Preparation of electrochemical sensor based on β -cyclodextrin/Carbon Nanotube Nanocomposite for Donepezil Hydrochloride as drug for treatment of Alzheimer's Disease

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This study was conducted to prepare nanocomposite based carbon nanotubes (CNTs) and β -cyclodextrin-CNTs (β CD-CNTs) as an electrochemical sensor for determination of DNP as medicine for treatment of Alzheimer's disease. The electrodeposition method was used for modification of the glassy carbon electrode (GCE) surface with a nanocomposite of β CD-CNTs. The structural analyses of electrodeposited β CD-CNTs on the GCE surface using SEM and XRD revealed that β CD particles covered the high porous bundles of entangled CNTs surface and created of a highly cross-linked CNTs composite. The electrochemical characterizations using CV and DPV techniques showed the synergetic effect of CNTs and β CD molecules can improve the response of nanocomposite modified GCE to determine the DNP. Results showed that the response of β CD-CNTs/GCE was sensitive, selective and stable to determination of the DNP, and linear range, sensitivity, and limit of detection were obtained at 0 to 550 μ M, 0.03233 μ A/ μ M and 8.5 nM, respectively. In prepared pharmaceutical samples of Aricept tablets, the precision and applicability of the β CD-CNTs/GCE for DNP determination sensor were evaluated, and the results showed that acceptable recovery (91.00 to 98.50%) and RSD (3.84 to 4.61%) values were obtained, as well as the appropriate performance of the β CD-CNTs/GCE for DNP determination sensor in clinical applications.

Keywords: CNTs; β -cyclodextrin; Nanocomposite; Electrodeposition; Donepezil hydrochloride; Differential pulse voltammetry

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