

BfR recommends the establishment of a European maximum level for uranium in drinking and mineral water

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Uranium is a widespread, radioactive heavy metal on earth. It is to be found in varying concentrations and states in various rocks and minerals as well as in water, soil and air. Uranium may also reach the environment anthropogenically for instance in mineral phosphate fertilisers. Because of its widespread presence traces of uranium can also be detected in foods like drinking and mineral water.

Uranium is not essential for humans. The ongoing intake of higher uranium concentrations can lead to kidney damage because of the chemical toxicity of the substance. The radioactive disintegration products of uranium can cause cancer. For the assessment of a possible health risk from uranium, both chemical and radiological toxicity must, therefore, be taken into account. The Federal Office for Radiation Protection (BfS) and the Federal Institute for Risk Assessment (BfR) have already voiced several opinions on this subject. This risk assessment of uranium in food including drinking and mineral water takes into account the results of an expert meeting, which was held at the invitation of BfR in Berlin on 21 July 2005 in order to bundle the latest scientific findings on uranium. This risk assessment also takes into account possible inputs from phosphate fertilisers and feed.

The procedure for the risk assessments of chemical and radiological toxicity varies because of the different structures of action of the two noxae. When assessing the hazard of radiologically toxic substances, the radiation dose is considered as the “sum noxa”. All radioactive substances and their disintegration products are included in the calculation of the radiation exposure of the population through food. On this basis the share of uranium in the overall exposure is calculated. This procedure has been standardised internationally. In contrast, the estimation of chemical toxicity must be done for the individual substance and its individual toxicity because of the differing effects of the individual substances. Hence, there is no corresponding standardised exposure model like there is for radiation protection.

In the risk assessment BfS and BfR come to the following conclusions. The radiological risk from uranium ingested from food, including drinking and mineral water, is very low for consumers in Germany. Radiation exposure is far lower than the guidance doses. What is more important is the chemical toxicity of the uranium concentrations measured in foods. BfR does not believe that there is any cause for concern. According to the scientific findings available today, the chemical action of uranium, which is ingested from food, does not constitute a significant health risk for consumers. Studies have shown that uranium does not accumulate within the food chain and plants only extract very little uranium from the soil. However, some questions are still open about a possible hazard from uranium-containing phosphate fertilisers which are applied to arable land. Nor can it be ruled out that consumers take up unsafe amounts of uranium from drinking or mineral water when it comes from regions with high natural uranium deposits.

Various institutions have established toxicological limit values for the intake of uranium or elaborated guidance values for still tolerable amounts of uranium in drinking water. In its health assessment of uranium BfR used as the basis the drinking water guideline value of the World Health Organisation (WHO), which is 15 microgram (μg) uranium per litre and aims to guarantee a lifelong, tolerable intake. Around 5% of the tested mineral waters were found to have a higher uranium content. These waters may have a negative effect on health if more than half a litre is consumed daily. BfR has repeatedly pointed this out and established a limit

value of 2 µg uranium per litre for mineral waters that are advertised for the preparation of infant formula. This value has since been taken over into international legislation.

On the European level there is no uniform maximum level for uranium in food, particularly in drinking and mineral water. BfR recommends the health assessment of uranium and the establishment of a value of this kind by the European Food Safety Authority (EFSA). Firstly, this would reduce the consumption of highly contaminated mineral waters and secondly, in the course of this process, any gaps in knowledge about the chronic toxicity of uranium in the low dose range could be closed.

The full version of the BfR Opinion in German is available on http://www.bfr.bund.de/cm/208/bfr_empfiehl_t_die_ableitung_eines_europaeischen_hoehstwertes_fuer_uran_in_trink_und_mineralwasser.pdf