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Real-time potentiometric sensor: An innovative tool for monitoring hydrolysis of chemo/bio-degradable drugs in pharmaceutical sciences

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In recent years, the whole field of Ion-Selective Electrodes (ISEs) in pharmaceutical sciences has expanded far beyond its original roots. The diverse range of opportunities offered by ISEs was broadly used in a number of pharmaceutical applications, with topics presented ranging from bioanalysis of drugs and metabolites, to protein binding studies, green analytical chemistry, impurity profiling, and drug dissolution in biorelevant media. Inspired from these advances and with the aim of extending the functional capabilities of ISEs, the primary focus of the present paper is the utilization of ISE as a tool in personalized medicine. Given the opportunity to explore biological events in real-time (such as drug metabolism) could be central to personalized medicine. Atracurium besylate (ATR) is a chemo-degradable and bio-degradable pharmaceutically active drug. Laudanosine (LDS) is the major degradation product and metabolite of ATR and is potentially toxic and reported to possess epileptogenic activity which increases the risk of convulsive effects. In this work, ATR have been subjected to both chemical and biological hydrolysis, and the course of the reactions is monitored by means of an ISE. In this study, we have designed an efficient real-time tracking strategy which substantially resolve the challenges of the ATR chemical and biological degradation kinetics. By utilizing a potentiometric sensor, tracking of ATR chemical and biological degradation kinetics can be performed in a very short time with excellent accuracy. The limit of detection (LOD) was calculated to be 0.23 mol L^{-1}, the potential drift was investigated over a period of 60 min and the value was 0.25 mVh^{-1}. Real serum samples for measurement of the rate of *in vitro* metabolism of ATR were performed. Furthermore, a full description of the fabricated screen-printed sensor was presented.

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