Exposure Science and Policy – Past and Future perspectives on food

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Abstract

EFSA is an integral part of the EU's food safety system. Its mission is to contribute to the safety of the EU food and feed chain and to a high level of protection of human life and health (Regulation 178/2002; under revision now). Risk analysis covers three different aspects, the separation of which is explicitly laid down in that Regulation: risk assessment, risk management, and risk communication. EFSA's core responsibilities are the delivery and communication of advice on general scientific assessment priorities, and the evaluation of food and feed products that require a safety assessment before they can be used on the EU market.

As such, EFSA carries out risk assessments using the four-steps paradigm: hazard assessment (identification and characterisation) together with exposure assessment informs risk characterisation. When considering exposure assessment, external exposure is most frequently used as an easily quantifiable estimate, based on levels of a given substances, such as a contaminant, pesticide, or micronutrient in food in combination with consumption of that food.

When controlling risk in the population, the realm of risk managers, only the exposure part can be influenced (as toxicity is an intrinsic aspects of a food hazard). As such risk assessors can identify safe levels of exposure, which can or cannot be considered acceptable by risk managers. Upon conversion of these safe levels into actual levels in a food accounting for consumption levels and patterns, they can legally deposit maximum safe levels in Regulations. These risk management choices are typically informed by risk assessments done by EFSA's experts in the Panels and by staff. Food producers must produce in conformity with these legally identified levels. Thereafter, established safe levels of a hazard in foods can be controlled and enforced by food safety authorities in the member states.

Human biomonitoring data are one step closer in between external exposure and the ultimate health effect. Yet, in contrast to levels in foods, human biomonitoring data cannot be used for enforcement purposes. Rather these data inform on public health issues associated with unavoidable substances (such as contaminants) and can be used for monitoring purposes, including monitoring of measures taken to reduce external exposure. In the past, EFSA has used human biomonitoring to inform its risk assessments, such as for bisphenol A, cadmium, lead, the mycotoxin deoxynivalenol (DON), and some pesticides. Human biomonitoring cannot only focus on exposure but also on effects. EFSA has used biomarkers of effect in several risk assessment Opinions such as for exposure to lead and cadmium. Moreover, biomarkers of effect are identified as a necessity in the scientific substantiation of some health claims under Regulation 1924/2006.

In EFSA, dietary exposure is typically assessed by combining data on concentration in all food products with data on their consumption from different countries and age groups with some degree of modelling depending on accuracy required and data availability. EFSA has a legal requirement to collect data on food consumption and on chemical occurrence in food and feed. Furthermore, EFSA works in close cooperation with national organisations towards harmonising dietary survey methodology and building of a common and high-quality EU food consumption database within the EU menu' project. Both for dietary exposure and human biomonitoring data (analytical as well as scientific/physiological) validation, standardisation and harmonisation is required before it can be used. Public expectations of greater transparency represent an integral part of EFSA's work.

Keywords
EFSA, Biomonitoring, biomarkers, food safety, risk assessment