Press release

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Basic information

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Department of: Clinical Medicine

Main supervisor: Professor Hans Erik Bøtker

Title of dissertation: Metabolic modulation of cardiovascular function: Experimental exploration of potential heart failure therapies

Date for defence: 07/06/2024 at (time of day): 14.00 Place: auditorium B, G206-142, Palle Juul-Jensens Boulevard 99, Aarhus N

Press release (Danish)

Forbedring af hjerte-kar funktion med metabolisk aktive stoffer

Energistofskiftets påvirkning af hjerte-karsystemets gennem aktive næringsstoffer såsom ketonstoffer, butansyre og mælkesyre undersøges i et nyt ph.d.-projekt fra Aarhus Universitet, Health. Projektet er gennemført af Jacob Marthinsen Seefeldt, der forsvarer det d. 07/06

Hjertesvigt er en tilstand, hvor hjertets pumpefunktion er nedsat og er på verdensplan en belastende sygdom for patienter og sundhedsvæsener. Når pumpeevnen svigter, involverer det nedsat kontraktionskraft af hjertemusklen og en kompensatorisk øget modstand i karsystemet, der tilsammen yderligere belaster hjertet og forværrer symptomerne ved sygdommen. Nyere forskning har vist, at stofskiftet i hjertet ændrer sig i takt med, at sygdommen udvikler sig. Derfor kan stoffer, der optimerer hjertets stofskifte have en gavnlig effekt på hjertesvigt. I dette ph.d. projekt fandt vi, at behandling med selektive Sodium Glucose Co Transporter (SGLT)-2-hæmmere, som bruges i behandlingen af sukkersyge, forbedrer hjertets pumpeevne og stofskifte, og at niveauet af ketonstoffer stiger i forbindelse hermed. Det førte os videre til at vise, at både ketonstoffer, butansyre og mælkesyre har direkte indflydelse på hjerte-karsystemet, idet alle stoffer kan øge hjertets kontraktionskraft samtidig med, at de nedsætter modstanden i karsystemet. Tilsammen forbedrer det hjertets pumpevne betydeligt. Disse egenskaber er centrale i behandlingen af hjertesvigt og gør stofferne til oplagte kandidater at teste i større forsøgsdyr og, på sigt, i mennesker.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 07/06 kl. 14.00 i auditorium B, G206-142, Aarhus Universitetshospital, Palle Juul-Jensens Boulevard 99, Aarhus N. Titlen på projektet er ”Metabolic modulation of cardiovascular function: Experimental exploration of potential heart failure therapies”. Yderligere oplysninger: Ph.d.-studerende Jacob Marthinsen Seefeldt, e-mail: jacob.seefeldt@clin.au.dk, tlf. +45 41178633.

Bedømmelsesudvalg:

Professor Ulf Simonsen - chairman of the committee and moderator of the defence
Department of Biomedicine, Aarhus University, Aarhus, Denmark

Professor Ellen Aasum
Section of Physioology, Department of Medical Biology, Faculty of Health Sciences, UiT The Arctic University of Norway, Tromsø, Norway

Clinical Professor, Consultant cardiologist Jacob Eifer Møller
Department of Clinical Research, Section of Cardiology, University of Southern Denmark, Odense, Denmark

Press release (English)

Improvement of the cardiovascular system by metabolically active substances

The cardiovascular effects of metabolically active substances such as ketone bodies, butyric and lactic acid are investigated in a new PhD project from Aarhus University Health. The project was carried out by Jacob Marthinsen Seefeldt, who is defending his dissertation on 07/06.

Heart failure is a condition characterized by reduced cardiac function, posing a significant burden on patients and healthcare systems worldwide. When cardiac output declines, it involved decreased contractile strenght of the heart muscle and a compensatory increase in vascular resistance, which strains the heart and worsens the condition. As the disease progresses, the heart's metabolism undergoes changes. Therefore, substances that optimize cardiac metabolism may have a beneficial effect on heart failure. In this PhD project, we found that treatment with selective Sodium Glucose Co Transporter (SGLT)-2 inhibitors improves cardiac function and metabolism, leading to an increase in ketone body levels. This finding led to the discovery that ketone bodies, butyrate, and lactate have a direct impact on the cardiovascular system, boostning cardiac outout and contractile strength and a simultaneous reduction of vascular resistance. These propoerties are central to heart failure treatment in general and the results presented here motivates further testing of these substances in larger animal models and in humans.

The defence is public and takes place on 07/06 at 14.00 in auditorium B, G206-142, Aarhus University Hospital, Palle Juul-Jensens Boulevard 99, Aarhus N. The title of the project is "Metabolic modulation of cardiovascular function: Experimental exploration of potential heart failure therapies". For more information, please contact PhD student Jacob Marthinsen Seefeldt, email: jacob.seefeldt@clin.au.dk, Phone +45 41178633.

Assessment committee:

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