Food contamination with ochratoxin A and consumer’s risk: A comprehensive study

Bundesanstalt für Getreide-, Kartoffel- und Fettforschung (BAGFK), Institut für Biochemie von Getreide und Kartoffeln, Detmold, Germany

Ochratoxin A (OTA) is a mycotoxin produced by several Aspergillus and Penicillium species. The substance proved to be carcinogenic in animal tests and is discussed also as being carcinogenic to humans. Efforts to regulate the concentration of OTA in contaminated food are being taken. For this, the OTA status of the German population is evaluated by collaboration of several institutes. More than 150 items of food are analysed for their OTA content. The eating habits of the German population as well as OTA blood levels are also determined. The project is sponsored by the German Ministry of Health.

Genotoxicity of 2-dodecylcyclobutanone, a compound formed in fat-containing food treated by ionizing radiation

Henry Delincee, Beatrice-Louise Pool-Zobel and Gerhard Rechkemmer
Institute of Nutritional Physiology, Federal Research Centre for Nutrition, Haid-und-Neu-Str, 9, D-76131 Karlsruhe

2-Alkycyclobutanones seem to be radiation-specific components originating from fatty acids, and therefore an assessment of their potential health hazard - albeit a minimal risk - is advisable. In an in vivo experiment two concentrations of 2-dodecylcyclobutanone (2-DCB), a compound having palmitic acid as its precursor, were given per gavage. In experiment two concentrations of 2-dodecylcyclobutanone (2-DCB), a compound having palmitic acid as its precursor, were given per gavage. Efforts to regulate the concentration of OTA in contaminated food are being taken. For this, the OTA status of the German population is evaluated by collaboration of several institutes. More than 150 items of food are analysed for their OTA content. The eating habits of the German population as well as OTA blood levels are also determined. The project is sponsored by the German Ministry of Health.

Aneuploidogenic and clastogenic potential of the mycotoxins patulin and citrinin

E. Pfoeller, M. Metzler
Institute of Food Chemistry, University of Karlsruhe, P.O. Box 6980, 76128 Karlsruhe, Germany

The mycotoxins patulin (PAT) and citrinin (CIT) are found in rotten fruits and vegetables. PAT and CIT proved negative in standard short-term assays for mutagenicity, but gave ambiguous results in rodent long-term studies for carcinogenicity. To clarify their genotoxic potential, we have studied PAT and CIT with respect to the inhibition of microtubule (MT) assembly under cellfree conditions and the induction of mitotic arrest and micronuclei (MN) containing whole chromosomes (CREST-positive MN, indicating aneuploidogenic potential) or acentric chromosome fragments (CREST-negative MN, indicating clastogenic potential) in cultured V79 male Chinese hamster cells.

Both PAT and CIT inhibited MT polymerization. Whereas PAT bound covalently to thiol groups of the MT proteins, a noncovalent and coelchicine-like mechanism was observed for CIT. In V79 cells at a high cell survival rate, both PAT and CIT induced mitotic arrest and CREST-positive MN in a concentration-dependent manner. Furthermore, PAT caused chromatin bridges between the nuclei of daughter cells, implying that the separation of sister chromatids is disturbed during anaphase. CREST-negative MN were induced by PAT but not by CIT in V79 cells. The genotoxic potential of PAT and CIT may contribute to their putative carcinogenicity in long-term animal studies.

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Genotoxic potential of isoflavone and coumestane phytoestrogens

S.E. Kulling, L. Lehmann, S. Mayer, M. Metzler
Institute of Food Chemistry, University of Karlsruhe, P.O. Box 6980, 76128 Karlsruhe, Germany

Phytoestrogens are endogenous constituents of many edible plants and part of our daily food. In order to assess their genotoxic potential, we have investigated the effects of the isoflavone phytoestrogens genistein (GEN), daidzein (DAI) and biochanin A (BCA) as well as the coumestane phytoestrogen coumestrol (COUM) at various endpoints for genetic damage in cultured Chinese hamster V79 cells. Neither COUM nor GEN or DAI affected the cytoplasmic microtubule complex (CMTC) or the mitotic spindle, implying that they are not aneuploidogenic. However, COUM and GEN but not DAI were strongly clastogenic, inducing DNA strand breaks and micronuclei containing acentric fragments as shown with CREST antikinetochore antibodies (CREST-negative micronuclei). Moreover, COUM was a clear inducer of gene mutations at the HPRT locus in V79 cells, whereas GEN was only marginally active and DAI inactive at this endpoint. BCA exhibited aneuploidogenic potential in V79 cells, causing mitotic arrest and disruption of the CMTC and the mitotic spindle; it also induced CREST-positive micronuclei containing whole chromosomes. A combination of BCA and GEN caused an increased number of CREST-positive and decreased number of CREST-negative micronuclei in comparison with either BCA or GEN alone.

These results show that some but not all phytoestrogens exhibit genotoxic potential.

Abstracts 1.1.22 - Aneuploidogenic and clastogenic potential of the mycotoxins patulin and citrinin

E. Pfoeller, M. Metzler
Institute of Food Chemistry, University of Karlsruhe, P.O. Box 6980, 76128 Karlsruhe, Germany

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Abstracts 1.1.24 - Genotoxic potential of isoflavone and coumestane phytoestrogens

S.E. Kulling, L. Lehmann, S. Mayer, M. Metzler
Institute of Food Chemistry, University of Karlsruhe, P.O. Box 6980, 76128 Karlsruhe, Germany

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