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MEDVIZ FROM VISION TO DECISION

SEMINAR FRIDAY 11.11.2016

MedViz Facilities, Møllendalsbakken 7, 5th floor, 12:00-13:00

MedViz Lighthouse Project –Image-based quantitative assessment on abdominal organ function

Introduction

Professor Jarle Rørvik

Recent advances in medical technology have shown the great potential of imaging modalities like MRI, PET,SPECT, US, and optical imaging to provide important *functional information* about tissues and organs, and thus go beyond morphological characterization only. This is the case for abdominal organs as well. However, abdominal organs are particularly challenging due to movements during the imaging session, where the organ displacements are caused by respiration, pulsations, and peristalsis. In contrast to functional imaging of the brain, being a rather stationary organ, dynamic contrast enhanced MRI (DCE-MRI), blood-oxygenation level dependent MRI (BOLD-MRI), diffusion-weighted MR imaging (DW-MRI) and arterial spin labelling aging (ASL) of moving organs, like the kidney, have been lagging behind with respect to their implementation, quantification and Clinical applicability. To achieve this goal, we need *a new kind of translational research* - "from mathematics to medicine". This consist of a close collaboration and a certain level of mutual understanding between researchers from the basic sciences (mathematics, physics), from informatics and computer science (advanced visualization), from biomedicine (physiology, pharmacokinetics), and medical doctors, i.e. radiologists and clinicians responsible for the relevant diseases and patient groups. During the past few years, our research group (as part of the MedViz consortium) has worked hard to establish an environment for such translational imaging research focusing on kidney diseases and prostate cancer. We have carried out and published research on image registration, image segmentation, pharmacokinetic modelling, and visualization. We are a partner in the Cost-Action project "Magnetic Resonance Imaging Biomarkers for Chronic Kidney Disease" lead by Professor Steven Sourbron / Leeds and established cooperation with other national and international research groups. We aim to further develop this broad team of competences the coming years by defining specific research goals and subprojects and bring the new knowledge to a broader spectrum of clinical applications, targeting patients with diseases affecting abdominal organs, including the kidney and prostate.

Postdoc Erlend Hodneland

Title: Utfordringer ved bildeanalyser av funksjonelle bildedata av nyrene.

DCE-MRI has challenges related to accuracy and precision. In this talk we will discuss various error sources affecting the mathematical analysis, related to choice of field-of-view, AIF position, patient motion, as well as pharmacokinetic model approximation.

Postdoc Are Losnegård

Title: Image analysis and machine learning using multimodal imaging of the prostate.

Prostate cancer can be challenging to detect and diagnose, and in this project we are trying to solve some of these challenges with image analysis and machine learning. On the voxel-level, we look at methods for tissue classification in multiparametric MRI with comparison to histology whole-mount sections. On the patient-level, we are trying to predict recurrence of prostate cancer after treatment using a radiomics approach.

Researcher Erling Andersen

Title: Challenges with quantitative measures using multi-modal MR imaging of kidney function.

Abdominal organs are challenging to study, in particular due to the patient motion. Quantitative measures of tissue properties and kidney function depend on a trade-off between patient compliance and scanner characteristics. The presentation will outline some of these challenges.

In addition to the present event we also remind you that **Eli Eikefjord** is a central player in this MedViz Lighthouse Project. Eli will defend her PhD thesis on December 13, 2016 in the BB-Building, entitled "Towards clinical application of renal dynamic contrast-enhanced MRI– Optimization of technical performance and evaluation of clinical feasibility".