

Summary

Identification of sources of nitro-/aminoarenes in the urine of non-smokers

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Aromatic amines (AA) are suspected to be causatively linked to the development of human bladder cancer. In a basic cross-sectional study 81 nonsmoking subjects (48 women) at the age of 20-61 years were analysed for their urinary excretion of aromatic amines including aniline, toluidines, aminonaphthalines (NA), aminobiphenyls (BI) and 1-aminopyrene. The repeatability of the determinations in urine samples was shown in a sub-collective of 20 individuals. By means of an experimental day given standardized food to the subjects and a second 3-day longitudinal study the association between excretion and uptake of presumably contaminated food items was investigated in a subcollective of 10 individuals on the basis of urine and food samples. The urinary levels of AA were determined in each experiment in 24-h urine samples.

Based on a questionnaire the nutrition habits, passive smoking behaviour and other potential factors influencing AA excretion were identified. By means of regression analyses clues to relevant factors of influence, such as food items, were found. To verify the non-smoking status indicated in the questionnaires urinary cotinine levels were determined.

For the 81 non-smoking subjects the medians of toluidines were in the range of 44.6 to 61.7 ng/24-h urine, whereas for NA and BI medians in a range of 0.7 to 11.6 ng/24-h urine were found. A high intraindividual variability of the NA- and BI-excretion was observed. For the AA levels in the 24-h urine samples of the 10 individuals participating on the experimental day with standardized food uptake an increase of the corresponding medians was found compared to the day before.

AA were detected in food samples of certain vegetables and fresh salads, vegetable oil and grilled meat in the range of 5 ng/kg to 30 µg/kg.

This study demonstrates for the first time that the general population is exposed to AA through contaminated food items. The absence of 1-aminopyrene in human urine may indicate that nitroarenes in the environment could be excluded as the source of the urinary excreted AA. In contrast aniline and toluidines could be detected in German hair dyes in the ppm-range. In addition tires are also found to contain AA in concentrations up to mg/kg.