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Electrochemical Immunobiosensors for Point-of-Care Detection of Hypoxia Biomarkers
(Book Chapter)

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Abstract

Hypoxia, a state of reduced oxygen pressure below a critical threshold, restricts the function of organs, tissues, and cells. It induces myriad changes in the metabolites, proteins, and enzymes involved in important biological functions resulting in clinical obstacle. With the recent understanding of the molecular pathways regulated by hypoxia and the discovery of novel hypoxia markers, however, the prospect of targeting hypoxia has become more tangible. The measurements of these biologically important hypoxia biomarkers are imperative in human physiology because they provide valuable information regarding people at high altitude. We have fabricated miniaturized electrochemical immunobiosensors to measure various clinically important hypoxia biomarkers, including nitrite and its metabolites, cytochrome c, and superoxide dismutase using specific biorecognization elements, including enzymes and antibodies biofunctionalized nanocomposite modified screen printed electrodes (SPE). Combined with these immunobiosensors, cost-effective LabVIEW-based virtual instrumentation and a microcontroller-based portable electrochemical analyzer to determine hypoxia biomarkers for point-of-care applications have been successfully developed.

Author keywords

Cytochrome c | Electrochemical analyzer | Hypoxia | Immunobiosensors | LabVIEW | Microcontroller | Superoxide dismutase-1

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