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Assessment of food toxicology

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The interest in food toxicology is evident by the dependency of humankind on nutrition by virtue of their heterotrophic metabolism. By means of modern biochemistry, molecular and cell biology, computer science, bioinformatics as well as high-throughput and high-content screening technologies it has been possible to identify adverse effects and characterize potential toxicants in food. The mechanisms of toxicant actions are *multifactorial* but many toxic effects converge on the generation of oxidative stress and chronic inflammation resulting in cell death, aging and degenerative diseases. Integration of food toxicology data obtained throughout biochemical and cell-based *in vitro*, animal *in vivo* and human clinical settings has enabled the establishment of alternative, highly predictable in silico models. These systems utilize a combination of complex *in vitro* cell-based models with computer-based algorithms. A decrease of rodent animal testing with its limitations of high costs, low throughput readouts, inconsistent responses, ethical issues and concerns of extrapolability to humans have led to an increased use of these but also alternative lower hierarchy surrogate animal models (*e.g. D. melagonaster; C. elegans or D. rerio*) and efforts to integrate organotypic systems and stem cell-based assays. Despite those achievements, there are numerous challenges in various disciplines of food toxicology.

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