INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	Ph.D.
Thesis Title	:	APTAMERS FOR BREAST CANCER PROTEIN MARKERS
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Thesis Submitted to the Department	:	Biosciences and Bioengineering
Date of completion of Thesis Viva-Voce Exam	:	30.08.2016
Key words for description of Thesis Work	:	Aptamers, Breast Cancer, Diagnostics

SHORT ABSTRACT

In the present thesis, specific DNA aptamers were screened against breast cancer protein biomarkers Her2 and ER alpha. The aptamers were screened by *in-vitro* SELEX process from a pool of 10^{14} number of oligonucleotides. The sensitivity of the candidates were evaluated by isothermal calorimetry and other *in-vitro* binding studies. To assess the biocompatibility of the selected aptamers, MTT assay was performed in marker positive and negative cancer cell lines and normal cell lines also. Specificity of the aptamers toward the marker positive cell lines were tested by flow cytometry technique. Immunocytochemistry of ER_Apt1 and ECD_Apt1 candidates suggest the specific binding of screened aptamers to ER alpha and Her2 positive cell lines respectively. Immunohistochemistry data with biotinylated aptamers showed the specific staining of breast cancer tissue specimens with negligible cross reactivity. Cellular and histochemical studies revealed that these DNA aptamers could be used as a theranostic agent for Her2 and ER positive carcinomas and could provide a novel cost effective alternate to conventional antibody in solid and solution based immunoassays for cancer diagnosis and related applications. Furthermore, these aptamers were modified with methylene blue at one end and thiol at another end to suite them for development of aptamer based sensor applications. The aptamers were immobilized on gold electrode surfaces and various electrochemical measurements (CV, SWV) were recorded with and without the protein biomarkers in solution phase by a standard 3-electrode system. The characteristic peaks indicate that, the aptamer based electrochemical sensors can detect the analytes efficiently. Thus, this study explores the potential of aptamer based biosensors for detection and prognosis of marker positive breast carcinoma and related disorders.