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Hyphenated two-dimensional chiral capillary electrophoresis - tandem mass spectrometry method for ultra-trace determination of antihistamine enantiomers in biological samples

Peter Mikuš, Juraj Piešťanský and Katarína Maráková
Comenius University in Bratislava, Slovakia

A new highly advanced multidimensional analytical approach for the ultra-trace determination of target chiral compounds in untreated complex real samples was developed in this work. The proposed analytical system provided high orthogonality due to on-line combination of three different methods (separation mechanisms), i.e. (i) isotachopheresis (ITP), (ii) chiral capillary zone electrophoresis (chiral CZE) and (iii) triple quadrupole mass spectrometry (QQ MS). The ITP step, performed in a large bore capillary (800 μm), was utilized for the effective sample pretreatment (preconcentration and matrix clean-up) in a large injection volume (1-10 μL) enabling to obtain as low as ca. 80 pg.mL^{-1} limits of detection for the target enantiomers in urine matrices. In the chiral CZE step, the different chiral selectors (neutral, ionizable, and permanently charged cyclodextrins) and buffer systems were tested in terms of enantioselectivity and influence on the MS detection response. The performance parameters of the optimized ITP – chiral CZE-QQ MS method were evaluated according to the FDA guidance for bioanalytical method validation. Successful validation and application (enantioselective monitoring of renally eliminated pheniramine and its metabolite in human urine) highlighted great potential of this chiral approach in advanced enantioselective biomedical applications.

Biography

Peter Mikuš has completed his PhD 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 60 papers in reputed CC journals.

mikus@fpharm.uniba.sk

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