

# Old Enemies, Novel Challenges: Food Safety in the 21<sup>st</sup> Century

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## **ABSTRACT:**

In times of still steadily increasing world population, reoccurring disruptions of supply routes e.g. due to conflicts or catastrophes and, at the same time, misbalance and limitations of global resources, strategies to maintain/enable food security are of utmost importance. However, the utilization of alternative nutrient sources, novel production technologies, strategies towards sustainability and circular economy will inevitably be associated with new challenges for food safety. Persistent contaminants in the food chain might be accumulated or novel process-related contaminants be formed. With changes in the consumption pattern, the exposure of the consumer to bioactive food constituents, material- and/or process-related contaminants might substantially change with potential relevance for human health. Thus, it is crucial to closely link food technological developments to respective food safety assessment. But not only novel food technology might change the exposure of the consumer to undesired food constituents. The climate change is already affecting the growth conditions of microorganismus such as microalgae, bacteria and fungi. Mycotoxins, fungal metabolites with toxic potential, represent a class of contaminants which are found in food worldwide. However, due to climate change, the growth conditions of the organism will change, thus affecting the occurrence of respective toxins. The structural spectrum of mycotoxins is as broad as the array of toxic effects associated with respective exposure. A famous example is aflatoxin B1 (AFB1) formed by certain *Aspergillus* and *Penicillium* species. AFB1 is a known liver carcinogen in humans. Originally found predominantly in regions with higher temperature and humidity, the occurrence of AFB1 forming strains has recently be recorded in regions of Europe which were formerly considered as “moderate climate”. A limited spectrum of well-studied mycotoxins are regulated and monitored in many countries. But recent studies indicate that further, so called “emerging” mycotoxins might also be of toxicological relevance. Among these, *Alternaria* toxins and enniatins are currently in the focus of research. Genotoxic, immunosuppressive and endocrine disruptive activities of some of these toxins are discussed. Fungi of the genus *Alternaria* occur ubiquitously and grow under a wide range of conditions. They can infest crops designated for human food production and thereby their toxic secondary metabolites can be found in feed and food. The high chemical diversity among the produced toxins results in a complex toxicological profile which is still not entirely elucidated. The composition of the produced toxin mixtures largely depends on both, the fungal strain and the growth conditions. Further research on occurrence and toxicity of these potential contaminants is urgently needed. Taken together, novel strategies towards food security are of utmost importance but it is crucial to harmonize respective approaches with adequate food safety assessment.

## **KEYWORDS:**

Emerging mycotoxins, exposure assessment, toxicity, climate change, alternative protein sources