor længe varer den kliniske effekt??
- Replikation??

DPS TMS Guidelines 2025

Unipolar Depression: SAINT

SAINT protokol anbefales ikke som rutinebehandling.

SAINT kan dog overvejes ved:

- ✓ Indlagte patienter med moderat til svær unipolar depression uden psykotiske symptomer, hvor standard TMS-protokoller og ECT ikke er en terapeutisk mulighed.

DPS TMS Guidelines 2025

Unipolar Depression: SAINT

Meget effektiv, men...

- Er 10 behandlinger om dagen nødvendige, eller kan det forkortes, så det passer til en 8 timers arbejdsdag?
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- Hvor længe varer den kliniske effekt??
- Replikation??

Hvor længe varer den kliniske effekt??

Replikation??

Gode nyheder!





Brain Stimulation

Volume 18, Issue 3, May–June 2025, Pages 875-881



Durability of clinical benefit with Stanford Neuromodulation Therapy (SNT) in treatment-resistant depression

[Andrew D. Geoly](#), [Katy H. Stimpson](#), [Flint M. Espil](#), [Brandon S. Bentzley](#), [Nolan R. Williams](#)  

Department of Psychiatry & Behavioral Sciences, Stanford University, Palo Alto, CA, USA

World Psychiatry

OFFICIAL JOURNAL OF THE WORLD PSYCHIATRIC ASSOCIATION (WPA)



Research Report |  Free Access

Stanford neuromodulation therapy for treatment-resistant depression: a randomized controlled trial confirming efficacy, and an EEG study providing insight into mechanism of action and a potentially predictive biomarker of efficacy

[Ian H. Kratter](#), [Christopher W. Austelle](#), [Jennifer I. Lissemore](#), [Masataka Wada](#), [Andrew Geoly](#), [Anna Chaiken](#), [Irakli Kaloiani](#), [Noriah Johnson](#), [Stephanie Wan](#), [Lena Kozyr](#) ... [See all authors](#) 

First published: 14 January 2026 | <https://doi.org/10.1002/wps.70032> | [VIEW METRICS](#)

Hvor længe varer den kliniske effekt??




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FULL ACCESS | Articles | Publication Date: 7 April 2020





Stanford Accelerated Intelligent Neuromodulation Therapy for Treatment-Resistant Depression

Eleanor J. Cole, Ph.D., Katy H. Stimpson, B.S., Brandon S. Bentzley, M.D., Ph.D., Merve Gulser, B.S., Kirsten Cherian, Ph.D., Claudia Tischler, B.S., Romina Nejad, M.S., ... [SHOW ALL ...](#), and Nolan R. Williams, M.D.  | [AUTHORS INFO & AFFILIATIONS](#)

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Department of Psychiatry & Behavioral Sciences, Stanford University, Palo Alto, CA, USA

Results

Seventy percent (32 of 46) of participants entered remission the week following treatment. After 12 weeks of treatment, 15 of 46 (33%) participants remained in remission. Of the participants who entered remission, 15 of 32 (47%) remained in remission.



Research Report |  **Free Access**

Stanford neuromodulation therapy for treatment-resistant depression: a randomized controlled trial confirming efficacy, and an EEG study providing insight into mechanism of action and a potentially predictive biomarker of efficacy

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48 patienter med TRD

TMS (n=24)

Sham (n=24)



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Ian H. Kratter, Christopher W. Austelle, Jennifer I. Lissemore, Masataka Wada, Andrew Geoly, Anna Chaiken, Irakli Kaloian, Noriah Johnson, Stephanie Wan, Lena Kozyr ... See all authors

First published: 14 January 2026 | <https://doi.org/10.1002/wps.70032> | [VIEW METRICS](#)

MADRS (0-60)

