

Public Abstract

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Title:Detection of Circulating Breast Cancer Cells Using Photoacoustic Flow Cytometry

According to the American Cancer Society, more than 200,000 new cases of breast cancer are expected to be diagnosed this year. Moreover, about 40,000 women died from breast cancer last year alone. As breast cancer progresses in an individual, it can transform from a localized state to a metastatic one with multiple tumors distributed through the body, not necessarily contained within the breast. Metastasis is the spread of cancer through the body by circulating tumor cells (CTCs) which can be found in the blood and lymph of the diagnosed patient. Diagnosis of a metastatic state by the discovery of a secondary tumor can often come too late and hence, significantly reduce the patient's chance of survival. There is a current need for a CTC detection method which would diagnose metastasis before the secondary tumor occurs or reaches a size resolvable by current imaging systems. Since earlier detection would improve prognosis, this study proposes a method of labeling of breast cancer cells for detection with a photoacoustic flow cytometry system as a model for CTC detection in human blood. Gold nanoparticles and fluorescent polystyrene nanoparticles are proposed as contrast agents for T47D, the breast cancer cell line of choice. The labeling, photoacoustic detection limit, and sensitivity are first characterized and then applied to a study to show detection from human blood.