ELECTROCHEMICAL IMMUNOSENSING OF DIPEPTIDYL PEPTIDASE IV:TOWARD SENSITIVE AND ACCESSIBLE CANCER-RELATED BIOMARKER DETECTION

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Dipeptidyl peptidase IV (DPP-IV, also known as CD26) is a multifunctional serine protease involved in immune regulation, metabolic homeostasis, and cancer-related signaling pathways. Altered levels of soluble DPP-IV have been reported in blood and other biological fluids in various oncological and metabolic disorders, suggesting its potential value as a clinically relevant biomarker [1] [2]. Despite this, the diagnostic utility of DPP-IV remains insufficiently explored, largely due to limitations of existing analytical approaches. Conventional detection methods, including chromatographic and optical techniques, often require complex instrumentation, labeled reagents, and extensive sample preparation, limiting their applicability for rapid, cost-effective, and decentralized diagnostics [3].

The objective of this study is to explore the potential of electrochemical immunosensing as an alternative approach for DPP-IV detection, addressing current methodological limitations and contributing to the development of sensitive and accessible biomarker detection platforms for early DPP-IV related disease diagnostics.

An electrochemical immunosensing platform based on screen-printed electrodes modified with gold nanostructures is proposed. The surface modification with gold nanostructures is intended to enhance electron transfer kinetics and improve antibody immobilization efficiency. The study focuses on the systematic evaluation of electrode surface modification strategies and their influence on immunosensor performance.

The study is expected to provide insight into how gold nanostructure-based surface modification influences the electrochemical response of immunosensing platforms toward DPP-IV recognition. Particular attention is given to evaluating trends in signal enhancement, surface-related stability, and reproducibility, which are critical parameters for reliable immunosensor performance. The anticipated findings will help identify key factors governing efficient electron transfer and biomolecular interactions at the electrode interface, thereby guiding the rational design of optimized electrochemical immunosensors.

This research aims to provide fundamental insights into electrochemical immunosensing strategies for DPP-IV detection and to support the development of portable and efficient biosensing tools. The proposed approach has the potential to contribute to future advances in early cancer diagnostics and biomarker-based electrochemical sensing technologies.

Keywords: DPP-IV, Electrochemical immunosensor, biosensor, biomarker, cancer

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