7 to 19: let depression

20 to 34: moderat depression

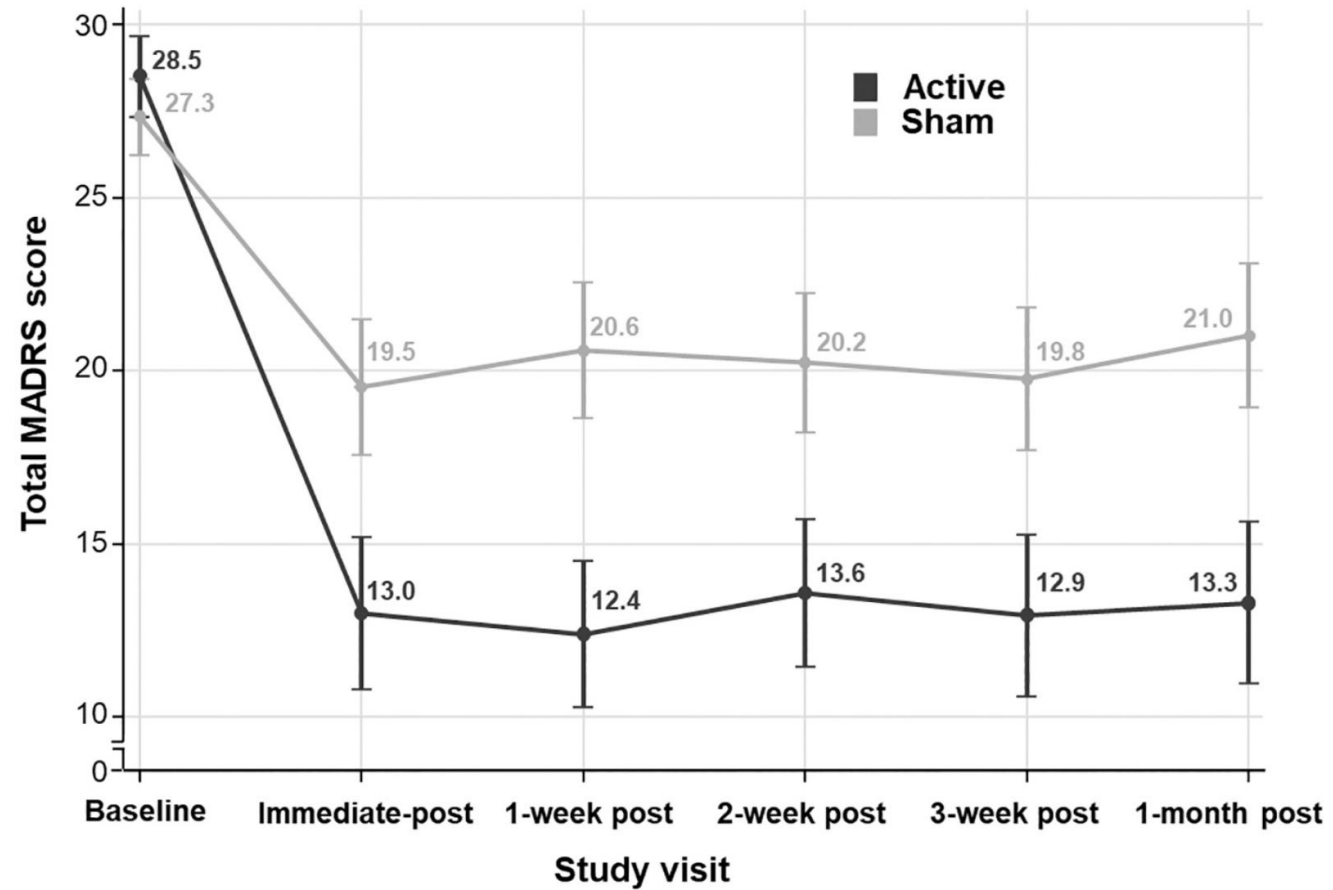


Figure 4 Longitudinal clinical outcomes by mean score on the Montgomery-Åsberg Depression Rating Scale (MADRS) in participants receiving active and sham Stanford neuromodulation therapy. Solid circles represent generalized mixed-effects model-estimated marginal means. Error bars represent model-based standard errors.



