

## Press release

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### Basic information

Name: Frederik Boe Hansen Email: [frederikboe@clin.au.dk](mailto:frederikboe@clin.au.dk) Phone:

Department of: Clinical Medicine

Main supervisor: Asger Granfeldt

Title of dissertation: "Cerebrovascular pathophysiology in an experimental cardiac arrest rat model"

Date for defence: 04.02.22 at (time of day): 14:00 Place: 1252-204, Eduard Biermann auditorium

Press release (Danish)

### Hjernens blodårer efter genoplivning

Den hyppigste dødsårsag efter hjertestop og efterfølgende genoplivning er skader på hjernen. Dårlig distribution af blodet i hjernen menes at være en vigtig faktor for udviklingen af hjerneskaden efter hjertestop. Et nyt ph.d.-projekt fra Aarhus Universitet, Health, har med udgangspunkt i en rottemodel undersøgt blodårerne i hjernen efter hjertestop. Projektet er gennemført af Frederik Boe Hansen, der forsvarer det d. 04/02-2022.

Hvert år rammes mere end 5.000 personer af hjertestop uden for hospitalerne i Danmark. Dødeligheden efter hjertestop er høj, hvilket fortrinsvis skyldes hjerneskade, som opstår under og efter hjertestoppet. Årsagen til at hjerneskaden forværres efter genoplivning er ikke endeligt klarlagt, men dårlig blodforsyning samt væskeophobning i hjernen menes at spille en central rolle. Det aktuelle ph.d. projekt er baseret på 3 dyreeksperimentelle hjertestopsstudier, hvor 2 studier har undersøgt hjernens blodårer i perioden efter genoplivning. Et tredje studie har endvidere undersøgt effekten af en særlig type medicin med potentiale til at reducere hjerneskaden efter hjertestop. De vigtigste fund fra projektet er, at blodårenes normale mekanismer til at kontrollere blodgennemstrømningen er ændrede efter hjertestop. Dette kan medvirke til væskeophobning i hjernen og en ændret distribution af blod i hjernen efter hjertestop, hvilket kan forværre hjerneskaden. Resultaterne fra ph.d. projektet danner grundlag for yderligere undersøgelser af mekanismerne i hjernens blodårer efter hjertestop. Dette kan på sigt føre til nye behandlingsmuligheder med henblik på at mindske graden af hjerneskade efter hjertestop.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 04/02-2022 kl. 14.00 i Eduard Biermann auditorium, Aarhus Universitet, Bartholins Allé 3, Aarhus. Titlen på projektet er "Cerebrovascular pathophysiology in an experimental cardiac arrest rat model". Såfremt COVID-19 situationen ikke tillader et fysisk forsvar, vil forsvaret foregå online. I givet fald kan man anmode om deltagelse via Zoom ved at kontakte ph.d.-studerende Frederik Boe Hansen via e-mail på [frederikboe@clin.au.dk](mailto:frederikboe@clin.au.dk).

Bedømmelsesudvalg:

Asger Andersen, læge, ph.d., Institut for Klinisk Medicin - Hjertesygdomme, Aarhus Universitet, Danmark.

Professor Renaud Tissier, Ecole Nationale Vétérinaire d'Alfort, Frankrig.

Inger Jansen-Olesen, læge, ph.d., dr.med, Afdeling for Hjerne- og Nervesygdomme, Neurocentret Rigshospitalet, Danmark.

Press release (English)

## The brain's blood vessels following cardiac arrest and resuscitation

Brain injury is the leading cause of death after cardiac arrest. Following resuscitation, disturbed blood flow in the brain is thought to be a key factor in the development of brain injury. The current PhD project is based on a cardiac arrest rat model, where blood vessels from the brain were thoroughly investigated after cardiac arrest and subsequent resuscitation. The project was carried out by Frederik Boe Hansen, who is defending his dissertation on 04/02-2022.

Annually, more than 5,000 people suffer from an out-of-hospital cardiac arrest in Denmark. The mortality rate is high; primarily due to brain injury that evolves during and after the cardiac arrest. The exact mechanisms leading to the progression of brain injury has not been elucidated yet. However, malfunctioning blood supply along with the build-up of extra fluid in the brain is believed to be pivotal factors.

The PhD project was based on three experimental cardiac arrest animal studies. Two studies aimed to describe potential changes to the brain's blood vessels after cardiac arrest. A third study aimed to investigate the effect of a novel pharmacological treatment with the potential to mitigate brain injury following cardiac arrest.

The main results showed that the blood vessels' ability to control blood flow was disturbed after cardiac arrest. These changes may trigger a malfunctioning blood supply and the build-up of extra fluid in the brain, thus carrying the potential to aggravate brain injury after cardiac arrest.

The current project forms the basis for further investigations of the blood vessels' properties after cardiac arrest, which may entail the development of novel treatment strategies capable of diminishing brain injury in the post cardiac arrest period.

The defence is public and takes place on 04/02 at 2.00 pm in Eduard Biermann auditorium, Aarhus University, Bartholins Allé 3, Aarhus. The title of the project is "Cerebrovascular pathophysiology in an experimental cardiac arrest rat model". The defence may be converted to an online event due to COVID-19. In this case, a Zoom-link will be provided by contacting PhD student Frederik Boe Hansen via email: frederikboe@clin.au.dk.

Assessment committee:

Asger Andersen, Associate Professor, Department of Clinical Medicine - Cardiology, Denmark.

Professor Renaud Tissier, Ecole Nationale Vétérinaire d'Alfort, France.

Inger Jansen-Olesen, PhD, DMSc, Danish Headache Center, Department of Neurology, Rigshospitalet, Denmark.

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