Press release

Please fill in this form and return it to graduateschoolhealth@au.dk in Word format no later than three weeks prior to your defence.

Basic information

Name: Vitalii Dashkovskyi Email: vitali@cfin.au.dk Phone: 20667088

Department of: Clinical Medicine

Main supervisor: Eugenio Gutiérrez-Jiménez

Title of dissertation: The Role of Non-Classical Cortical GABAergic Neurons in Brain Hemodynamics

Date for defence: 14.01.2026 at (time of day): 13:00-15:30 Place: 1252-204 Eduard Biermann

Press release (Danish)

PhD-forsvar: Hæmmende neuroner i cortex lag 1 undertrykker aktivt blodgennemstrømningen i hjernen

Det yderste lag af hjernens cortex indeholder specialiserede hæmmende neuroner, der kontrollerer informationsstrømme. Dette overfladelag er også hvor blodkar kommer ind i hjernens cortex, hvilket gør det til et kritisk sted for regulering af blodforsyningen til dybere væv. Dog har det været dårligt forstået, hvordan disse neuroner regulerer blodgennemstrømningen. Dette arbejde identificerer NDNF-udtrykkende neuroner som underkendte regulatorer af kortikal vasokonstriktion. Projektet blev udført af Vitalii Dashkovskyi, som forsvarer sin afhandling den 14/01/2026.

I sit PhD-projekt undersøgte PhD-stipendiat Vitalii Dashkovskyi rollen af NDNF-udtrykkende hæmmende neuroner i lag I af cortex i reguleringen af blodgennemstrømning. Ved anvendelse af to-foton mikroskopi i vågne mus identificerede forskningen neuroner, der bliver aktive efter toppen af sensorisk-fremkaldt hyperæmi, lige før vasokonstriktionsfasen begynder, hvilket tyder på deres direkte involvering i denne proces.

Optogenetisk aktivering af disse neuroner bekræftede overvejende konstriktive effekter af deres aktivitet. På mesoskala niveau blev omfattende hæmodynamisk undertrykkelse observeret, i kontrast til den hurtige hyperæmi induceret af aktivering af excitatoriske neuroner. Disse fund kaster lys over negative BOLD-responser observeret i funktionel MR-studier og har potentielle implikationer for forståelsen af cerebrovaskulær dysfunktion ved aldring og neurodegenerative sygdomme.

Forsvaret er offentligt og finder sted den 14/01/2026 kl. 13:00 i auditorium 204 Eduard Biermann, Bygning 1252 (Søauditorierne), Bartholins Allé 3, 8000 Aarhus C. For yderligere information kontakt PhD-studerende Vitalii Dashkovskyi, e-mail: vitali@cfin.au.dk, Telefon: +45 20667088.

Bedømmelsesudvalg:
Lektor Sâmia Joca – Formand og ordstyrer, Institut for Biomedicin, Health, Aarhus Universitet, Aarhus, Danmark.

Doctor Bruno Cauli, Center for Neuroscience, Sorbonne University (NeuroSU) / Institute of Biology Paris-Seine (IBPS), Frankrig.

Lektor Changsi Cai, Institut for Neurovidenskab, Københavns Universitet, København, Danmark.

Press release (English)

PhD defence: Cortical layer 1 inhibitory neurons actively suppress brain blood flow

The outermost layer of the brain's cortex contains specialised inhibitory neurons that control information flow. This surface layer is also where blood vessels enter the brain cortex, making it a critical site for regulating blood supply to the deeper tissue. Yet, how these neurons regulate blood flow has remained poorly understood. This work identifies NDNF-expressing neurons as underappreciated regulators of cortical vasoconstriction. The project was carried out by Vitalii Dashkovskyi, who is defending his dissertation on 14/01/2026.

In his PhD project, PhD fellow Vitalii Dashkovskyi investigated the role of NDNF-expressing inhibitory neurons in layer I of the cortex in regulating blood flow. Using two-photon microscopy in awake mice, the research identified neurons that become active after the peak of sensory-evoked hyperemia, just before the vasoconstriction phase begins, suggesting their direct involvement in this process.

Optogenetic activation of these neurons confirmed predominantly constrictive effects of their activity. At the mesoscale, widespread hemodynamic suppression was observed, in contrast to the rapid hyperemia induced by activating excitatory neurons. These findings shed light on negative BOLD responses observed in functional MRI studies and have potential implications for understanding cerebrovascular dysfunction in aging and neurodegenerative diseases.

The defence is public and takes place on 14/01/2026 at 13:00 in auditorium 204 Eduard Biermann, Building 1252 (Søauditorierne), Bartholins Allé 3, 8000 Aarhus C. For more information, please contact PhD student Vitalii Dashkovskyi, email: vitali@cfin.au.dk, Phone: +45 20667088.

Assessment committee:
Associate Professor Sâmia Joca – Chair and Moderator, Department of Biomedicine, Health, Aarhus University, Aarhus, Denmark.

Doctor Bruno Cauli, Center for Neuroscience, Sorbonne University (NeuroSU) / Institute of Biology Paris-Seine (IBPS), France.

Associate Professor Changsi Cai, Department of Neuroscience, University of Copenhagen, Copenhagen, Denmark.

Permission

By sending in this form:

- I hereby grant permission to publish the above Danish and English press releases.
- I confirm that I have been informed that any applicable inventions shall be treated confidentially and shall under no circumstances whatsoever be published, presented or mentioned prior to submission of a patent application, and that I have an obligation to inform my head of department and the university's Patents Committee if I believe I have made an invention in connection with my work. I also confirm that I am not aware that publication violates any other possible holders of a copyright.