Study detects how a genetic variant modifies the brain stimulation impact on memory

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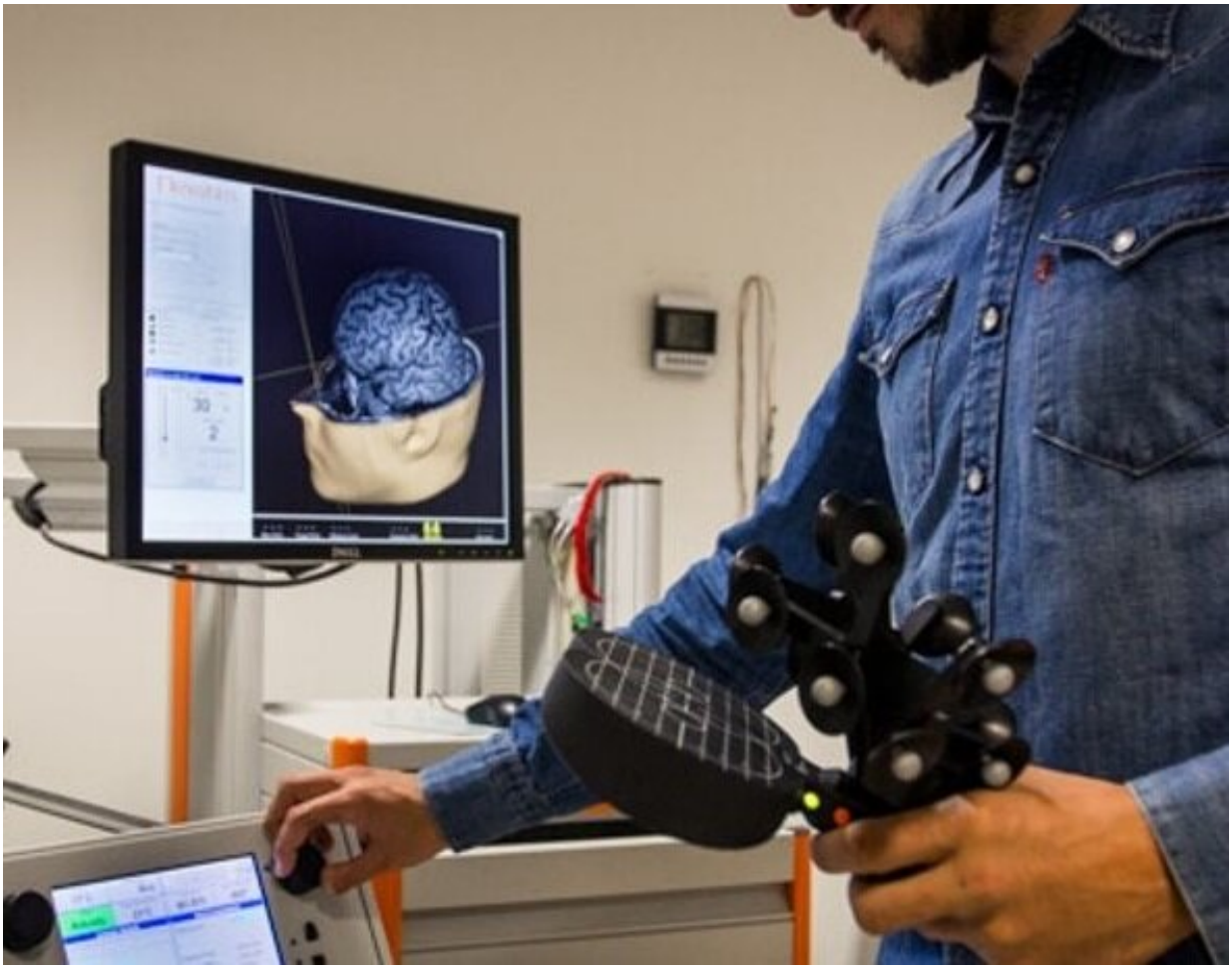

Conclusions reveal it is easier to alter the cognitive activity through transcranial magnetic stimulation (TMS) in people with the genetic variant Val/Val for the BDNF gene. Credit: University of Barcelona

The gene of the brain-derived neurotrophic factor (BDNF) is associated with several processes related to memory and brain plasticity. Now, a paper reveals that it is easier to alter the cognitive activity through transcranial magnetic stimulation (TMS) in people with the genetic variant Val/Val for the BDNF gene.

The article, published in the journal *Scientific Reports*, is led by the researcher Kilian Abellaneda, member of the Barcelona Brain Stimulation Lab (BBSLab), coordinated by David Bartrés-Faz, professor at the Faculty of Medicine and Health Sciences and researcher at the Institute of Neurosciences of the University of Barcelona (UBNeuro), and member of the August Pi i Sunyer Biomedical Research Institute (IDIBAPS). The study counts on the participation of teams from the Hospital Clínic de Barcelona, Guttmann Institute, the Harvard School of Medicine (United States) and the universities of Siena, Trento and La Sapienza (Italy), among other institutions.

TMS is a non-invasive technique that helps to a better understanding of the brain activity and it has multiple applications in the study of cognitive processes and neuropsychological rehabilitation. As part of the study, using techniques of functional neuroimaging, the team could confirm that under the effects of neurostimulation, the Val/Val allele variant carriers showed a greater brain activity in processes in which memory is used—specifically in the brain regions contralateral to stimulation—a feature that would be related to functional compensation brain processes.

"We believe the obtained data in this study provides relevant information on the neurobiological mechanisms related to the neuroplasticity processes that explain the individual differences regarding the effects of stimulation at a cognitive level. Therefore, the new results could be of great interest in order to design future interventions that prioritize the highest level of customization," notes Kilian Abellaneda, member of the

Department of Medicine of the UB and IDIBAPS.

This study is part of a European collaboration in the Pharmacog project, within the field of neurodegenerative diseases. One of the objectives of this project is to develop experimental platforms to modify, in a controlled way, cognitive functions in humans and the underlying brain processes, in order to use them later to study the effect of future drugs in the early stages of their development.

More information: Kilian Abellaneda-Pérez et al, BDNF Val66Met gene polymorphism modulates brain activity following rTMS-induced memory impairment, *Scientific Reports* (2022). DOI: 10.1038/s41598-021-04175-x

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