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Early breast cancer detection with bi-modal molecular imaging

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Breast cancer is the most frequently diagnosed cancer in women. Currently mammography is the main screening and diagnostic tool, however it exposes the patient to radiation and its ability to distinguish benign and malignant disease are limited which results in a large number of unnecessary biopsies. PET provides information based on a tumor's increased glucose consumption but doesn't detect small tumors. Ultrasound allows differentiation between cystic and solid lesions with sharp borders, but doesn't provide good differentiation between malignant and benign tumors. MRI has excellent spatial resolution but has not been applied to its full potential for the diagnosis of breast cancer due to its low specificity. At the same a combined PET/MRI human system has been introduced to clinics. Therefore a novel contrast agent for simultaneous PET and MR imaging that is specific to the most aggressive form of invasive ductal carcinoma (triple negative (TN)) is proposed. The bi-modal PET and MRI contrast agent enables both PET-MRI detection of this malignant breast cancer with high sensitivity (PET) and high spatial resolution (MRI). The development of a novel targeted contrast agent for breast molecular PET and MR imaging will considerably increase sensitivity of these imaging technologies enabling significant improvement in diagnosis. The specific aim of the study is to construct superparamagnetic core/shell nanoparticles that strongly reduce both T1 and T2 relaxation times. They will be conjugated with single domain antibodies (sdAbs) against three tumor targets overexpressed by the targeted breast cancer, creating very specific and efficient contrast agents.

Biography

Barbara Blasiak completed her PhD at the Institute of Nuclear Physics, Polish Academy of Sciences, Krakow, Poland. Her PhD thesis was on molecular imaging of glioma. Currently she is involved in applications of nano-technology in medicine at the University of Calgary, Canada. She has been a coordinator of the multi-site, cross-Canada project on molecular imaging. She continues her work on innovative rf coils for low and high field MRI systems. Blasiak is a recipient of several awards. She is an author of 12 publications related to molecular imaging of cancer.

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