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PhD in Medical Sciences
2020-2021

INVITATION to the Public defence of

Sander DE GROOTE

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

Spinal Cord Stimulation alters the human brain

The defence will take place on **Wednesday, 31th March 2021 at 5 p.m.**

and will be organised **online** accessible through the following link:

Please click here to join the public defence.

[Klik hier om deel te nemen aan de vergadering](#)

Summary of the dissertation

Spinal Cord Stimulation (SCS) is an effective form of semi-invasive treatment in patients with Failed Back Surgery Syndrome (FBSS), as next stage in the management of pain when conservative treatment methods have failed. However, the underlying mechanisms of action (MOA) remain partly unclear. In this work, we describe the influence of SCS on the supraspinal brain mechanisms in patients with FBSS to improve our knowledge about the underlying mechanisms. This doctoral thesis aims to provide an exploration of the functional connectivity changes of resting state networks. A second aim of this thesis is to unravel the possible changes in the morphology of the brain, in patients with FBSS after SCS. We found (i) an increased effect of suprathreshold stimulation on the spino-reticulo-thalamo-cortical pathway compared to subthreshold stimulation. This could be related to an overstimulation of the central nervous system during suprathreshold SCS. As a second and third result of our thesis, (ii + iii) the interregional communication between regions in the salience network/central executive network and the descending pain modulatory system (DPMS network), were modulated after three months of subthreshold stimulation. This can raise the suggestion that subthreshold SCS modulates the functioning of the medial pain pathway and the descending nociceptive inhibitory pathways. In the last part of the thesis (iv), alterations were found in the gray- and white matter volumes (related to chronic pain) during SCS. We conclude that SCS could induce both functional connectivity and morphological changes in brain regions related to chronic pain.

Curriculum Vitae

Sander De Groote obtained his master degree in Rehabilitation Sciences and Physiotherapy at Hasselt University in 2015. The same year, he started studying his master after master Manual therapy on the Vrije Universiteit Brussel (VUB). From 2016 until now he combined working as a sport physiotherapist with his doctoral thesis under supervision of professor dr. Moens, dr. Van Schuerbeek and dr. Goudman. His thesis work was performed at the Hospital of Brussels and focussed on the brain alterations during spinal cord stimulation. Until 2019, he also worked as a teacher on the Thomas More Hogeschool in Turnhout. This year, he started with an educational master at Hasselt University.