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Diffuse optical tomography: A new way to detect early stage breast cancer

Optical Imaging has distinguished itself as an important tool in the field of biomedical imaging, and provides many advantages over current modalities. The method of diffuse optical tomography (DOT) uses near-infrared light, which corresponds with low absorption inside tissue, to enable the quantification of scattered photons. DOT detects the scattered photons measured at the surface of tissue and then uses a reconstruction algorithm to determine properties of the medium. Systems based on this technology are highly advantageous since they are low cost, portable, and safe. While many advantages exist to this technology, there is an inherent problem in quantifying the signal relative to the probes in the medium. With a help form fluorophore-peptide conjugates, DOT can be further developed into Fluorescent Molecular Tomography (FMT); ultra-high sensitivity of FMT is of particular interest because it allows early detection of tumors and can be used for functional imaging by selecting target probes. It is our desire to use and develop FMT technology for concurrent imaging with the traditional modalities of MRI, CT, PET, and/or SPECT. In this investigation we use a newly developed and novel fluorophore-peptide conjugate with an excitation wave.