

## Press release

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### Basic information

Name: Christian Østergaard Mariager      Email: [cm@clin.au.dk](mailto:cm@clin.au.dk) Phone: 22312531

Department of: Clinical Medicine

Main supervisor: Christoffer Laustsen

Title of dissertation: Hyperpolarized  $^{13}\text{C}$ -magnetic resonance for assessment of organ transplant graft viability

Date for defence: 11/12-2020 at (time of day): 11:00 Place: AIAS auditorium, Building 1632, Room 201, Aarhus University, Høegh-Guldbergs Gade 6B, 8000 Aarhus C.

Online: <https://aarhusuniversity.zoom.us/j/69188147614>

Press release (Danish)

Hyperpolarized  $^{13}\text{C}$ -magnetic resonance for assessment of organ transplant graft viability

På verdensplan er antallet af patienter der afventer et organ til transplantation stigende, hvilket er årsagen til den nuværende mangel på donororganer. Normothermisk perfusion er en mulig strategi for at imødekomme denne stigende efterspørgsel, samt for at forbedre udfaldet efter transplantation. Dog er der et behov for nye og sensitive metoder til at evaluere overlevelsesevnen af disse organer, som hyperpolariseret og funktionel magnetisk resonans, for at støtte denne udvikling.

I denne afhandling designede og testede jeg et magnetisk resonans kompatibelt normothermisk perfusionssystem. Tre ex vivo organmodeller blev undersøgt; den humane placenta, samt nyrer og hjerter fra grise. Hyperpolariseret  $[1-^{13}\text{C}]$ pyruvat blev brugt til at vurdere den metaboliske status af organerne, i kombination med konventionelle magnetisk resonans teknikker til at evaluere anatomi og funktion.

Resultaterne opnået i dette PhD projekt demonstrerer evnen og muligheden for at evaluere stofskifte, hemodynamik og/eller funktion i ex vivo perfunderede organer ved hjælp af hyperpolariseret og konventionel magnetisk resonans metoder.

Projektet er gennemført af Christian Østergaard Mariager, der forsvare det d. 11 december 2020.

Forsvaret af ph.d.-projektet er offentligt og finder sted i AIAS auditorium, Bygning 1632, lokale 201, Aarhus Universitet, Høegh-Guldbergs Gade 6B, 8000 Aarhus C. Forsvaret kan også følges online via linket øverst i pressemeddelelsen. Yderligere oplysninger: Ph.d.-studerende Christian Østergaard Mariager, e-mail: [cm@clin.au.dk](mailto:cm@clin.au.dk), tlf. 22312531.

Bedømmelsesudvalg:

Formand og moderator - Sune Jespersen, Professor, Msc, PhD, Dr.Med.Sci  
Center of Functionally Integrative Neuroscience, Department of Clinical Medicine. Department of Physics and Astronomy, Aarhus University, Denmark.

Opponent - Sebastian Kozerke, Professor Doctor of Biomedical Imaging, Msc, PhD  
Zürich Center for Experimental and Clinical Imaging Technologies (EXCITE), ETH Zürich, Switzerland.

Opponent - Adam Espe Hansen, Clinical Professor, Msc, PhD  
Department of Diagnostic Radiology, Rigshospitalet, University of Copenhagen, Denmark.

Press release (English)

## Hyperpolarized $^{13}\text{C}$ -magnetic resonance for assessment of organ transplant graft viability

The worldwide number of patients awaiting organ transplantation is increasing, directly leading to a shortage of donor organs. Normothermic perfusion is a possible strategy to meet increased demand and improve outcome after transplantation. However, highly sensitive organ viability assessment strategies, such as hyperpolarized and functional magnetic resonance imaging, are needed to support this continued effort.

In this dissertation I designed and tested a magnetic resonance compatible normothermic perfusion system. Three ex vivo organ models were investigated, namely the human placenta, the porcine kidney and the porcine heart. Hyperpolarized [ $^{13}\text{C}$ ]pyruvate was used to assess the metabolic status of the organs, in combination with conventional magnetic resonance methods to assess anatomy and function.

The results obtained in this PhD project demonstrates the ability and feasibility of hyperpolarized and conventional magnetic resonance to distinguish metabolic features, assess hemodynamics and/or function in ex vivo organ models.

The project was carried out by Christian Østergaard Mariager, who is defending his dissertation on the 11<sup>th</sup> of december 2020.

The defence is public and takes place at 11 am in the AIAS auditorium, Building 1632, Room 201, Aarhus University, Høegh-Guldbergs Gade 6B, 8000 Aarhus C. The defence can also be viewed online via the provided link. For more information, please contact PhD student Christian Østergaard Mariager, email: [cm@clin.au.dk](mailto:cm@clin.au.dk), Phone +45 22312531.

Assessment committee:

Chairman and moderator - Sune Jespersen, Professor, Msc, PhD, Dr.Med.Sci  
Center of Functionally Integrative Neuroscience, Department of Clinical Medicine. Department of Physics and Astronomy, Aarhus University, Denmark.

Opponent - Sebastian Kozerke, Professor Doctor of Biomedical Imaging, Msc, PhD  
Zürich Center for Experimental and Clinical Imaging Technologies (EXCITE), ETH Zürich, Switzerland.

Opponent - Adam Espe Hansen, Clinical Professor, Msc, PhD  
Department of Diagnostic Radiology, Rigshospitalet, University of Copenhagen, Denmark.

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