Research Report | [Free Access](#)

Stanford neuromodulation therapy for treatment-resistant depression: a randomized controlled trial confirming efficacy, and an EEG study providing insight into mechanism of action and a potentially predictive biomarker of efficacy

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Remission: MADRS \leq 10

$p=0.039$, $OR=3.5$, $NNT=3.4$

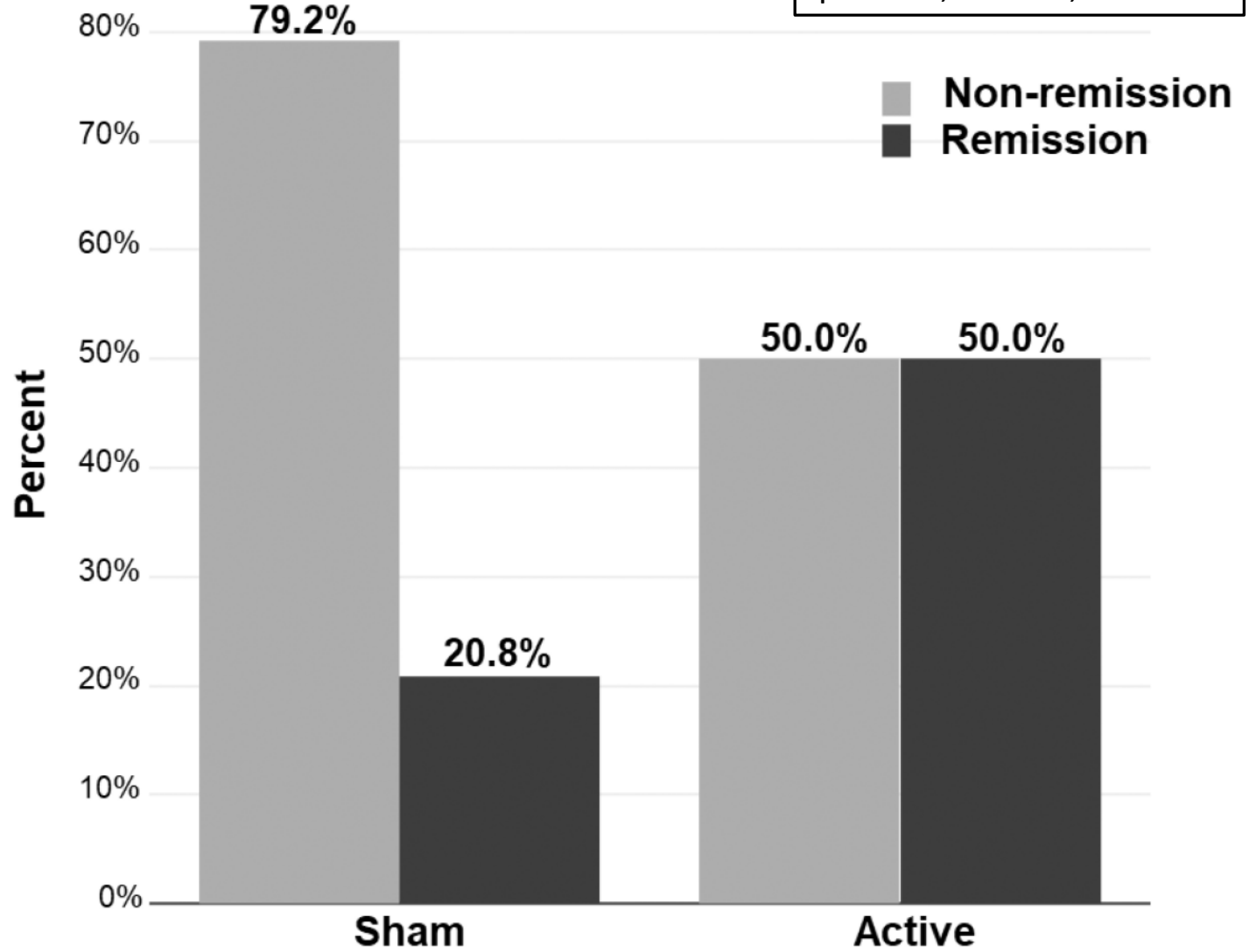
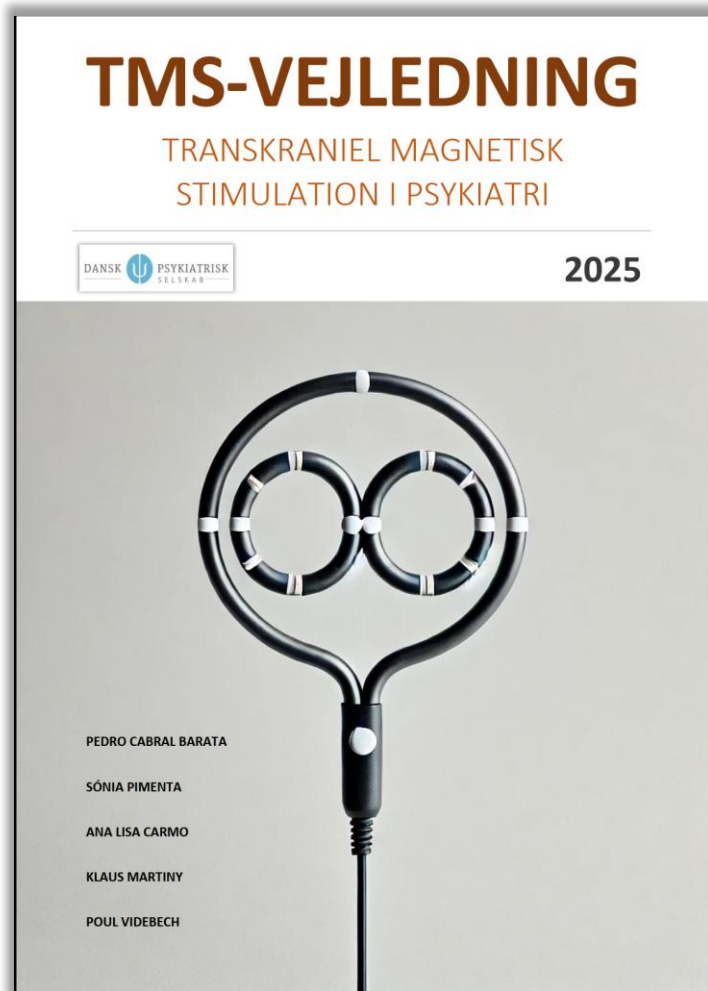


