

Abstract

Amperometric Immunosensing Scaffolds for Rapid, Simple, Non-Invasive and Accurate Determination of Protein Biomarkers of Well-Accepted and Emerging Clinical Importance †

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New amperometric immune-scaffolds for the rapid, sensitive and reliable determination of human protein biomarkers of well-accepted (p53) and emerging (endoglin and fibroblast growth factor receptor) proteins of clinical relevance in the diagnosis and prognosis of cancer, will be described. These are based on sandwich immunosensing configurations where specific capture antibodies are covalently immobilized on magnetic microcarriers (MBs). After the specific capture of the target proteins followed by incubation in solutions with peroxidase labelled specific secondary antibodies, the resulting modified MBs are magnetically captured on the surface of disposable screen-printed carbon electrodes. The electrocatalytic reduction of hydroquinone at an applied potential of -0.20 V vs. the Ag pseudoreference electrodes in the presence of H_2O_2 by linked HRP is used to determine the target biomarker concentration. The three immunoplatfoms offer attractive operational and analytical characteristics with low detection limits (in the range between 2.8 fg mL^{-1} and 1.29 ng mL^{-1}) and short assay times (15–45 min). Accurate results on the determination of these proteins in minimally pretreated human serum samples and different cancer cells lysates will be shown. The developed bioscaffolds may be integrated in portable multiplexed systems, and applied in the implementation of point-of-care (POC) devices useful in hospital routines.



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