Electrochemical Monitoring of Cisplatin as Anticancer Compound to the Treatment of Laryngeal Cancer in the Elderly Using Poly(cyanocobalamin) Modified Composite of Ag Nanoparticles Graphene Oxide Electrode

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Received: 1 October 2021 / Accepted: 29 October 2021 / Published: 6 December 2021

The purpose of this research was to develop a poly(cyanocobalamin) modified composite of Ag nanoparticles graphene oxide (poly(cyc)/Ag-GO) for electrochemical monitoring of cisplatin, a chemotherapy medication used to treat laryngeal cancer. The Ag-GO composite was electrodeposited on a glassy carbon electrode (GCE), and then poly(cyc) was electropolymerized on Ag-GO/GCE. The XRD and FE-SEM structural characterization of Ag-GO nanocomposite revealed that the Ag nanoparticles were discretely distributed on the surface of the GO nanosheets, resulting in a high porous structure with discrete electroactive sites for cyanocobalamin's strong bond and improved electron transfer and signal in electrochemical reactions. Using CV and DPV, electrochemical analyses revealed a stable, sensitive, and selective response of poly(cyc)/Ag-GO/GCE to cisplatin determination. The proposed sensor's detection limit, sensitivity, and linear range were determined to be 0.2 μM , 0.01316 $\mu\text{A}/\mu\text{M}$, and 40-1200 μM , respectively. The sensor's capability was tested using prepared platinum injection and human serum as real samples, and the results revealed acceptable recovery (95.25% to 98.50%) and RSD (3.08% to 4.76%), implying that the proposed cisplatin sensor is accurate enough for clinical sample analysis.

Keywords: Cisplatin, Differential pulse voltammetry, Cyanocobalamin; Ag nanoparticles; Graphene oxide; Electropolymerization; Electrodeposition

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