HAL
open science

The Psychomotor Retardation, a Marker of Response to rTMS Treatment in Patients with Major Depressive Disorder?

Thibault Deschamps, Anne Sauvaget, Samuel Bulteau, Véronique Thomas-Ollivier

To cite this version:

Thibault Deschamps, Anne Sauvaget, Samuel Bulteau, Véronique Thomas-Ollivier. The Psychomotor Retardation, a Marker of Response to rTMS Treatment in Patients with Major Depressive Disorder?. Neuropsychiatry, 2017, 07, 10.4172/neuropsychiatry.1000274 . hal-03340120

HAL Id: hal-03340120

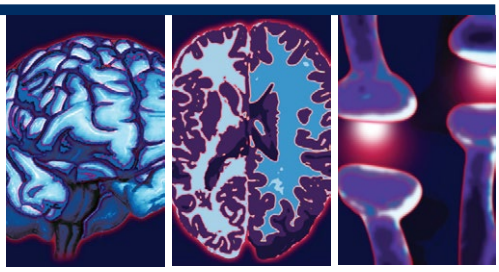
https://nantes-universite.hal.science/hal-03340120v1

Submitted on 10 Sep 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Commentary



The Psychomotor Retardation, a Marker of Response to rTMS Treatment in Patients with Major Depressive Disorder?

Thibault Deschamps[1,†], Anne Sauvaget[2,3], Samuel Bulteau[2], Véronique Thomas-Ollivier[1]

Abstract

Now more than ever, let us continue to develop personalized medicine to improve the remission rate for treatment resistant depressed patients. Recent findings about psychomotor retardation - a core symptom of depression - provide new insights into the predictive efficiency of personalized treatments, such as rTMS.

Keywords

Psychomotor retardation, Depressive disorder, rTMS treatment, Cognitive and behavioral therapies

Repetitive transcranial magnetic stimulation (rTMS) is a therapeutic option often used in routine care plans for patients with major depressive disorder (MDD), especially for those who do not respond to treatment with medication or cognitive and behavioral therapies. Although clinically safe and quite efficient for medication-resistant major depression [1], this noninvasive neurostimulating technique is not without a certain cost [2]. In view of budget constraints related to healthcare strategies, providing attending psychiatrists with robust treatment moderators (i.e. patient's baseline characteristics with high predictive power of effectiveness of any specific treatment) may optimize the personalized treatment selection for MDD patients [3,4].

In this context of examination on specific dimensions of depression that can guide treatment selection, our current proposal is to advocate, or perhaps even better to reclaim the psychomotor retardation (PMR) - a core symptom of depression – whose importance in diagnostic, prognostic and personalized therapeutic issues is often understated, or even skipped. Not so much by its lack of relevant value in psychiatry, but mostly through the inconsistency of research evidence addressing these purposes. Here is the opportunity to shine light on the recent findings about PMR driving new insights into the predictive efficiency of personalized treatments, such as rTMS.

The PMR concern has been around for quite some time. From Widlöcher [5], this clinical symptom is considered to play a crucial role in depression. This "seniority" has resulted in the clinical use of interviewer-rated scales based on observations of behavior, such as the retardation item of the Hamilton Depression Rating Scale [6] and the Salpêtrière Retardation Rating Scale (SRRS) [5,7]; yet only few studies focused upon the prognostic dimension of PMR. Perhaps quite as rare, but more recent is the research examining

[1]University of Nantes, Laboratory "Movement, Interactions, Performance" (EA 4334), Faculty of Sport Sciences, Nantes, France

[2]Addictology and Liaison Psychiatry Department, Nantes University Hospital Nantes, France

[3]EA SPHERE 4275 Methods for Patients-centered outcomes and Health Research, University of Nantes, Nantes, France

[†]Author for correspondence: Thibault Deschamps, University of Nantes, Laboratory Movement, Interactions, Performance (UPRES-E.A. 4334), 25 bis boulevard Guy Mollet, BP 72206, 44322 Nantes Cedex 3, France. Phone: +33 (0)2 51 83 72 14, email: thibault.deschamps@univ-nantes.fr

the neuroanatomical substrates and the cortical mechanisms underlying depression-related PMR [8]. One reason can probably be ascribed to different methodological issues, starting with those related to the very nature of clinical scales and their relative sensitivity to subtle changes and robust prognostics. Besides this approach based on depression-focused questionnaires requires that MMD patients have reasonable insight into their symptoms. Yet there may be physical (motor), psychological (cognitive) or other changes that the patient is not aware of. That brings us to our first point to consider: a scientific and clinical interest for better characterization and independent outcomes measures of the PMR.

