6st Graduate Student Symposium on Molecular Imprinting - Kent, 27-28 Agosto 2015

"A molecularly imprinted sensor for sensitive detection of 8-hydroxy-2'-deoxyguanosine (8-OHdG) oxidative stress biomarker"

Autores: Gabriela V. Martins, Elvira Fortunato, Helena R. Fernandes, M. Goreti F. Sales

Early diagnosis of Oxidative Stress (OS) biomarkers can be used as a crucial tool in cancer prevention, treatment and survival. In this context, 8-hydroxy-2'-deoxyguanosine (8-OHdG) is a repair product of oxidized guanine lesions and has been acknowledged as a suitable biomarker of OS[1]. Under this scope, a simple and sensitive molecularly imprinted (MIP)-based sensor for detection of urinary 8-OHdG has been designed via electrochemical polymerization.

The biomimetic film was assembled *in-situ* on the gold-modified electrode through electropolymerization of phenol monomer combined with the target molecule 8-OHdG. The electropolymerization of phenol was performed by Cyclic Voltammetry (CV) over the potential range 0.1 to 0.9 V in PBS buffer at pH 7.4, enabling the formation of a non-conductive layer. Several experimental parameters, such as, the initial concentration of the monomer and the ratio template-monomer, have been carefully optimized and the electrochemical performance of the designed MIP sensor was investigated by CV and Electrochemical Impedance Spectroscopy (EIS). In parallel, RAMAN and FTIR spectroscopies comproved the formation of polyphenol films on the electrode surface by electrochemical oxidation of phenol.

Our results demonstrated that 8-OHdG molecule was successfully entrapped into the polymeric matrix, enabling a three-dimensional structure with numerous imprinted cavities sites. The developed electrochemical biosensor showed high sensitivity and selectivity towards 8-OHdG over the concentration range [0.1 - 100] pg/ml. Moreover, it was employed to detect 8-OHdG in urine samples as a non-invasive approach to assess the extent of DNA oxidative damage. Overall, this label-free biosensor constitutes a promising low-cost tool to be implemented as an easy-to-use protocol for sensitive detection of 8-OHdG in biological samples.