

## Determination of clopidogrel using a graphite electrode modified by multi-walled carbon nanotube/ poly ortho aminophenol nanocomposite film

A. Mohammadi<sup>1</sup>, S. Meghrazi barin<sup>1,\*</sup>, A. Naeemy<sup>2</sup>

<sup>1</sup>Department of Drug and Food Control, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup>Nanotechnology Research Centre, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

**Background and Aims:** The main purpose of the study is to determine clopidogrel (CLP) by multi-walled carbon nanotube (MWCNT)/ Poly Ortho Aminophenol (POAP) nanocomposite film.

**Methods:** The oxidation of CLP at multi-walled carbon nanotube/ poly ortho aminophenol modified graphite electrode (MWCNT/ POAP/ GE) electrode has been performed in sulfuric acid (pH: 3.7). Cyclic voltammetry (CV), Chronoamperometry (CA) under different conditions of pH, scan rates and Concentration of CLP were investigated for the determination of CLP using electrochemical techniques.

**Results:** The most appropriate technique was CV with a sensitive peak occurring at 0.99 V using MWCNT/ POAP/ GE. MWCNT/ POAP porous structure improves the surface area for electrooxidation of CLP and an increasing in the peak currents related to GE and POAP/ GE was observed. MWCNT/ POAP/ GE showed an electrocatalytic effect in anodic oxidation of CLP. A linear relationship exists between peak current height and CLP concentration over a good concentration range. Using Laviron's equation, the values of  $\alpha$  and  $k_s$  for the immobilized redox species were determined. The anodic peak currents show linear dependency with the square root of scan rate. This behavior is the characteristic of a diffusion controlled process. Under the CA regime the reaction followed a Cottrellian behavior and the diffusion coefficient of CLP was found in agreement with the values obtained from CV measurements.

**Conclusions:** These remarkable characteristics make the prepared sensor suitable for analysis of CLP in pharmaceutical samples.

**Keywords:** Graphite electrode; Multi-walled carbon nanotubes; Clopidogrel