AbstractID: 3691 Title: In vitro stability of a liposome-based multimodal contrast agent: a CT and MR imaging study

Purpose: To investigate the stability of a liposome-based multimodal contrast agent for computed tomography (CT) and magnetic resonance (MR) imaging in the presence of various environmental conditions *in vitro* using both imaging and chemical analysis techniques.

Method and Materials: Liposomes encapsulating iohexol and gadoteridol were dialyzed in an 8000 molecular weight cut-off dialysis bag against 250-fold excess of physiological buffer and fetal bovine serum (FBS) at 37°C. The liposome-based contrast agent was also irradiated to clinically relevant single doses ranging from 0.5 Gy to 32 Gy delivered at a rate of 3.9 Gy/min (6MV, photon beam, medical linear accelerator) at 37°C in physiological buffer and FBS. The same samples were imaged in a purpose-built multimodal phantom using CT (120 kV, 200 mA) and MR (1.5T, TR/TE = 450/9) before and after either dialysis or irradiation. The mean CT and MR signal differential was measured over circular regions of interest. Chemical detection of iohexol and gadoteridol concentrations was performed using high performance liquid chromatography and inductively coupled plasma atomic emission spectrometry respectively.

Results: Partial release of the encapsulated agents occurred during dialysis due to differences in osmotic pressure and volume distribution (in the presence and absence of blood proteins). This small degree of agent leakage caused the MR signal to slightly increase and the CT signal to slightly decrease. In addition, the imaging properties of the system were found to remain unchanged when clinically relevant radiation doses were applied.

Conclusion: The liposome-based multimodal contrast agent remained substantially stable under osmotic pressure and distribution volume changes, in the presence of blood proteins and clinically relevant radiation doses. This investigation showed the feasibility of employing this system for blood pool CT and MR imaging over the course of a radiation treatment.