Simple and highly effective 2D capillary electrophoresis separation with on-capillary UV detection in bioanalysis of Varenicline

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Abstract

A new capillary electrophoresis (CE) method for monitoring renally excreted varenicline (VAR), highly effective drug prescribed in the case of smoking cessation, in human urine was developed. The method, based on the two-dimensional (column-coupled) CE separation with UV detection, provided advantage of the on-line sample preparation and, by that, sensitivity and selectivity enhancement. The capillary isotachophoresis (cITP) on-line sample treatment included stacking of the sample in a large volume and simple elimination of the major matrix constituents. The second dimension, capillary zone electrophoresis (CZE) with cyclodextrin selector, provided fine baseline separation of the analyte from the rest of sample matrix constituents. The developed method was validated according to the FDA guideline for bioanalytical method validation (limit of detection, lower limit of quantification, linearity, precision, and accuracy). Favorable performance parameters of the proposed method as well as its simplicity, high effectivity, and low cost indicated its potential for the routine biomedical use. It was successfully applied to monitor the changes of VAR concentration levels in human urine samples (Figure 1). The data obtained of the method were consistent and comparable also with data published in literature. This work was supported by the projects VEGA 1/0873/15, KEGA 022UK-4/2015, APVV-15-0585 and carried out in the Toxicological and Antidoping Center at the Faculty of Pharmacy Comenius University in Bratislava.

Image

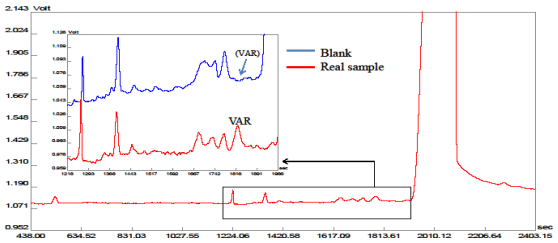

Figure 1: Illustrative electrophoretic profiles from the analysis of human urine sample taken 18 h after the administration of one dose of Champix to a healthy volunteer. cITP-CZE-UV analysis and detail of migration position of unchanged VAR compared with blank. Human urine sample was 10-fold diluted. VAR – varenicline.

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. A research team of P.M. 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 70 papers in reputed CC journals.

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