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## **TOXIC HEAVY METALS AND OTHER TRACE ELEMENTS IN FOODSTUFFS FROM DIFFERENT COUNTRIES: RESULTS FROM AN IAEA CO-ORDINATED RESEARCH PROGRAMME**

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Human growth and metabolism depend, basically, on a well balanced diet in terms of proteins, lipids, carbohydrates, etc. However, traces of inorganic elements also play an important role in various metabolic processes and their excess or deficiency may disturb normal biochemical functions of the body. Human exposure to these elements is mainly through the diet. A research study related to the determination and assessment of toxic heavy metals and some other, mainly essential, trace elements in foodstuffs has been carried out in twelve countries under the auspices of the IAEA. The main purpose of this Co-ordinated Research Programme (CRP) was to obtain comparative data on the existing elemental concentrations of potentially toxic elements in foodstuffs in various countries and to compare them with the maximum permissible levels specified in national legislation and international guidelines. The elements identified as having high priority for this study were arsenic, cadmium, chromium, lead, mercury and selenium. Also of interest, but of lower priority, were antimony, copper and zinc. The matrices of interest were foodstuffs which comprised together more than 50% of the average daily intake. Drinking water was also considered to be highly relevant and was studied by some participants. A detailed research protocol was issued by the IAEA for this CRP. It contains guidelines on the types of food to be collected, the minimum amount of each food to be sampled to obtain a representative analytical sample, how to prepare it for analysis, and procedures for analytical quality control and data evaluation. Emphasis was placed on the use of nuclear and nuclear-related analytical techniques. However, in cases where other, conventional, methods were considered more appropriate, their use was also encouraged. The techniques actually used by the participants were neutron activation analysis, both instrumental (INAA) and radiochemical (RNAA), anodic stripping voltammetry (ASV), inductively-coupled plasma emission spectrometry (ICP-ES), atomic absorption spectrometry (AAS), direct current plasma emission spectrometry (DCP-ES) and proton-induced X-ray emission (PIXE). Quality assurance was emphasized and the IAEA organized a number of external analytical quality control exercises to ensure that the analytical data produced by the laboratories was reliable. Through these procedures it was possible to detect some mistakes and correct for them. With only a few exceptions, participants reported that the concentrations of toxic elements in the analyzed foodstuffs complied with present regulations and guidelines. As regards essential trace elements, the results obtained from this study showed that these are present in variable concentrations depending on the type of foodstuff, the country and the season during which the samples were collected. A summary of the results obtained is presented in this paper.