Based on the well-established definition, including many motor and cognitive components [9], the first step aimed to investigate the feasibility of a comprehensive battery of tests (e.g. 3-Meter Timed Up and Go test, dual-tasking postural control assessments, the handgrip strength test or verbal fluency tasks) assessing PMR for MDD patients after a 3-week protocol of rTMS. All these measures not only were feasible, free of adverse effects, and well tolerated by the MDD patients in naturalistic conditions before or after the rTMS protocol, but a preliminary insight emerged from improvements in some psychomotor assessments following the intervention, especially in balance performance [10]. Be that as it may, once this pre-requisite has been validated, the prognostic potential of PMR is ready to produce scientific evidence. That is our challenging conviction.

In that respect, we argue that the limited application of the PMR as a relevant treatment moderator in precision medicine can be explained not only by the few studies available in the literature about the neurostimulation-related effects on PMR in MDD patients, but also by their divergent results. Clearly, some studies have shown that rTMS significantly decreased PMR [11], whereas others found that rTMS did not influence PMR [12]. No firm conclusion could be drawn at this stage. Note also that these studies quantified the PMR either with one specific scale, or with only one item of a specific depression scale, but no cognitive, motor and behavioural assessments were specifically recorded. To overcome this second issue, Deschamps, *et al.* [13] recently investigated the interplay between the PMR scores and balance performance in MDD patients. The standing postural sway, particularly through the analysis of the center-of-pressure (COP) velocity based parameters, was easily measured by using a force platform during trials, with or without vision, and while backward counting (dual task). As a striking result, significant positive correlations were found between the PMR scores and the velocity-based COP variables, especially in the dual-task conditions. Hence, the study showed for the first time that the posture-cognitive dual tasking performance can be a good and reliable hallmark of depression-related PMR. In addition, some other explanatory results strongly suggest that this initial postural instability may be a consistent moderator that could predict positive outcomes in MDD patients after an rTMS intervention, such as significant improvements in PMR scores, depression (decrease in MADRS scores) and postural instability [13]. A more efficient postural control to rTMS stimulation marks substantively the motor component of PMR, even if an improved dual task performance is likely indicative of improvement in cognitive efficiency (i.e. lower attentional demands).

All else being equal, it's really time to produce neuroscientific evidence of these promising findings. We believe that this potential "dual postural moderator" deserves to be taken into consideration and specifically examined in a double-blind, sham-controlled trial to determine a prediction model, and if appropriate, to validate its clinical relevance on an independent cohort. Be convinced, and let us collectively enable this ambition.

As the last argument from these perspectives, far from being specific to neuropsychiatry, devising common and standardized measurements to assess motor-cognitive interactions may influence the future knowledge of the underlying mechanisms that can affect pathways to disability in mental disorders. Undoubtedly, the cognitive and motor aspects of everyday life for all human beings share behavioral and etiological factors that can drive new insights into (the best) treatment selection for individual patients. In that way, PMR-related dual postural performance seems to be a suitable candidate, by considering the cognitive and mobility dysfunction in MDD patients as a common problem. Mechanistically, changes in PMR-related brain networks probably arise from the alteration of limbic signals, at the interface of emotion, volition, higher-order cognitive function, and movement control

[8]. Combined with positive effects of rTMS treatment on the limbic system, a reduction of attention and cognitive deficits in MDD patients can be found [14], with positive impact on fine motor outcomes [15] and postural control [10,13]. However, a great deal of research still is needed to increase this functional anatomical specificity of PMR.

