I N V I T A T I O N

Aarhus, September 2015

PhD defense: Anna Tietze

CFIN researcher and consultant at the Department of Neuroradiology, Aarhus University Hospital, Anna Tietze is defending her PhD thesis entitled:

"Advanced Magnetic Resonance Imaging methods in cerebral glioma patients"

Recent therapeutic advances in the treatment of patients with cerebral gliomas put great demands on Magnetic Resonance Imaging (MRI) strategies for therapy planning, outcome prediction, and treatment monitoring. The assessment of neo-angiogenesis, tumor hypoxia, or microstructural changes, such as cellularity and micronecrosis, has the potential to determine glioma subtypes. This allows more targeted and individualized treatment approaches, which eventually may result in improved patient outcome.

The objective of the present work is to evaluate the role of advanced imaging biomarkers in glioma patients in terms of tumor grading and outcome prediction. A physiological model that describes microvascular changes in tumor angiogenesis in terms of capillary transit time heterogeneity is presented. Its implication for the oxygen extraction efficacy in tumor tissue is described, and the significance of this new imaging parameter as a diagnostic and predictive marker is evaluated.

Dynamic Contrast Enhanced (DCE) MRI can assess the integrity of the blood-brain barrier, which often is compromised in high-grade gliomas. This technique plays an increasing role in treatment monitoring. Concerns have been raised, however, with respect to the accuracy and precision of quantitative DCE data. In particular, accurate pre-bolus tissue T_1 values are essential to quantify hemodynamic parameters based on DCE MRI. Different techniques for T_1 estimation are explored, and a time-saving approach with a pre-defined T_1 value is investigated.

The prognosis of glioma patients is contingent on precise target selection for stereotactic biopsies and on the extent of tumor resection. ^{11}C-methionine Positron Emission Tomography (PET) is thought to demonstrate tumor heterogeneity and invasion with high diagnostic accuracy. It is, however, an expensive and time-consuming procedure, and in contrast to MRI, only available at larger centers. The spatial distribution of tumor, outlined by perfusion- and diffusion-weighted MRI, conventional MRI, and ^{11}C-methionine PET is compared, and it is investigated if advanced MRI methods can improve the accuracy of conventional sequences if ^{11}C-methionine PET is not available.

Diffusion Kurtosis Imaging is a relatively new MRI technique that provides important microstructural information in biological systems. Its application in larger clinical studies is, however, hampered by long acquisition times and computationally demanding post-processing. A new and fast Diffusion Kurtosis Imaging method is evaluated with regard to its sensitivity to grade gliomas. Results obtained by the rapid approach are compared to those by conventional Diffusion Kurtosis Imaging and to mean diffusivity, calculated from traditional diffusion-weighted MRI.

DATE: Wednesday, 23 september 2015
TIME: 14:00 - 16:30
PLACE: DNC Auditorium, AUH, Building 10G, Nørrebrogade 44, 8000 Aarhus C.

Opponents:
- Professor Elna Marie Larsson, Inst. f. Kirurgiska vetenskaper, Enh. f. Radiologi, Akademiska Sjukhuset, Uppsala, Sweden
- Professor Pia Sundgren, Diagnostisk Radiologi, Centralblocket SUS, Skånes Universitetssjukhus, Lund, Sweden

Supervisors:
- Leif Østergaard (CFIN), Kim Mouridsen (CFIN), Per Borghammer (NUK-PET).

The defense is public and will be conducted in English.
ALL ARE WELCOME.
After the defense CFIN & Department of Neuroradiology are hosting a small reception.