

Abstract

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Title of Doctoral Thesis: Matrix effects in LC-MS analysis: occurrence, evaluation, and their elimination

The dissertation thesis deals with the issue of matrix effects in analysis using liquid chromatography coupled to mass spectrometry (LC-MS). LC-MS represents a well-established, widely used, and powerful tool in the field of qualitative and quantitative analysis of a wide range of different compounds. Despite all the advantages offered by LC-MS such as sensitivity, selectivity, and robustness, it suffers from a major drawback represented by matrix effects. This undesirable phenomenon affects important parameters of LC-MS method such as accuracy, precision, linearity, limit of detection, and limit of quantification. Therefore, an evaluation of these effects should be involved in validation of every single LC-MS method and their source should be eliminated. The assessment is generally performed by qualitative and quantitative approaches such as post-extraction addition, post-column infusion, and comparison of slopes of calibration curves.

The matrix effects can be reduced or fully eliminated by an intervention in each step of the whole LC-MS analysis. Sample preparation procedures may remove the origin of the matrix effects even prior the LC-MS analysis. Efficient chromatographic method allows to separate the interferences from the analyte of the interest before reaching ion source of the mass spectrometer which represents the primary place of their formation. The matrix effects can be also prevented by changing ion source parameters. Different calibration approaches may fully compensate the already exhibited matrix effects.

Experimental part of the dissertation thesis focuses on development of LC-MS and SFC-MS methods for determination of clinically relevant compounds contained in complex matrices and the evaluation and removing of the matrix effects. The target analytes were represented by antioxidant catechins, neurotoxic amino acid β -*N*-methylamino-L-alanine, cholesterol-lowering statins, and vitamins.