The potential benefits of evidence linking cognition/motor interaction in MDD patients may be clinically crucial. It may offer a reliable prognostic tool for detecting patients who are more likely to remit based on their response to rTMS treatment.

Acknowlegments

The research was supported by grants from the Region of Pays de la Loire, France, for the project "Longévité, Autonomie, Mobilité". The sponsor had no role in the preparation, review, or approval of the manuscript.

Disclosures

None.

References

1. Berlim MT, Van den Eynde F, Daskalakis ZJ. A systematic review and meta-analysis on the efficacy and acceptability of bilateral repetitive transcranial magnetic stimulation (rTMS) for treating major depression. *Psychol. Med* 43(11), 2245-2254 (2013).
2. Vallejo-Torres L, Castilla I, González N, *et al.* Cost-effectiveness of electroconvulsive therapy compared to repetitive transcranial magnetic stimulation for treatment-resistant severe depression: a decision model. *Psychol. Med* 45(7), 1459-70 (2015).
3. Shilyansky C, Williams LM, Gyurak A, *et al.* Effect of antidepressant treatment on cognitive impairments associated with depression: a randomized longitudinal study. *Lancet. Psychiatry* 3(5), 425-435 (2016).
4. Wallace ML, Frank E, Kraemer HC. A novel approach for developing and interpreting treatment moderator profiles in randomized clinical trials. *JAMA. Psychiatry* 70(11), 1241-1247 (2013).
5. Widlöcher DJ. Psychomotor retardation: clinical, theoretical, and psychometric aspects. *Psychiatr. Clin. North. Am* 6(1), 27-40 (1983).
6. Hamilton M. A rating scale for depression. *J. Neurol. Neurosurg. Psychiatry* 23(1), 56-62 (1960).
7. Montgomery SA, Åsberg M. A new depression scale designed to be sensitive to change. *Br. J. Psychiatry* 134(1), 382-389 (1979).
8. Liberg B, Rahm C. The functional anatomy of psychomotor disturbances in major depressive disorder. *Front. Psychiatry* 6(1), 34 (2015).
9. Buyukdura JS, McClintock SM, Croarkin PE. Psychomotor retardation in depression: biological underpinnings, measurement, and treatment. *Prog. Neuropsychopharmacol. Biol. Psychiatry* 35(2), 395-409 (2011).
10. Thomas-Ollivier V, Deschamps T, Bulteau S, *et al.* Effect of Repetitive Transcranial Magnetic Stimulation on Psychomotor Retardation in Major Depression: A Pilot Feasibility Study. *J. Neuropsychiatry. Clin. Neurosci* 28(1), 62-65 (2016).
11. Baeken C, De Raedt R, Santermans L, *et al.* HF-rTMS treatment decreases psychomotor retardation in medication-resistant melancholic depression. Prog. Neuropsychopharmacol. *Biol. Psychiatry* 34(4), 684–687 (2010).
12. Hoeppner J, Padberg F, Domes G, *et al.* Influence of repetitive transcranial magnetic stimulation on psychomotor symptoms in major depression. *Eur. Arch. Psychiatry. Clin. Neurosci* 260(3), 197-202 (2010).
13. Deschamps T, Sauvaget A, Pichot A, *et al.* Posture-cognitive dual-tasking: a relevant marker of depression-related psychomotor retardation. An illustration of the positive impact of repetitive transcranial magnetic stimulation in patients with major depressive disorder. *J. Psychiatr. Res* 83(1), 86-93 (2016).
14. De Raedt R, Vanderhasselt MA, Baeken C. Neurostimulation as an intervention for treatment resistant depression: from research on mechanisms towards targeted neurocognitive strategies. *Clin. Psychol. Rev* 41(1), 61-69 (2015).
15. Schrijvers DL, Baeken C, De Raedt R, *et al.* The impact of high-frequency repetitive transcranial magnetic stimulation on fine motor functions in medication-resistant major depression. *Neuropsychobiology* 66(4), 252-258 (2012).