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SENSING OF CANCER DNA USING RESONANCE FREQUENCY

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Lung cancer is one of the most common severe diseases driving to the death of human. Lung cancer can be divided into two cases of small-cell lung cancer (SCLC) and non-SCLC (NSCLC), and about 80% of lung cancers belong to the case of NSCLC. From several studies, correlation between epidermal growth factor receptor (EGFR) and NSCLCs has been investigated. Therefore, EGFR inhibitor drugs such as gefitinib and erlotinib have been used as lung cancer treatments. However, the treatments result showed low response (10~20%) in clinical trials due to EGFR mutations that cause the drug resistance. Patients with resistance to EGFR inhibitor drugs usually are positive to KRAS mutation. Therefore, assessment of EGFR and KRAS mutation is essential for target therapies of NSCLC patient. In order to overcome the limitation of conventional therapies, overall EGFR and KRAS mutations have to be monitored. In this work, only detection of EGFR will be presented. A variety of techniques have been presented for the detection of EGFR mutations. The standard detection method of EGFR mutation in ctDNA relies on real-time polymerase chain reaction (PCR). Real-time PCR method provides high sensitive detection performance. However, as the amplification step increases, cost effect and complexity increase as well. Other types of technology such as BEAMing, next generation sequencing (NGS), electrochemical sensor and silicon nanowire field-effect transistor have been presented. However, those technologies have limitations of low sensitivity, high cost and complexity of data analyzation. In this report, we propose a label-free and high-sensitive detection method of lung cancer using quartz crystal microbalance-based platform. The proposed platform is able to sense lung cancer mutant DNA with a limit of detection of 1nM.

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