

## Press release

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### Basic information

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Department of: Clinical Medicine

Main supervisor: Yury Shtyrov

Title of dissertation: Neural foundations of automatic speech comprehension in Parkinson's disease: neuromagnetic investigations

Date for defence: September 22<sup>nd</sup> 2020 at (time of day): 13:00 Place: Tvillingeauditorierne, Building 1324 - 011

Press release (Danish)

De nuværende behandlinger for Parkinsons sygdom (PS) (dvs. dopamin-relateret medicinsk behandling og dyb hjernestimulation (DBS)) er kendetegnet ved at afhjælpe patienternes bevægelsessymptomer bemærkelsesværdigt godt. Til gengæld er behandlingernes påvirkning af patienternes kognitive evner, især de sproglige, stadig til debat. Et nyt forskningsprojekt fra Aarhus Universitet har undersøgt de mere automatiske processer af sprogforståelsen hos Parkinson-patienter og hvordan disse hjerneprocesser bliver påvirket af de forskellige behandlingsmuligheder, dvs. enten dopamin-relateret medicinsk behandling eller DBS i nucleus subthalamicus (STN). Projektet er udført af Rasha Hyder som forsvarer sin ph.d.-afhandling d. 22. september.

Afhandlingen er baseret på tre studier der alle benytter magnetoencefalografi (MEG) i kombination med forskellige sproglige stimuli. I det første studie præsenteres et patient-venligt forsøgsparadigme som kan bruges til at undersøge flere forskellige sproglige funktioner på en måde der ikke er afhængig af opmærksomhed eller reaktioner fra forsøgsdeltagerne. Dette paradigme benyttes således i de efterfølgende studier med Parkinson-patienter. I det andet studie undersøges hvordan sprogforståelsen hos Parkinson-patienter i medicinsk behandling hænger sammen med såkaldt funktionel konnektivitet baseret på kildelokalisering af MEG-signalet. Det sidste og tredje studie er en serie af case studier af Parkinson-patienter behandlet med STN-DBS hvor effekten af unilateral og bilateral stimulation på patienternes sprogforståelse undersøges.

Afhandlingen er det første af sin art der undersøger de sproglige funktioner hos Parkinson-patienter uafhængigt af opmærksomhed og reaktioner fra patienterne. Den er rettet mod forskere inden for kognitive neurovidenskab og klinisk aktive neurologer med interesse i de netværk i hjernen som understøtter sprogforståelse samt hvad aktiviteten i disse netværk kan fortælle om Parkinson-patienters kognitive status.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 22/09-2020 kl. 13.00 i Tvillingeauditorierne, Bygning 1324-011, Aarhus Universitet. Titlen på projektet er "Neural foundations of automatic speech comprehension in Parkinson's disease: neuromagnetic investigations".

Yderligere oplysninger: Ph.d.-studerende Rasha Hyder, email: [rasha.hyder@cfm.au.dk](mailto:rasha.hyder@cfm.au.dk), tlf.: +45 5377 0112.

Bedømmelsesudvalg:

Professor Sarang S. Dalal, Institut for Klinisk Medicin, Aarhus Universitet, Danmark.

Professor Vadim Nikulin, Institut for Neurologi, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Tyskland.

Professor Roelien Bastiaanse, Humanistiske Fakultet, University of Groningen, Holland

Press release (English)

While the current treatments of Parkinson's disease (PD), dopaminergic medications and deep brain stimulation (DBS), are associated with remarkable alleviation of the motor symptoms, their impact on cognitive functions, particularly language, is still controversial. A new research project investigates the automatic stages of language comprehension in Parkinson's disease (PD) and how their neurolinguistic processes are affected in patients depending on treatment strategy, either dopaminergic medication or deep brain stimulation of the subthalamic nucleus (STN-DBS). The project was carried out by Rasha Hyder, who is defending her dissertation on September 22nd.

The dissertation is based on three studies in which magnetoencephalography (MEG) in combination with language tasks are used. In the first study, a patient-friendly paradigm is proposed which can be used to assess language functions in an attention- and task-free manner. The paradigm developed here is then deployed in the subsequent studies with PD patients. The second study involves PD patients treated with dopaminergic medication to investigate how speech comprehension correlates with functional connectivity based on MEG source analyses. The final study is a multi-case study involving PD patients with STN-DBS, examining the influence of unilateral and bilateral STN-DBS on speech comprehension in PD.

The dissertation presents the first work investigating language function in PD patients independently from attention and behavioral tasks. It is aimed at cognitive neuroscientists and clinical neurologists interested in brain networks subserving language comprehension or what they reveal about the cognitive status of patients with Parkinson's disease.

The defence is public and takes place on 22/9 at 13 in the Tvillingeauditorierne, Building 1324 - 011, Aarhus University. The title of the project is "Neural foundations of automatic speech comprehension in Parkinson's disease: neuromagnetic investigations". For more information, please contact PhD student Rasha Hyder, email: rasha.hyder@cfin.au.dk, Phone +4553770112.

Assessment committee:

Professor Sarang S. Dalal, Department of Clinical Medicine, Aarhus University, Denmark.

Professor Vadim Nikulin, Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany.

Professor Roelien Bastiaanse, Faculty of Arts, University of Groningen, Netherlands

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