

Abstract

Introduction: Ovarian and breast cancers are one of the most common malignancies in the female reproductive system, which unfortunately have a high mortality rate. However, these malignancies can be further cured if diagnosed early. Early detection of such malignancies is difficult because there are no clear clinical signs in the early stages. Biomarkers are a good and relatively new method used to diagnose malignancies, evaluate treatment responses, and check for recurrence after chemotherapy. Human epididymal protein 4 (HE4) is a type of tumor marker whose serum levels can increase in ovarian and breast malignancies in the early stages. Laboratory tests and existing protocols to identify and measure different biomarkers to diagnose different diseases often require high equipment and costs. Biosensors are tools that can measure and detect a wide range of valuable clinical biomarkers. In this study, using a biosensor, we seek to diagnose and measure serum HE4.

Materials and Methods: First, the surface of the printed circuit board electrodes was modified using Lincoln Cysteine to allow the connection of the primary antibody. In the next step, the primary antibody was attached to the gold electrode surface. After preparing the magnetic nanoparticles attached to the gold, the secondary HE4 antibody was attached to it and in the presence of different antigen concentrations, their sandwich connection was checked and the resulting signals were recorded and the calibration curve was drawn.

Results and conclusion: In the present study, considering that the current flow rate has decreased in each stage, it shows the connection of antigen to antibody. The test was 3.7 micrograms per milliliter and the line detection range was 1-150 micrograms per milliliter. Due to the cheapness and availability of this method, it can be used to diagnose the disease early and evaluate the response to treatment and evaluate the recurrence of the disease.

Keywords: Biomarker, Biosensor, Electrochemical Techniques, HE4, Breast Cancer, Ovarian Cancer