Abstract

Introduction: Diagnosis of viral infections such as hepatitis and AIDS is a main priority for health systems of countries. Chronic infections with hepatitis B virus can lead to the liver carcinoma and cirrhosis. Hepatitis B surface antigen (HBsAg) is a part of hepatitis B virus that appears in the bloodstream in the case of an active infections and is used as a biomarker for dection of acute and chronic hepatitis B infections. In recent years, biosensors have been used as powerful tools for detection of tiny concentrations of HBsAg.

Methods: In this study, first, the surface of the screen-printed electrode (SPE) was modified with multi-walled carbon nanotubes (MWCNT). Second, the specific antibody (Ab) of HBsAg was attached on the MWCNT-SPE (Ab-MWCNT-SPE). In the following, bovine serum albumin (BSA) was used to neutralize unreacted surfaces to prevent non-specific binding sites (Ab/BSA-MWCNT-SPE). Then, all surface of Ab/BSA-MWCNT-SPE covered with ferrocene-modified HBsAg (HBsAg*) as the signaling probe, and incubated with native HBsAg molecules to mesure the on-off signals.

Results: The purposed biosensor (HBsAg*-Ab/BSA-MWCNT-SPE) produced detetable ectrochemical signals due to the presence of Ferocene molecules in the structure of antibody molecules. In the presence of native antigen (HBsAg), electrochemical signals were reduced significantly because ferocene-conjugated HBsAg (HBsAg*) were replaced by native HBsAg. Under optimum conditions, the limit of detection (LOD) and linear detection range (LDR) for our biosensor were found to be 6.3 $pg.mL^{-1}$ and 0.01-300 $ng.mL^{-1}$.

conclusions: The developed biosensor showed acceptable accuracy, selectivity, sensitivity with low detection limit and wide linear detection range. Briliant advantages of this biosensor were simplicity of assebling and stability of the produced signals. The assembly of this biosensor can be used as model for construction of other screen-printed based biosensors.

Key words: Antigens- hepatitis B- Biosensor