

BSc/MSc-project for students in Biomedical Engineering, DTU/KU

Title: *Optimized NMR Imaging and post-processing Protocols for Assessment of Global Cardiac Function in AMI animal model*

Description:

Aim

The objective of this project is to establish and optimize an applicable, accurate and reproducible MR imaging/post-processing protocol for a non-invasive assessment of cardiac function and mass using high-resolution magnetic resonance cine imaging (cine-MRI).

Description: Magnetic resonance imaging (MRI) is the most sophisticated, non-invasive imaging modality to investigate the functional and structural alternations on the hearts. This non-invasive, using intrinsic contrast is capable of obtaining true 3D information on the cardiovascular system. The assessment of myocardial mass and function by cine-MRI has been well established in clinical routine application and frequently used in preclinical sites as a state-of-art translational imaging modality. As the hearts are covered from the base to the apex, an assessment of cardiac functional parameters could be obtained. However, the accuracy of the cardiac functional assessment is always relayed on the post-processing procedure such as image segmentation of specific cine frames. An accurate and complete segmentation of the cine frames allows accurate calculation of geometric and functional parameters, such as end-diastolic volume (EDV), end-systolic volume (ESV) and ejection fraction (EF).

This project will work out an applicable in vivo imaging/post-processing protocol for providing accurate cardiac function by estimations of global cardiac parameters such as LV mass and EF. This project is expected to be a pro-step for establishing an accurate and reproducible imaging tool for estimation of the extent/severity and pump function of the infarcted heart. The setup will be later used for visualizing the pathophysiological processes and measuring the effectiveness of the drug delivery in the infarcted area in the heart, such as in Acute Myocardial Infarction (AMI).

The project can be extended to continue as a PhD project, i.e. explore/imaging the response/effect of drugs used in AMI. The experiments will be run at the Nuclear Magnetic Resonance (NMR) Center at the University of Copenhagen, Denmark, using Bruker BioSpec 9.4 T MR small animal scanner.

Required qualifications: Engineering physics student

Responsible institution: Biomedical Institute, Panum NMR Center

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Allowed no of students per report: 1-2

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