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Cytotoxicity studies of lung cancer cells using impedance biosensor

(Conference Paper)

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Abstract

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Electrical cell-substrate impedance sensing (ECIS) is a valuable tool for real time monitoring of cell behavior such as attachment, mobility, and growth. To employ ECIS, the cells need to attach, spread and proliferate on the sensor in the presence of adhesion-promoting protein that mimics the extracellular matrix (ECM) of the cells. For cell attachment, collagen I, Bovine had been used as the coating substrate. In this study, four designs with varying electrode distances had been measured to detect the changes in impedance values of Lung Carcinoma cell lines (A549). The impedance change due to the cell growth and attachment was modeled as an equivalent circuit consisting of resistors and capacitors of both the cell culture media and the cells. The impedance measurements were measured every 8 hours for 120 hours at frequencies of 100Hz to 10MHz using Agilent Precision Impedance Analyzer 4294A. The experimental results have shown that the closest distance of the electrode gave the most optimum impedance value for A549 cancer cell's measurement. The cancer cells were also treated with a chemotherapeutic drug, Taxol and its impedance response was monitored over 5 days. Experimental results show that there is significant reduction in impedance when the cancer cells were exposed to Taxol, indicating that the cells are no longer adherent to the sensor's surface or are dead. © 2015 IEEE.

Author keywords

A549 | Cell Adhesion | Collagen | ECIS | Interdigitated Circuit

Indexed keywords

Engineering controlled terms: Biological organs | Cell adhesion | Cell culture | Collagen | Electrodes | Equivalent circuits | Smart sensors

Engineering uncontrolled terms: A549 | Chemotherapeutic drugs | ECIS | Electrode distances | Extracellular matrices | Impedance biosensors | Impedance measurement | Real time monitoring

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