Potential and limitations of LC-MS/MS based multi-mycotoxin analysis

Michael Sulyok. Rainer Schuhmacher, Rudolf Krska
Department IFA-Tulln, University of Natural Resources and Applied Life Sciences Vienna

Mycotoxins are secondary metabolites that are produced by moulds upon the infection of grains, fruits, vegetables as well as processed food. Although approximately 400 compounds are currently recognized as mycotoxins, only few of them are addressed by food legislation. Most of the existing analytical methods likewise focus on these regulated toxins. However, even these few compounds exhibit considerable variations concerning their chemical properties (polarity, UV-activity, fluorescence), which certainly complicates matters considering a simultaneous detection and has led to a large number of analytical methods dealing only with one compound class. This approach results in an enormous expenditure of time and costs if a sample has to be tested for several classes of mycotoxins.

Modern methods such as HPLC-MS/MS enable multi-analyte determination in principle. Nevertheless, multi-mycotoxin analysis in food is a real analytical challenge even for those methods, as it would be advantageous to work without any clean-up and analyze raw extracts instead in order not to adulterate the mycotoxin pattern by sample preparation. However, it has been thought for a long time that the application of such a "dilute and shoot"-approach is not feasible for quantitative analysis due to co-eluting matrix constituents that decrease or even completely suppress the analytical signal (matrix effects). With the development of a multi-mycotoxin method that currently comprises 186 metabolites we have shown that the robustness of the latest generation of mass spectrometers allows to quantitatively analyse a broader range of mycotoxins in diluted raw extracts provided that these matrix effects are investigated in detail.

The aim of this presentation is to highlight the difficulties that are involved in the routine application of such multi-analyte methods and to discuss suitable counteractive measures. Based on selected examples, the contribution of these methods to food analysis and food safety will be demonstrated.