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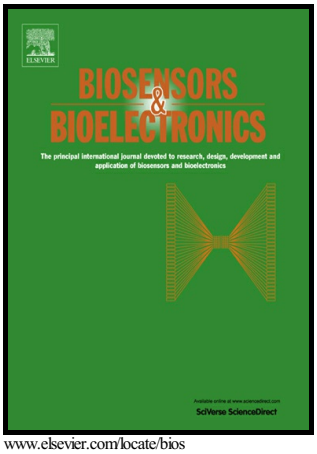

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A dual-functional microfluidic chip for on-line detection of interleukin-8 based on rolling circle amplification

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Abstract

Interleukin 8 (IL-8), also known as C-X-C motif ligand 8(CXCL8), is a proinflammatory chemokine functioned in neutrophil chemotaxis and activation. And it plays an important role in the process of glioma stem-like cell vascularization in the latest research. Herein, a dual-function microfluidic biosensor based on rolling circle amplification (RCA) was fabricated for cell culture and online IL-8 detection. A microfluidic chip was designed with two high passages connected by the vertical channels. One of the channels with immobilized capture antibody was prepared for IL-8 detection and another channel for cell culture. Immunoassays were achieved by a sandwich structure consisting of antibodies, IL-8, and aptamers. Signal amplification was mainly due to RCA and biotin-streptavidin linkage. The linear range for IL-8 was 7.5 -120 pg•mL^{-1} in this assay. Moreover, the developed method was successfully applied to detect the IL-8 in tumor-derived endothelial cells (TDEC) and Human Umbilical Vein Endothelial cells (HUVEC) under chemical hypoxia condition. Semi-quantitative detection of IL-8 consumption in HUVEC cells in low oxygen condition was also achieved. These results were in statistical agreement with those obtained by commercial assay of enzyme-linked immunoassay kit (ELISA). The microfluidic chip based biosensor reported hereby has a large prospect in the basic research and clinical diagnosis of cancer stem cell.