Design of a competitive electrochemical biosensor based on affinity reaction between deoxynivalenol and its polyclonal antibody

L. Bonel[2], S. Hernández[2], JC. Vidal[1] and JR. Castillo[1]

[1]Institute of Environmental Sciences (IUCA)
Analytical Spectroscopy and Sensors Group (GEAS)
University of Zaragoza. Ciudad Universitaria, 50009, ZARAGOZA. Spain
[2] CAPHER IDI S.L, C/Ermesinda de Aragón, 4, nº116, 50012, ZARAGOZA, Spain

e-mail: lbonel@capher.es

Deoxynivalenol (DON) is a mycotoxin produced by *Fusarium* fungi, which are abundant in certain cereals such as wheat, corn, barley, oats, and rye and their processed grains such as malt, beer or bread. DON inhibits the synthesis of DNA and RNA and protein ribosomes. DON causes vomiting, and if the concentration taken in the diet is lower growth and reduced food consumption (anorexia).

Due to the great importance of mycotoxins in food contamination, the Spanish and European legislation are demanding in recent years a extrict control. Maximum permissible concentrations of DON for different foods, are between 200 and 1750 µg/Kg, and the tolerable daily intake is 1 µg/Kg body weight (Commission Regulation No. 1126/2007).

This work proposes a direct competitive electrochemical immunosensor where we immobilize the biorecognition element and then the competitive reaction takes place between DON and DON-HRP. Electrochemical transduction is done by the chronoamperometry technique (CRA). Previously to the development of this immunosensor, we have optimized the different parameters and variables with the technique ELISA.

A highly specific polyclonal antibody to DON is immobilized onto magnetic nanoparticles modified with different functional groups.

Nanoparticles magnetic beads (MBs) functionalized have been modified with a polyclonal antibody specific to DON (pAbDON). After separation and washing steps, the modified magnetic beads were localized on disposable screen-printed carbon electrodes (SPCEs), and the product of the enzymatic reaction with the substrate was detected by chronoamperometry.

This biosensor will be a direct immunosensor (immobilized biorecognition element) and competitive and electrochemical detection is performed by an electrochemistry technique.

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