Miroslav Ryska, J Anal Bioanal Tech 2016, 7:5(Suppl)
http://dx.doi.org/10.4172/2155-9872.C1.023

7th International Conference and Exhibition on

Analytical & Bioanalytical Techniques

September 28-30, 2016 Orlando, USA

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Can matrix effect in LC/MS or LC/MS/MS assay be avoided or fully compensated?

The source of the matrix effect as a consequence of analyte ions suppression or ions enhancement must be sought in the presence of unknown impurities from matrix. These impurities can be regarded as Brønsted bases or acids. They are participating in the complex ionization process in parallel or competing ion-molecular reactions. Not only impurities from extracts but impurities adsorbed in the ion source and/or in the analytical system may play an important role in the extensively understood term "matrix effects". These adsorbed substances cannot be fully removed from the system by any cleaning procedure. On the other hand, this effect may be effectively used in the sensitive method of the determination of some drugs (e.g. lacidipine). To fully compensate for the negative impact of the "matrix effect", use of isotopically labeled internal standards (isotope dilution technique) proved to be the only effective technique. This applies especially to LC/MS/MS determination of drugs and their metabolites in complex extracts of biological matrices. The isotope dilution technique is successful regardless of the method of purification, the ionization technique (APCI or ESI in both positive and negative ion modes), and the type of the equipment used. In addition, the quality of isotopically labeled internal standards (with respect to the kinetic isotope effects dependent on the number of deuterium atoms present) is not crucial either. The isotope dilution technique proved to be 100% effective for the compensation of matrix effect influences in 132 analytical methods developed and validated. The strict requirements of EMEA guidelines to investigate different plasma sources for the assessment of the matrix effect in the analytical method validation are discussed further within this context.

Biography

Miroslav Ryska has completed his under-graduate degree from Charles University, MS in Physical Chemistry from Moscow State University and PhD from the Institute of Macromolecular Chemistry of Czechoslovak Academy of Sciences. From 1961 to 1978, he has worked at the Institute of Macromolecular Chemistry of the Czechoslovak Academy of Sciences. From 1978 to 1997, he has worked as a Researcher in the field of MS and its application in research of metabolism and pharmacokinetics of drugs at the Research Institute for Pharmacy and Biochemistry in Prague. He has written more than 100 publications mainly on the topic of mass spectrometry, trace analyses, analyses of drugs, metabolites and quantitative analysis. In the 1990's, he was an Editor of two international journals, *The Journal of Mass Spectrometry and Rapid Communication in Mass Spectrometry*. He has founded Quinta-Analytica s.r.o. in 1997 and currently, he is the Vice President of Quinta-Analytica.

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