AARHUS UNIVERSITY

Press release

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Basic information

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Department of: Clinical Medicine

Main supervisor: Professor Bjørn Richelsen, MD, DMSc. Department of Endocrinology and Internal Medicine, Aarhus University Hospital and Steno Diabetes Center Aarhus.

Title of dissertation: Brown adipose tissue metabolism: Metabolic characterization and effect of beta-adrenergic receptors - rodent and human adipocyte investigations

Date for defence: 27th february, 2020 at (time of day): 14 Place: Aarhus University Hospital, Palle Juul Jensens Boulevard 99, 8200 Aarhus N, Entrance C-C110, Auditorium C114-101

Press release (Danish)

Betydning af det brune fedtvæv: Metabolisk karakterisering og effekt af beta-adrenerg receptor-stimulation - undersøgelser af gnaver modeller og humane fedtceller.

Stimulering af brunt fedtvæv (BAT) øger forbrændingen og kan dermed spille en vigtig rolle i vægtregulering. Aktivering af BAT kan derfor potentielt forbedre metaboliske parametre såsom insulinfølsomhed og fedtomsætning. Imidlertid er den fysiologiske rolle af BAT hos mennesker endnu ikke fuldt klarlagt. Et nyt Ph.d.-projekt fra Aarhus Universitet, Health, har undersøgt BAT metabolisme ved hjælp af MR-scanninger og cellekulturer. Projektet blev udført af cand. med. Mette Ji Riis-Vestergaard, der forsvarer sin afhandling den 27/02, 2020.
I øjeblikket er den mest anvendte metode til at undersøge BAT aktiviteten hos mennesker 18F-FDG PET / CT scanningsmetoden, hvilket indebærer radioaktivstråling. For at supplere disse undersøgelser er der behov for nye strålefrie metoder, der også bedre kan beskrive de metaboliske forhold i BAT. Ph.d.-studiet præsenterer to nye MR-baserede scanningsmetoder, hyperpolariseret [1-13C] pyruvat MR (HP-MRI) og Deuterium Metabolic Imaging (DMI), der kan karakterisere og diskriminere kulde-stimuleret BAT aktivitet i gnavere. Disse resultater kan forhåbentligt føre til anvendelse af begge strålefrie metoder til BAT undersøgelser i mennesker.
Ph.d.-studiet undersøgte også den beta-adrenerge regulering i en nyudviklet human BAT fedtcelle-model. Disse data tyder det på at den primære beta-adrenerge receptor, der er involveret i human BAT-aktivering er beta-1 adrenerg receptoren, hvilket er i modsætning til forholdene hos gnavere, hvor beta-3 adrenerg receptoren er den primære regulator. Disse fund er af betydning for udviklingen af farmakologiske stoffer, der vil kunne stimulere BAT i mennesker.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 27/02 2020 kl. 14 i auditorium C114-101, Aarhus Universitets Hospital, Palle Juul Jensens Boulevard 99, Aarhus N. Titlen på projektet er ”Brown adipose tissue metabolism: Metabolic characterization and effect of beta-adrenergic receptors - rodent and human adipocyte investigations ”. Yderligere oplysninger: Ph.d.-studerende Mette Ji Riis-Vestergaard, e-mail: metteriis@clin.au.dk, tlf. 24945889.

Bedømmelsesudvalg: Professor Henning Grønbæk, MD, PhD - formand for bedømmelsesudvalget.
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Press release (English)

Brown adipose tissue metabolism: Metabolic characterization and effect of beta-adrenergic receptors - rodent and human adipocyte investigations

Stimulation of brown adipose tissue (BAT) increases energy expenditure and may be an important factor in weight regulation. Stimulation of BAT may improve metabolic parameters such as insulin sensitivity and fat turnover. However, the physiological role of BAT in humans are not yet fully understood. A new PhD project from Aarhus University, Health has investigated BAT metabolism using MR scans and cell culture studies. The project was carried out by MD Mette Ji Riis-Vestergaard, who is defending her dissertation on 27/02, 2020.
Currently, the most used method for BAT investigations in humans is 18F-FDG PET/CT scans, a method that involves radioactivity. To supplement these investigations and to further characterize BAT metabolism new radiation-free methods are needed. The PhD study presents two new MR-based scan methods, hyperpolarized [1-13C]pyruvate MRI (HP-MRI) and Deuterium Metabolic Imaging (DMI) that can characterize and discriminate cold-activated BAT in rodents. These results may open up for the use of both radiation-free methods for BAT investigations in humans.
Moreover, the PhD study investigated the beta-adreneric regulation in a newly-developed human brown fat cell model. These data suggest that the predominant beta-adrenergic receptor involved in human BAT regulation may be the beta-1 adrenergic receptor, unlike rodents were the beta-3 adrenergic receptor is the primary regulator. This is of importance when developing new drugs targeting human BAT.

The defence is public and takes place on 27/02, 2020 at 14 at Aarhus University Hospital, Palle Juul Jensens Boulevard 99, Entrance C-C110, Auditorium C114-101, 8200 Aarhus N. The title of the project is Brown adipose tissue metabolism: Metabolic characterization and effect of beta-adrenergic receptors - rodent and human adipocyte investigations. For more information, please contact PhD student Mette Ji Riis-Vestergaard, email: metteriis@clin.au.dk, Phone +45 28945889.

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