



The Singapore Bioimaging Consortium (SBIC)
presents a seminar

on

"What does MRI contrast reveal about brain tissue composition?"

Speaker: Carsten Stueber
Max Planck Institute for Cognitive and Brain Sciences
Leipzig, Germany
Date : Thursday, 17 October 2013
Time : 2.00pm – 3.00pm
Venue : SBIC Seminar Room
11 Biopolis Way
Level 2, Helios Building
Singapore 138667
(Please use Level 1 entrance)

Abstract

For almost every type of magnetic resonance brain image acquisition, the distribution of myelin clearly plays an important role in providing tissue contrast. The trace metal iron, due to its magnetic properties and relatively high localized concentrations, is also known to have a major impact on the intensity of some types of MR image. It is thus widely accepted that the two major front-runner contributors to MRI tissue contrast are myelin and iron. So far, no combined study has directly disentangled the separate contributions of myelin and iron to the tissue contrasts provided by typical MRI pulse sequences. Because myelin and iron distributions often overlap, in particular in the cortex, it is difficult to deduce their concentrations from MR images. To provide a gold standard for tissue concentrations he used PIXE, Proton Induced X-ray Emission, to quantitatively map the elemental distribution of iron and other elements in slices of cadaver human brain. In particular, I show that simultaneously acquired maps of phosphorus and sulphur concentration allow measurement of myelin density. Together, the measured concentration of these components provides an accurate simulation of various types of MRI contrast, using a general linear model. Use of the resulting coefficients enables quantitative inference of the underlying tissue concentrations of iron and myelin from T1 maps, T2* maps and quantitative susceptibility maps.

About the Speaker

Dr Carsten Stueber was born in Wittenberg, Germany. He did his undergraduate and graduate studies at the University of Leipzig. The title of his Master thesis was "Cell elasticity as a function of Action expression". Dr Stueber worked as a researcher at the Department of Biophysics in the same university from 2006 to 2009 and has just

obtained his PhD in Physics from the Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig (Germany).

--- Admission is free and all are welcome ---