

# Molecular and Biophysical Imaging Seminar

**Prof. Dr. Matthias Taupitz**

**Charité - Universitätsmedizin Berlin, Institut für Radiologie**

## **„Magnetic Iron Oxide Nanoparticles for In Vivo MR Imaging: Clinical and Experimental Results“**

Iron Oxide Nanoparticles as used as contrast medium for in vivo MRI can be divided into two groups – SPIO (SuperParamagnetic Iron Oxide) with diameters between 50 and 150 nm and USPIO (Ultra-small SuperParamagnetic Iron Oxide) with diameters between 20 and 50 nm. SPIO of two companies have been in clinical use as contrast medium for MR imaging of the liver and the spleen, especially with the aim to detect small metastases and to characterize unclear liver lesions. USPIO have been investigated in clinical trials with regard to their ability to improve lymph node diagnostics in oncologic patients, especially to detect small metastases in non enlarged lymph nodes. Another interesting and potentially important clinical application of USPIO is the characterization of inflammatory changes in the atherosclerotic vessel wall, which might indicate the risk of plaque rupture and sudden cardiovascular event. The aforementioned applications are based on the non specific uptake of the particles by macrophages after intravenous injection and their signal decreasing effect in T2w sequences. USPIO can also be used as so called blood pool contrast medium for MR angiography. After intravenous injection they cause efficient shortening of the T1-relaxation time of blood, which leads to very bright appearance of the vessel lumen in T1w sequences. USPIO can be coupled to disease specific molecules (peptides, antibody fragments etc.) to enable targeting and specific contrast enhancement of certain pathologies. These approaches are in the phase of early experimental research. In the own group, Very Small iron Oxide Particles (VSOP) with particle diameters of about 7 nm have been developed, which are even smaller compared to USPIO. VSOP have been successfully tested preclinically and clinically for MR angiography of the coronary arteries. Experimentally VSOP have also been tested for liver MRI as well as for certain approaches of disease specific imaging.

**Dienstag, den 31. August 2010, 16:00 Uhr**

Charité – Universitätsmedizin Berlin  
Campus Mitte, Hörsaalruine  
Charitéplatz 1  
10117 Berlin

Einladende: M. Bräutigam, W. Brenner, B. Ittermann, T. Niendorf, L. Schröder, M. Taupitz, H. Kunze