Electrochemical Immunosensor for Monocyte Chemoattractant Protein-1 Detection Based on Pt Nanoparticles Functionalized Single-walled Carbon Nanohorns

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A novel label-free electrochemical sensing strategy for detecting monocyte chemoattractant protein-1 (MCP-1) was developed by using single-walled carbon nanohorns (SWCNHs) functionalized with Pt nanoparticles (PtNPs-SWCNHs). After modification with the PtNPs-SWCNHs, the electrode could serve as an effective platform for antibody immobilization and electron transfer owing to the large surface area and excellent conductivity of PtNPs-SWCNHs. Moreover, the PtNPs-SWCNHs composite could provide an obvious electrochemical signal through amperometric *i*-*t* curve method, due to its high catalytic activity for the reduction of hydrogen peroxide (H₂O₂). Under optimal conditions, the amperometric *i*-*t* curve signals had a strong linear relation with the logarithm of the MCP-1 concentration ranging from 0.06 pg mL⁻¹ to 450 pg mL⁻¹, and the detection limit was 0.02 pg mL⁻¹. Furthermore, the proposed immunosensor could detect MCP-1 in serum samples with desirable results. Overall, this immunosensor may provide a new alternative strategy for rapid detection of MCP-1.

Keywords: Monocyte chemoattractant protein-1; Single-walled carbon nanohorns; Pt nanoparticles; Electrochemical immunosensor.

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