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PhD in Medical Sciences  
2015-2016

INVITATION to the Public defence of

**Sarah HERREMANS**

To obtain the academic degree of '**DOCTOR IN MEDICAL SCIENCES**'

**The neurobiological impact of high frequency repetitive transcranial magnetic stimulation on alcohol craving in alcohol-dependent patients.****Wednesday 4 November 2015**

Auditorium **Brouwer**, 17:00

Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

How to reach the campus Jette:

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## Summary of the dissertation

Repetitive transcranial magnetic stimulation (rTMS) is a neurostimulation technique that has been safely used in different neurological and psychiatric disorders. In recent years there are indications that high frequency (HF) rTMS might be beneficial in the treatment of alcohol-dependent patients by decreasing alcohol craving. Because current available treatment options appear to be largely insufficient for these patients, research on new potential interventions is crucial. In this thesis we had several objectives in relation to recently detoxified hospitalized alcohol-dependent patients. First, we explored whether previous findings on craving reduction could be replicated in such patients. Second, we focused on the possible underlying mechanisms of action of HF-rTMS on brain activity. Lastly, the application of an accelerated HF-rTMS treatment protocol - where multiple sessions on the same day are administered - was evaluated for safety and efficacy.

One HF-rTMS session turned out to be ineffective in decreasing alcohol craving (craving in general and cue-induced), but it increased attentional control. Applying an accelerated HF-rTMS protocol, which had never been executed in such a difficult-to-treat patient group, decreased alcohol craving measurements. However, these beneficial effects seemed to be unrelated to alcohol-related cue-exposure craving induction. On the other hand, one session and accelerated HF-rTMS affected brain structures implicated in respectively the extended reward and attentional neurocircuits. In contrast to what was expected, a substantial number of patients treated with the accelerated HF-rTMS protocol had relapsed only four weeks after the stimulation. Diminished cognitive control mechanisms may be indicative for future relapse. Although in those patients, with seemingly diminished control mechanisms, accelerated right DLPFC HF-rTMS tended to positively affect the relapse neurocircuit - and therefore perhaps ameliorated cognitive control mechanisms - these neuronal changes were not sufficient to have a clinical impact.

## Curriculum Vitae

Sarah Herremans graduated from High School in 1999 (Koninklijk Lyceum Aalst, Belgium). In June 2006, she obtained her medical degree at the Faculteit Geneeskunde en Farmacie aan de Vrije Universiteit Brussel (VUB), Belgium. After completion of her training as a psychiatrist in 2011, she started working as a psychiatrist at the Universitair Ziekenhuis Brussel (UZBrussel).

In 2011 she graduated as a cognitive behavioral therapist, which is a 3-year course, at the Universiteit Gent, Belgium. Currently, she is in the process of terminating her training 'International Master of affective Neuroscience' at the Universiteit van Maastricht, the Netherlands. Under impulse of Prof. Dr. Chris Baeken, she started a doctoral thesis on the neurobiological effects of HF-rTMS on alcohol craving in 2011.