DIETARY EXPOSURE TO INORGANIC ARSENIC IN AREAS WITH ELEVATED LEVELS OF GEOGENIC ARSENIC IN LATIUM (CENTRAL ITALY)

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In Latium (central Italy), arsenic concentrations exceeding the regulatory limit of 10 µg/L for drinking water have been found in groundwater from a large area of old volcanic activity. At least in part of the area, high arsenic concentrations have been detected also in topsoil and subsoil and we recently showed that geogenic arsenic in agricultural soils is largely phytoavailable and enters the food chain at some sites. As a result, local population may be exposed to inorganic arsenic via water and also through consumption of food with higher than background arsenic concentrations. In order to assess dietary exposure to inorganic arsenic and identify the main contributors to the exposure, an integrated approach was adopted combining biomarkers of exposure, arsenic speciation (by HPLC-ICP-MS) in local food and duplicate diets, and a study of the impact of As-rich water in food processing and cooking. Total arsenic in toenails and speciated urinary arsenic (by HPLC-ICP-MS) were used as biomarkers of inorganic arsenic exposure. All subjects involved in the study provided samples of the water(s) used for drinking and cooking as well as detailed information on water use and smoking habits. Cooking experiments were done at relevant water arsenic concentrations and food processing was studied by sampling water, flour, and bread from local bakers. The intake contribution from food and water was investigated and the long-term exposure to inorganic arsenic assessed by toenail arsenic concentrations. The results are discussed in the light of the recent EFSA's assessment of inorganic arsenic exposure from food and water in European countries.

Keywords: inorganic arsenic dietary exposure, biomarkers of exposure, speciation