Figure 2 One-month remission rate in individuals receiving active and sham Stanford neuromodulation therapy



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3. **Kontraindikationer**

DPS TMS Guidelines 2025

Unipolar Depression: kontraindikationer

- Ferromagnetisk materiale i hoved/hals/thorax (<10 cm / <30 cm)
- Misbrug
- Moderat-svær elektrolytforstyrrelse

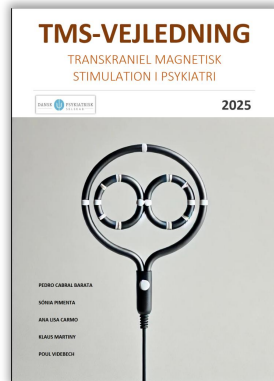
DPS TMS Guidelines 2025

Unipolar Depression

Psykotiske symptomer, svær agitation, delir, akut selvmordsrisiko?

ECT, ikke TMS!









Bilag 1 – Eksempel på TMS-sikkerhedstjekliste

TMS-sikkerhedstjekliste		JA	NEJ
1	Ferromagnetisk materiale eller implanteret elektronisk/medicinsk udstyr i hovedet, hals eller thorax		
	Metalklips, stents, plader eller skruer i hoved eller brysthule		
	Metalsplinter eller sprængstykker i hovedet eller brysthule		
	Ferromagnetiske kunstige hjerteklapper		
	Implantater/metalsplinter i øjnene		
	Cochlear implantat		
	Nervestimulatoer: Deep Brain Stimulation (DBS) eller Vagus Nerve Stimulator (VNS)		
	Pacemaker		
	Andre former for ferromagnetisk materiale eller implantat		
	Udstyr:		
2	Aktuelt misbrug af alkohol, benzodiazepiner eller andre rusmidler		
3	Moderat til svær elektrolytforstyrrelse (blodprøver må højst være 3 måneder gamle) P-natrium <129 eller >150 mmol/L P-kalium <3.0 eller >6.0 mmol/L		
4	Patienten kan indgå en troværdig aftale om at ikke drikke alkohol under TMS-forløb		
5	Graviditet		
6	Somatiske hjernelidelser		
	Epilepsi eller anamnese med krampeanfald		
	Hjerneinfarkt/hjerneblødning		
	Hjernetumor/intrakraniell hypertension		
	Tidligere svært hovedtraume		
	Tidligere neurokirurgisk intervention		
	Andet:		
7	Psykotiske symptomer, akut øget selvmordsrisiko, svær agitation eller truende delir		



Review

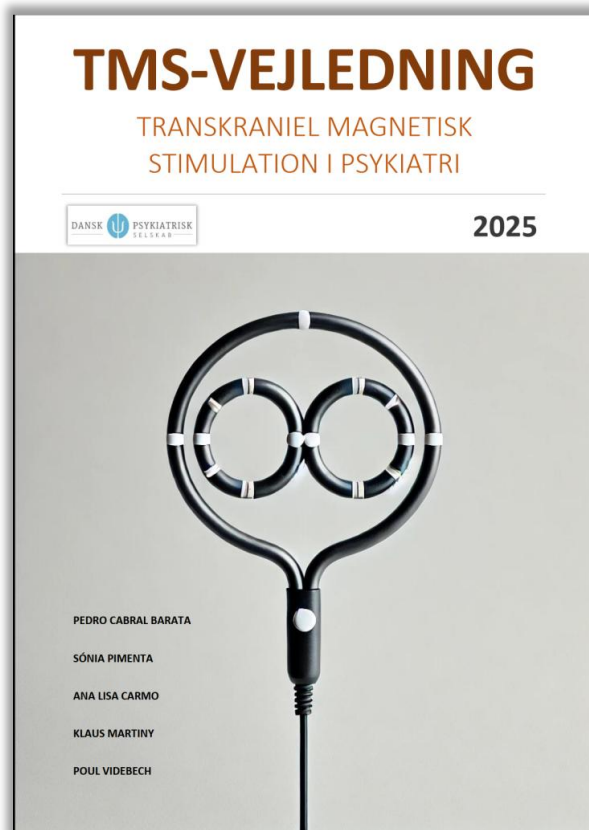
Safety and recommendations for TMS use in healthy subjects and patient populations, with updates on training, ethical and regulatory issues: Expert Guidelines

Simone Rossi^a  , Andrea Antal^{b,c}, Sven Bestmann^d, Marom Bikson^e, Carmen Brewer^f, Jürgen Brockmöller^g, Linda L. Carpenter^h, Massimo Cincottaⁱ, Robert Chen^j, Jeff D. Daskalakis^k, Vincenzo Di Lazzaro^l, Michael D. Fox^{m,n,o}, Mark S. George^p, Donald Gilbert^q, Vasilios K. Kimiskidis^r, Giacomo Koch^s, Risto J. Ilmoniemi^t, Jean Pascal Lefaucheur^{u,v}, Letizia Leocani^w, Sarah H. Lisanby^{x,y,z}...Mark Hallett^{ap,z}  





Take-home message



Indikationer

Unipolar depression & OCD

Protokoller v/ depression

10Hz og iTBS – venstre DLPFC

1Hz – højre DLPFC

SAINT?

≥30 sessioner (depression)

Kortere ved tidlig remission

Kontraindikationer

Psykotiske symptomer, agitation, akut selvmordsrisiko

Ferromagnetisk materiale

Misbrug

Elektrolytforstyrrelser

A person wearing a blue suit jacket is holding a white rectangular sign in front of their chest. The sign has the word "QUESTIONS?" written on it in a large, bold, dark blue font. The person's hands are visible, holding the sign from the bottom corners. The background is a plain, light-colored wall.

QUESTIONS?

pcb@privatpsykiatriskcenter.dk