Characterization of a genotoxic impact compound in Alternaria alternata infested rice as Altertoxin II

Toxicity-guided fractionation was used to identify DNA strand breaking impact compounds in extracts obtained from rice heavily infested with the Alternaria alternata strains DSM 62006 and DSM 62010. The major genotoxic potential measured in the comet assay using human colon carcinoma cells (HT29) could be attributed to three unknown peaks, whereas the fractions containing alternariol, its monomethylether or tenuazonic acid showed no significant DNA damaging effects. According to (1)H and (13)C-NMR spectroscopy, one genotoxic impact compound was identified as Altertoxin II (ATXII). ATXII showed potent DNA damaging properties in HT29 cells with substantial induction of formamidopyrimidine DNA glycosylase (FPG)-sensitive sites. However, no effect was observed with respect to the cellular redox status, measured in the DCF assay and as total glutathione. The induction of apoptosis could be excluded as a potential reason for enhanced DNA damage. After 24 h of incubation with 1 μM ATX II, a significant increase of cells in the G(0)/G(1) phase was observed together with an inhibition of cell proliferation in the sulforhodamine B assay. Taken together, ATX II was found to contribute substantially to the genotoxic effects of complex extracts obtained from Alternaria alternata infested rice. The results
demonstrate the high genotoxic potency of ATX II in human cells, underlining the necessity for further studies on the occurrence in food and its relevance for food safety.