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Mass spectrometry monitoring of varenicline and 2-hydroxy varenicline in human urine with on-line sample pretreatment by two-dimensional capillary electrophoresis

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The analytical approach based on the two-dimensional isotachopheresis – capillary zone electrophoresis (ITP-CZE) technique on-line hyphenated with the electrospray ionization – tandem mass spectrometry (ESI-MS/MS), developed in our work, is a powerful tool for the analysis of unpretreated or diluted biological samples containing ultra-trace concentration levels of ionic drugs and their ionic metabolic products. This was demonstrated on the highly reliable determination of pg-ng/mL levels of varenicline and identification of its metabolite, 2-hydroxy varenicline, in directly injected (unpretreated) human urine samples taken after the administration of a usual dose of the varenicline-containing commercial drug (Champix). The success of the proposed method is linked with (i) the enhanced sample loadability of the used CE system, (ii) on-line electrophoresis sample pretreatment (preconcentration and sample clean-up) and separation, (iii) high compatibility of CZE and ESI electrolyte systems, (iv) mass spectrometry detection sensitivity and selectivity. The proposed ITP-CZE-ESI-MS/MS method was approved by its favorable performance parameters such as the limit of detection and quantitation, linearity, linear range, precision, recovery/accuracy, selectivity and robustness. Practical outcome of this study could drive advanced monitoring of target drugs, their metabolites and related biomarkers in biological samples, carried out in clinical laboratories for diagnostic purpose as well as therapy optimization.

Biography

Peter Mikuš has completed his PhD at the age of 30 years from Comenius University (Slovakia). He is Researcher, University Teacher, Associated Professor, and Director of the Toxicological and Antidoping Center at the Faculty of Pharmacy Comenius University in Bratislava (FPCU) as well as Head of the Department of Pharmaceutical Analysis and Nuclear Pharmacy FPCU. His research team is focused on the development, validation and application of advanced hyphenated analytical methods, based on a combination of 2D-separation and spectral (UV-VIS, MS/MS) techniques, for pharmaceutical and biomedical research. He has published more than 60 papers in reputed CC journals.

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