**Plant-bound masked mycotoxins are released in the gut**

**Introduction**

Mycotoxins are unavoidable food contaminants produced by mould and present in many agricultural crops. Fusarium moulds are the most prevalent fungi in moderate climates and produce an array of mycotoxins. The two major groups of Fusarium mycotoxins are trichothecenes and zearalenone compounds. Trichothecenes such as deoxynivalenol, nivalenol, T-2 toxin and HT-2 toxin affect nutrient uptake and barrier function in the small intestine and are immunotoxic. Zearalenone compounds are potent oestrogen analogues and cause reproductive toxicity. Due to their high toxicity, maximum levels in food have been set to for some mycotoxins by the European Commission.

In addition to the known mycotoxins, cereals are frequently co-contaminated with plant-derived mycotoxin metabolites. These so called masked mycotoxins are likely to contribute to the overall toxic burden, but evidence is lacking on the fate of masked mycotoxins after ingestion.

**Key points**

- Plant-bound masked mycotoxins are present as co-contaminants in many cereals.
- Risk assessments have previously only focussed on parent mycotoxins and masked mycotoxin metabolites are only beginning to be included.
- We demonstrate that masked mycotoxins are stable in the small intestine, but rapid release of mycotoxins occurs in the large intestine due to microbial degradation by colonic microbiota.
- The parent mycotoxins are absorbed by the intestinal epithelium, but the masked forms are not.

**Research conducted**

Our research assesses the metabolism and absorption of common masked mycotoxins in the human gut *in vitro*. We have studied the stability of masked trichothecenes and zearalenone compounds under conditions mimicking the human small intestine and large intestine as well as their potential transport from the gut by intestinal cells. We have found that all masked mycotoxins are stable in the small intestine and are not transported by the intestinal cells intact. Once they reach the large intestine, all masked mycotoxins are broken down by human gut bacteria and their free parent mycotoxins are rapidly released. Zearalenone compounds are also further transformed by bacteria to unknown metabolites. This bacterial mycotoxin release in the colon is so rapid that masked
Mycotoxins are likely to contribute to mycotoxin exposure in humans. The efficiency of mycotoxin absorption from the human colon will need to be assessed in future studies.

Policy relevance
Findings from this study have enabled the Food Standards Agency to have a better understanding of the significance of masked mycotoxins in the diet and their fate in the human gut. The results may be used in future consideration of risks from their presence in food. This study was funded by the Food Standards Agency and the Scottish Government.

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References

