Desenvolvimento de eletrodo modificado com polímero molecularmente impresso (MIP) para o reconhecimento de cortisol

Development of molecularly imprinted polymer (MIP) modified electrode for cortisol recognition

L. F. Mendes [1,*], W. R. Araujo[1] e T. R. L. C. Paixão[1]

[1] *Instituto de Química - USP, Av. Prof. Lineu Prestes, 748 – São Paulo – SP - Brazil*

Abstract: Cortisol is a steroid hormone that realize fundamental role in important physiological processes regulation such as inflammation, blood pressure and glucose levels. Therefore, it is constantly associated with severe stress due to the higher production of this hormone in this circumstance indicating that cortisol could be a good biomarker to measure the stress level in biological fluids[1]. An alternative method to antigen-antibody (A-A) interaction sensor to quantify cortisol is the use of biomimetic materials, such as MIPs, which are more stable and cheap for development of sensors when compared with A-A systems. In this study, a cortisol hydrogel MIP-based and a control Non-Imprinted Polymer (NIP) were synthesized using a similar procedure as reported by Lígia *et. al*. [2] These materials were first evaluated by UV-VIS measurements using cortisol 100 µmol L^{-1} solution prepared in DMSO containing 200 mg of NIP and MIP and mixed on a rotary vortex mixer during 2 min followed by centrifugation. The supernatant was removed and the remaining cortisol concentration was measured. Spectrophotometric results pointed out that the MIP retains cortisol, and NIP-supernatant did not show any significant change in cortisol concentration. Demonstrated the efficiency to retain the cortisol by the MIP, a glassy carbon surface was modified with the MIP, NIP, MIP-cortisol and NIP-cortisol the modified electrodes were tested using cyclic voltammetry in 1 mmol L^{-1} potassium ferricyanide as redox probe (Figure 1). Figure 1 shows that in MIP modified electrode, the potassium ferricyanide reaches faster the electrode surface then in NIP, probably due the cavities formed by the template molecules. The voltammograms obtained using NIP-cortisol and MIP-cortisol modified electrodes shown almost the same voltammetric behavior obtained for NIP modified electrode due to the difficult of the redox probe to achieve the electrode surface demonstratting a great potential for selective recognition of cortisol suing a MIP modified electrode.

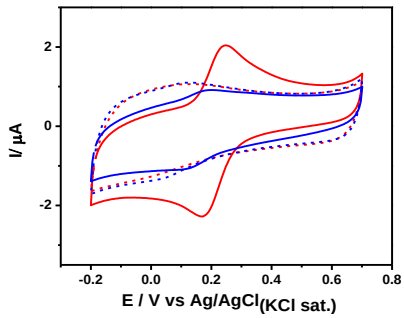

Figure 1. Cyclic voltammograms recorded using 200 mg of MIP (red full line), NIP (blue full line), MIP-cortisol (red dotted line) and NIP-cortisol (blue dotted line) immobilized in the glassy carbon electrode. Solution: 0.1 mol L^{-1} KCl + 1 mmol L^{-1} $K_3Fe(CN)_6$. Scan rate of 100 mV s^{-1}.

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References:

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* e-**mail do autor principal:** leticiafrancinemendes@gmail.com