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Two-dimensional capillary electrophoresis separation and on-line tandem mass spectrometry detection of antigripal drugs and their metabolites in urine matrices

Peter Mikus and **Juraj Piesťanský**
Comenius University in Bratislava, Slovakia

The advanced two dimensional isotachophoresis (ITP) – capillary zone electrophoresis (CZE) hyphenated with tandem mass spectrometry (MS/MS, here triple quadrupole, QqQ) was developed in the present work to demonstrate analytical potentialities of this approach in the analysis of antigripal drugs in multicomponent ionic matrices. This was demonstrated on the determination of pg.mL-1 levels of pheniramine, its desmethyl metabolite and phenylephrine in directly injected (unpretreated) urine samples, suitable for the monitoring of concentration vs. time dependences of these species. The main benefits of ITP-CZE-ESI-QqQ in comparison with CZE-ESI-QqQ are considerably higher sensitivity / lower LODs obtainable and more favorable parameters of precision and recovery/accuracy when performing analyzes at lower concentration levels. The separation selectivity of ITP-CZE-ESI-QqQ towards the targeted analytes is enhanced via the heart cut effect while CZE-ESI-QqQ has the advantage of utilization of the EOF effect for the monitoring additional (e.g. neutral) species related to the targeted analytes. Anyway, the on-line ITP sample preparation provides, besides pre-concentration and separation selectivity, also the maximum reduction of ionic sample matrix constituents entering MS. In this way, MS can be effectively protected (long-term working life is ensured), potential detection interferences are minimized and signal to noise ratio of the detection response is maximized. Obviously, ITP-CZE-ESI-QqQ is superior than ITP-CZE-UV regarding sensitivity/lower LOD, selectivity and identification reliability but disadvantageous regarding cost of instrumentation/analysis and the scale (number) of CE electrolytes usable for MS. The ITP-CZE-ESI-QqQ method has a great potential to be routinely applied for monitoring various targeted ultra-trace ionic drugs in biomedical/clinical laboratories.

Biography

Peter Mikus 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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