DEVELOPMENT OF AN AMPEROMETRIC MAGNETO-IMMUNOSENSOR FOR DETECTION OF FLUOROQUINOLONE ANTIBIOTICS

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The fluoroquinolones are a family of broad-spectrum antibiotics widely used in food-producing animals, aquaculture, pets and humans to treat or prevent bacterial infections. Because of the concerns about drug residues entering the food chain and contributing to bacterial resistance, Maximun Residue Limit (MRLs) have been set for several fluoroquinolones (ECC Council Regulation, 1990, No 2377/90). Their current determination by high performance liquid chromatography (HPLC) provides sufficient detectability but the sample throughput capabilities are limited. In this communication we will present the development of a novel electrochemical immunosensing strategy for the detection of fluoroquinolone antibiotics based on magnetic beads. The immunological reaction for the detection of fluoroquinolone antibiotics performed on the magnetic bead is based on an indirect competitive assay. The magnetic bead has been modified with specific coating antigen and the assay has been performed using specific antibody for fluoroquinolones and a anti-antibody labelled with peroxidase (HRP) tracer. After the immunochemical reactions, the modified magnetic beads can be easily captured by a magnetosensor made of graphite-epoxy composite, which is also used as the transducer for the electrochemical immunosensing. The electrochemical detection has been thus achieved through a suitable substrate and mediator for the enzyme HRP. The electrochemical approach has been also compared with a novel magneto-ELISA based on optical detection. The IC_{50} and the limit of detection for ciprofloxacin in buffer, using the competitive electrochemical strategy was found to be 0.4 µg/L and 0.03 µg/L respectively, and for the magneto-ELISA was found to be 1.5 µg/L 0.14 µg/L. Preliminary experiments demonstrate its potential as screening tool of fluoroquinolone antibiotic residues in food samples.