INTERNATIONAL SYMPOSIUM ON RADIOLOGY, NUCLEAR MEDICINE, AND DIAGNOSTIC IMAGING

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Paramagnetic core/shell nanoparticles for cancer detection in animal models

Magnetic Resonance Imaging (MRI) has been used for early cancer detection, as it provides high spatial resolution and soft tissue contrast. Yet its specificity is low. Standard contrast enhanced MRI is based on tumors vasculature (i.e. Gd-based) and it does not provide sufficiently high specificity for tumor diagnosis and thus targeted contrast agents providing T2 contrast have been applied to provide information on tumor specificity.

Therefore, we have developed core/shell NaDyF4/NaGdF4 nanoparticles changing both T1 and T2 relaxation times of surrounding water molecules. The NPs were conjugated with tumor specific antibodies and proteins. The relaxation times (T1 and T2) of the nanoparticles with various core/shell sizes and concentrations were measured at 9.4T and 3T to find the optimum T1/T2 ratio for maximum contrast. T1- and T2-weighted images using core/shell nanoparticles of the animal models of brain, breast and prostate cancer were collected. Mouse models of cancer were used at 9.4T. We imaged 6 weeks nude mice with the tumor before the injection of the targeted and non-targeted contrast agents and in different time after injection (10 min after,1h, 2h and 24h). The core/shell based NPs provided improved tumor contrast when the T1 and T2-weighted MR pulse sequences were applied. The results show that the developed NPs may improve the efficacy of MRI in cancer detection.

Keywords
Magnetic Resonance Imaging (MRI), Contrast Agents, Core/Shell Nanoparticles, Relaxation Time, Cancer

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Biography

Barbara Blasiak obtained her PhD degree in physics in 2011. Her research focused on magnetic resonance imaging. Currently she is working as a Professor in Institute of Nuclear Physics Department of Magnetic Resonance Imaging in Krakow. She made many foreign internships at the University of Victoria, University of Calgary and National Research of Council in Canada where she was involved in the applications of nano-technology in medicine and molecular imaging of brain, breast and prostate cancer. She is an author of 29 papers, presented 60 posters and 38 oral presentations. She was a leader of 9 projects.

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