MYCOTOXINS AND THEIR METABOLITES: FROM TARGETED TO UNTARGETED ANALYSIS

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Several highly publicized worldwide incidents related to chemical contaminants such as mycotoxins in food and feed have attracted much media attention. Mycotoxins are natural secondary metabolites produced by fungi on agricultural commodities in the field and during storage under a wide range of climatic conditions. Until recently, most of the available analytical methods (e.g. HPLC-UV/FLD) for the determination of these toxic metabolites only covered single mycotoxin classes (e.g. aflatoxins, type-B trichothecenes or fumonisins). In the meanwhile, mass spectrometry based analytical methods (GC-MS, Q-TOF, LC-MS/MS) have been key for the determination of a variety of mycotoxins and their metabolites in plants and foods and for the investigation of the metabolism of these toxic compounds in body fluids such as serum and urine. One example is a multi-analyte LC-MS/MS method which has recently been developed by us and which is capable of determining 360 fungal, bacterial and plant metabolites, respectively, in cultures, cereals and food products. LC-MS- based screening has also been playing a vital role in the discovery of novel mycotoxin conjugates so called “masked” - forms of mycotoxins in the past and it is believed that this will also continue in the future Metabolomics has emerged as the latest of the so-called –omics disciplines and shows great potential to determine hundreds to thousands of metabolites at once over a wide range of concentrations. In this context, in-vivo stable isotopic labelling in combination with LC-HRMS turned out to be a powerful tool for the untargeted screening of biotransformation products of natural toxins. After measurement of biological/food samples treated with a 1+1 mixture of labelled and non-labelled precursors, labelling-specific isotopic patterns can be reliably and automatically detected by means of the novel software tool (“MetExtract”), which was developed by us. In a preliminary study, the great potential of the presented approach is further underlined by the successful and automated detection of eight novel plant-derived biotransformation products of the most prevalent Fusarium mycotoxin deoxynivalenol (DON). The detection of the DON-GSH conjugate and derived processing products i n wheat has been reported for the first time, providing evidence for glutathione-mediated metabolism of DON in planta. The relevance of these novel metabolites for food safety is still to be investigated.

Keywords: *LC-MS/MS, LR-HR-MS, DON-GSH, masked mycotoxins*

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