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Occurrence of ochratoxin A in pork and pork products

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Man is doubly endagered by the mycotoxin ochratoxin A (OTA). Firstly, by the direct consumption of foodstuffs which are infected with moulds producing OTA and secondly - due to the relatively high persistence of OTA in the metabolism of pigs - indirectly by the consumption of foodstuffs which have been produced from slaughtered pigs.

OTA has been found to be a natural contaminant of cereals, especially in countries with moderate climate. Psychrotrophic OTA-producers of the genera Penicillium are mainly responsible for this contamination. For P. viridicatum a temperature range between 16 - 24°C, and a_w-values of 0.90 - 0.93 provide optimal conditions for OTA production (Lillehøj and Elling, 1983). Low temperature and high humidity favour the contamination of cereals with OTA.

The carry-over of OTA from feeds to pork leads to the introduction of this nephrotoxin into the human food chain. The highest concentration of this toxin occurs in the blood and kidneys of pigs, however, OTA is also present in the liver, the adipose and the muscular tissues. Following oral administration the biological half-live of OTA in pigs is nearly 4 days, and about 65 % of the administered dose is absorbed (Galtier and Alvinerie, 1981).

We investigated 300 pig kidneys, bought in butcher shops and supermarkets from all regions in the Federal Republic of Germany from June until December 1983, for their OTA-content. Following extraction and purification the samples were analysed for OTA using thinlayer-chromatographie (TLC). The detection limit was about 0.2 µg/kg, and the recovery about 70 %. OTA was detected in 41 (14 %) of the kidneys, in concentrations of 0.5 to 10 µg/kg. Most of the samples contained 1 to 2 µg/kg OTA (Scheuer and Leistner, 1984).

In 1984 we investigated sausages to which blood, blood plasma or edible offals are added, for their OTA-content. The samples were extracted and purified in the same manner as the kidney-samples, and analysed for OTA, using TLC and the high performance liquid chromatographie (HPLC). OTA was frequently found in Kochwurst and Brühwurst; fortunately in very low concentrations. In 20 (16 %) of 125 blood sausages (Kochwurst) and in 19 (19 %) of 100 liver sausages (Kochwurst) as well as in 19 out of 100 emulsion type sausages (Brühwurst) OTA was detected. 3.4 µg/kg was the highest concentration of OTA found, most of the samples contained 0.1 to 0.2 µg/kg OTA (Scheuer and Leistner, 1985).

Blood plasma, a low cost protein source with high nutritive value, is mainly responsible for the contamination of Brühwurst with OTA. In 1985 we investigated frozen blood plasma and dried plasma powder for OTA. None of the 16 analysed powder samples contained detectable amounts of OTA, however, we found in all of the 7 investigated frozen plasma samples OTA in concentrations of 0.5 to 5 µg/kg (Scheuer and Leistner, 1985).

The contamination of pig blood with OTA is common in the Federal Republic of Germany (Bauer et al. 1984). Therefore, it was surprising that none of the 16 investigated plasma powder samples contained detectable amounts of OTA. Apparently OTA is removed during the drying process from the blood plasma, and in this respect it seems preferable to use dried plasma powder for instead of liquid plasma for sausage manufacturing.

Conclusions: In pig kidneys and sausages to which blood, blood plasma or edible offals are added, ochratoxin A is frequently present, however, fortunately only in low concentrations. The toxicological evaluation of low residues of OTA in pork and pork products is under study in our laboratories.

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