



## **Committee on toxicity of chemicals in food, Consumer products and the environment**

### **Statement on the potential risk(s) of combined exposure to mycotoxins: Lay summary**

1. The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has identified the potential risk(s) from combined exposure to mycotoxins as a possible concern during their review of mycotoxins in the diet of infants and young children.
2. Mycotoxins are secondary metabolites produced by plant fungi under particular climate and biological conditions and can cause adverse health effects in both humans and animals. Those of greatest concern to human health are produced by several groups of filamentous fungi, namely *Aspergillus*, *Fusarium* and *Penicillium* species.
3. Mycotoxins are stable, low-molecular weight chemicals and are often not affected by food processing (e.g. cooking).
4. Cereals (e.g. wheat, oats, rice, corn (maize), barley, sorghum, rye, and millet) are often the crops most severely affected; however, some nuts, fruits and spices can also be affected.
5. Advances in analytical techniques have allowed the simultaneous detection and quantification of multiple mycotoxins in both food and animal feed (Krska *et al.*, 2007; De Santis *et al.*, 2017; Flores-Flores & González-Peñas, 2017; Bessaire *et al.*, 2019; Singh & Mehta, 2020; Agriopoulou *et al.*, 2020), indicating that exposure to multiple mycotoxins *via* the diet is possible.
6. Climate change could have a significant impact on mycotoxin production. Changes in the climate are expected to affect levels of rainfall, humidity, temperature *etc.*, which in turn, influence mycotoxin production, which varies for each individual pathogen species and/or strain.
7. Current government and industry regulations are usually based on assessing the risks from individual mycotoxins and, at most, group

metabolites with the parent compound, but take no account of the varied dynamics and potential interactions between co-occurring groups of mycotoxins.

8. In light of this, new combinations of factors (mycotoxins/host plants and geographical location) will need to be considered when assessing the potential risk(s) from dietary exposure to mycotoxins.

9. Based on the available information, the COT was unable to complete a risk assessment on the potential risk(s) from combined exposure to mycotoxins for several reasons. These include:

- A lack of harmonisation of approaches/methodologies and data analysis/modelling for toxicological investigations.
- The underlying mechanisms of interactions between individual mycotoxins in different combination(s) have yet to be fully understood.
- There is little information on the potential toxic effect(s) of mycotoxin mixtures on the gut microbiota.

10. Considerations for possible co-exposures from breastmilk and weaning foods also need to be considered for infants and young children.

11. Co-occurrence data in food is scarce, and the available methods for multi-mycotoxin detection in food samples are still not harmonised for use in a regulatory setting. In addition to this the following need further consideration for a robust exposure assessment:

- The management data for which the true values are below the limit of detection and could not be accurately determined.
- The consistent and well-defined use of probabilistic models and methodologies for multi-biomarker studies that estimate levels of exposure to multiple mycotoxins in biological samples (e.g. urine).

12. The COT noted that there was a lack of UK specific data, particularly in biomonitoring; however, there were a number of studies ongoing and additional information will be available in the future. The Public Health England Secretariat informed COT Members that the UK will not be collecting new data for mycotoxins under the Human Biomonitoring for the European Union Initiative; however, in the future, more data could be obtained through Health Protection Research Units. The results of such research would be of potential value in the risk assessment of co-exposures to mycotoxins.

13. COT Members recommended as a pragmatic first step that a review should be carried out of the mycotoxins that appeared to show a common effect on protein synthesis (*i.e.*, DNA or RNA synthesis), assuming dose

additivity<sup>1</sup>, and that frequently co-occur in food commodities – an exposure estimate could be performed and the estimates compared with the recommended health-based guidance values to calculate the Margin of Exposure<sup>2</sup> or the Hazard Index<sup>3</sup> utilised, to determine whether there is any potential concern from co-exposure to these mycotoxins in UK consumers.

14. Depending on the outcome of this screening risk assessment, research may be needed on those mycotoxins affecting ribosomal protein synthesis, to determine whether they do in fact exhibit dose additivity in their effects, to help develop a reliable basis for their cumulative risk assessment.

15. The full COT statement can be found on the COT website:  
[Statement on the potential risk\(s\) of combined exposure to mycotoxins 2021](#)

## **Lay Summary to COT Statement 2021/04 October 2021**

---

<sup>1</sup> Dose addition is a process to establish the response of organisms to a mixture of chemicals with similar toxicity. This involves adding up their individual effects, adjusted by their potency, to predict the likely impact of the overall mixture.

<sup>2</sup> The margin of exposure (MOE) is the ratio of the point of departure (typically the benchmark dose – lower confidence limit for a toxicological response in experimental animals), to the estimated human exposure for a compound. MOE values that are  $\geq 100$  are considered to be of low concern.

<sup>3</sup> A hazard exposure index is a risk-assessment tool, which can indicate whether further investigations are required for mixtures. It is based on dose addition assumptions; it is the sum of the hazard quotients of the chemicals in the mixture.