

Screening Breast Cancer by Joint Detection of Tumor Marker Carbohydrate Antigen 15-3 and Carbohydrate Antigen 72-4 with Biosensor Based on Imaging Ellipsometry

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Breast cancer developing from breast tissue is the leading type of cancer in women worldwide, and screening high risk population and concluding a clinical diagnosis in the early stage act as a pivotal factor to cure breast cancer. Carbohydrate Antigen 15-3 (CA 15-3) is considered as a specific tumor marker for breast cancer carcinogenesis. However, its detection specificity is insufficient in clinic. Almost one third of those who test positive in CA 15-3 are excluded after further examinations. In order to increase the detection specificity, joint detection of several related tumor markers for breast cancer has been proposed to gain the improved feedback. Thus, a need for joint detection of multiple indicators has been required in clinic.

The biosensor based on imaging ellipsometry (BIE) to visualize biomolecular interactions was reported in 1995 and the present model of BIE is mainly composed of a multi-throughput biomolecule array reactor and an imaging ellipsometry reader. With these properties, BIE can detect multiple indicators simultaneously, which completely meets the requirement for joint detection of tumor markers in clinic. By introducing control groups, CA 15-3 and Carbohydrate Antigen 72-4 (CA 72-4) as two breast cancer related tumor markers have been realized with BIE, respectively, and then their joint detection has been performed with BIE to increase the detection specificity for breast cancer screening.

149 serum samples composed of both the healthy people and patients have been analysed by BIE. Compared with the results obtained by standard approaches in clinic, the correlation analysis indicates the BIE are highly consistent with the clinical methods. In order to estimate the BIE performance for tumor markers detection, receiver operating characteristic (ROC) curve analysis has been introduced. Its result suggests that the joint detection of CA 15-3 and CA 72-4 plays a positive role in the improvement of the diagnosis specificity of breast cancer.