Development of a biossensor system based on layer-by-layer films of PAH and folic acid for detection of cancer cells with folate receptors.

- Poster
- Abilene Rodrigues Correia, abilenesax@yahoo.com.br

Abilene R. Correia - USP; Valtencir Zucolotto - USP; Nirton C. S. Vieira - UNIFESP (Campus São José dos Campos)

Early detection of tumor cells plays an important role in the effective treatment of cancer. Some conventional methods, such as imaging and radiolabels, are effective, but complex and costly. On the other hand, electrochemical biosensors have attracted considerable attention due to its advantages over conventional techniques, such as high sensitivity, simplicity, fast response, miniaturization and low cost. Recent studies have shown that tumor cell surfaces, especially in gynecologic cancers, express more folate receptors than normal cells. Folate receptors are folate binding proteins which have a high affinity for folic acid (FA) (Kd < 1 nmol/ L). In this study a biosensor was developed for the detection of tumor cells HeLa (cervical cancer cells), based on electrochemical platform modified with folic acid. HMEC (human mammary epithelial cells) was used as the negative control and a selectivity test was carried out with polymer Poly (acrylic acid) - PAA. The surface of the biosensor was modified with self-assembly layer-by-layer (LbL) films containing PAH (polyamine hydrochloride) and folic acid used as positively and negatively charged materials, respectively. The films had been characterized and optimized using ultraviolet and visible absorption spectroscopy, exhibiting an absorption band centered at 290 and 360 nm. Interactions between PAH and folic acid were investigated using Fourier transform infrared spectroscopy. Atomic force microscopy analyzes revealed a globular morphology for (PAH/FA) film containing 20 bilayers with a mean roughness of 17 nm. Electrochemical impedance spectroscopy and cyclic voltammetry have been used to detect cells. The developed biosensor was able to detect 10 nmol/L Folate receptors with a linear range of 10 to 40 nmol/L. The limit of detection to HeLa cell was 50 cells/mL in the linear range of 50 to 1000000 cells/ mL. The biosensor presented good reproducibility and stability (% DPR = 1,95%, n = 3).

Comentários: