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Electro-oxidation of carbamazepine metabolites: Characterization and influence in the voltammetric determination of the parent drug

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ABSTRACT

The electro-oxidation behavior of five important metabolites of carbamazepine (CBZ) and their potential influence on the voltammetric determination of the parent drug in biological fluids was investigated for the first time. This investigation was performed using cyclic voltammetry, in combination with controlled potential electrolysis and HPLC-DAD-MS analysis of oxidation products of these compounds. Using a sensitive glassy carbon electrode modified with multi-walled carbon nanotubes it was found that each metabolite produces a voltammetric response, that differs from the parent molecule and which can be used in its identification and to gain some insight about the electro-oxidation mechanisms of this class of molecules. Taking into account the HPLC-DAD-MS data, these electro-oxidation mechanisms were advanced and discussed. A voltammetric procedure for the determination of CBZ in human fluids was also been tested. Selecting the most appropriate experimental conditions was verified that the interference of each metabolite and their oxidation products on the voltammetric signal of CBZ may be neglected. The analytical performance of the proposed voltammetric procedure, as well as the correlation of its results with the results obtained from LC–MS, were very good.