Development and Validation of Exposure Biomarkers to Dietary Contaminants: Mycotoxins

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Abstract

Fungi are a source of dietary nutrition, important medicines and also unfortunately a number of potent dietary toxins known as mycotoxins. Mycotoxins contaminate an estimated 25% of cereal crops and thus exposure is frequent in many populations. From a human health standpoint aflatoxins (AF) and ochratoxin A (OTA) from Aspergillus and fumonisins (FB) and deoxynivalenol (DON) from Fusarium are the mycotoxins of greatest concern. The heterogeneous distribution of mycotoxins in food restricts the usefulness of food sampling and intake estimates; instead biomarkers provide better tools for informing epidemiological investigations of potential adverse health affects. Validated AF biomarkers (urinary AFM1, AF-N7-guaunine, serum AF-albumin) were established almost 20 years ago and were critical in confirming AF as potent liver carcinogens. Validation has included demonstration of, assay robustness, intake versus biomarker level, stability of stored samples. Data generated across labs and across analytical techniques further improves confidence of improved exposure assessment using biomarkers. More recently aflatoxin biomarkers are revealing issues of growth faltering and immune suppression, and importantly are being used to assess the effectiveness of intervention strategies. For the other important mycotoxins, these steps of development and validation are works in progress; though urinary ochratoxin, urinary (DON+DON-glucuronide) and urinary FB are the best candidates to date. This presentation will discuss the extent of the validation steps for these biomarkers and potential future activities associated with their use. Once established, such biomarkers should better inform epidemiological studies and thus improve potential risk assessment activities.

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