

## New immunosensor kits for the determination of Ochratoxin A, Fumonisin B1 and Deoxynivalenol mycotoxins in wines and cereals

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### Abstract

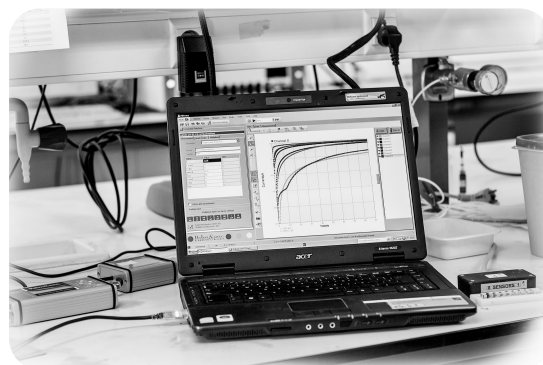
Ochratoxin A (OTA), Fumonisin B1 (FB1) and Deoxynivalenol (DON) are three of the most important mycotoxins that occur in a variety of foodstuffs such as cereals, cereal products, dried wine fruits, roasted coffee, wines, grape juices or processed cereal-based foods for infants and young children. Owing to its high toxicity in human and animals, the European legislation demands exhaustive analytical controls with the objective of protecting the consumer's health, by keeping these contaminants in levels which are toxicologically acceptable. The maximum allowed concentration levels in European Union are in the range 0.5-10  $\mu\text{g Kg}^{-1}$  (OTA), 200-4000  $\mu\text{g Kg}^{-1}$  (FB1), and 200-1750  $\mu\text{g Kg}^{-1}$  (DON).

We have developed spectrophotometric and electrochemical immunosensors for these mycotoxins, which allow determinations from extracts in about 60 min for up to 22 samples simultaneously. The cross-reactivities between different mycotoxins are very low (in a range of 1.6-6%).

For the spectrophotometric immunosensor, the reproducibility is about 6-7 %RSD. Sensitivities are: LOD=0.52  $\mu\text{g kg}^{-1}$  (in cereals), LOD=0.16  $\mu\text{g kg}^{-1}$  (in wines) and EC<sub>50</sub>=0.15 ng mL<sup>-1</sup> for OTA; LOD=6.0  $\mu\text{g kg}^{-1}$  and EC<sub>50</sub>=0.15 ng mL<sup>-1</sup> for FB1; LOD=5.3  $\mu\text{g kg}^{-1}$  and EC<sub>50</sub>=8.3 ng mL<sup>-1</sup> for DON. The LODs (limits of detection) in foods were calculated from the concentrations of the mycotoxins producing a 10% inhibition against the antibody. The time for the determination with this kit is 4-5 min (up to 22 samples simultaneously). On the other hand, the reproducibility of these electrochemical immunosensor is in the range 9-12 %DSR. The detection limits (10% inhibition) are: LOD=0.29  $\mu\text{g Kg}^{-1}$  (OTA in cereals), LOD=0.18  $\mu\text{g L}^{-1}$  (OTA in wines); LOD=6.0  $\mu\text{g Kg}^{-1}$  (FB1 in maize foods); and LOD=5.3  $\mu\text{g Kg}^{-1}$  (DON in cereals). The time for the determination with this kit is 4-6 min (up to 22 samples simultaneously).

All the immunosensors were statistically validated with certified reference materials and by using official AOAC high-performance liquid chromatography (HPLC) methods. The relative errors were in all cases lesser than about 9%.

**From this research, University of Zaragoza and CAPHER IDI SL have developed six immunosensor kits for the determination of OTA, FB1 and DON in wines and cereals. These commercial kits allow faster and more sensitive determinations compared with other kits on the market.**



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