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Effects of low concentrations of individuial mycotoxins and their combinations on immune cells

Gunnar Sundstøl Eriksen[1], **Line M Karlsøen**[1], **Anita Solhaug**[1] and **Jørn Holme**[2]
[1]Norwegian Veterinary Institute, Norway
[2]Norwegian Institute of Public Health, Norway

Toxin-producing fungi are widespread contaminants in food and feed. Since many fungal species produce many toxins, fungal species frequently occur together and a diet is composed of multiple food items, humans and anmals are exposed to a mixture of mycotoxins. Mycotoxins have diverse chemical and toxicological properties, and they may have similar or dissimilar toxicological mode of action and identical or different target organs. The immune system is particularly sensitive towards several mycotoxins. Humans and animals are normally exposed to low levels of mycotoxins, while many studies of the effects of mycotoxins have focussed on rather high exposures. We therefore investigated the effects of exposure to low levels of selected mycotoxins alone and in combination on the immune cells in vitro. We studied the effects of the mycotoxins 2-amino-14,16-dimethyloctadecan-3-ol (AOD), alternariol (AOH), enniatin B (ENNB), deoxynivalenol (DON), sterigmatocystin (ST) and zearalenone (ZEN) on the differentiation of THP-1 cells from monocytes to macrophages alone and in combinations. At non-cytotoxic concentrations, AOH, ZEN and DON inhibited the differentiation process, while the differentiation was unaltered by AOD and ST. The effects of the binary combinations of AOH, ZEN and DON were predicted according to models for independent action (IA) and concentration addition (CA) and compared with the experimental findings. Deviations from the predicted models would indicate that there were some interactions. In order to simulate a realistic exposure scenario, we focussed on the interactions at low effect concentrations (EC20) in the interaction studies. The combinations of AOH with DON and DON with ZEA had additive effects, while the combination of AOH and ZEA apparently had synergistic effects at these low concentrations.

Biography

Gunnar Sundstøl Eriksen has completed his PhD at Swedish University of Agricultural Sciences. He is currently a Senior Scientist at Norwegian Veterinary Institute. He is also a member of Norwegian Scientific Committee for Food (VKM).

gunnar.eriksen@vetinst.no

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