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Oral intake of aluminum from foodstuffs, food additives, food packaging, cookware and pharmaceutical preparations with respect to dietary regulations

This study compared Al intake data worldwide and to assess its toxicological relevance to healthy adults and to susceptible groups of the population. The content of Al found in foodstuffs in Germany varies largely ranging from about 1,000 mg/kg dry matter, DM (black tea leaves) via about 100 - 200 mg/kg DM (vegetables, herbs, spices) and about 20 - 40 mg/kg DM (table salt, meat, coffee, fruits, potatoes, cocoa) to about 10 mg/kg DM (sugar, bread, rice, dairy products, fish, legumes, flours). The dietary intake has been calculated for adults in the USA, which consume 2-25 mg Al daily, with 1 - 10 mg from natural sources (foods, beverages, drinking water), 0-20 mg from food additives, and 0-2 mg from cooking utensils. The worldwide mean Al intake typically ranges from 2-17 mg/day, with a lower range of 1 mg Al/day naturally present in diets, whereas in some countries (Sweden, USA) the upper range of Al present in foods is about 100 mg daily, due to foods prepared with Al-containing additives. The average daily intake of Al in Germany from all three sources amounted to 3 and 4 mg for adult subjects on a mixed and vegetarian diet, respectively. The provisional tolerable weekly intake (PTWI) of the FAO/WHO is 0 - 7 mg/kg body weight equivalent to 0 - 1 mg/kg body weight and day. In the Member States of the European Union, the limit value for Al in drinking water has been set at 0.2 mg/l. In Germany, the use of Al-containing food additives is permitted for definite foods and specific purposes only, mostly to a limited extent. Intake from Al containing pharmaceutical preparations (antacids, analgesics, anti-ulceratives, phosphate binders) is reported to be 126 - 5,000 mg daily. The authors concluded that the mean daily Al intake in Germany of 3 - 4 mg is about 5% of the upper range of the PTWI value, whereas in Sweden and the USA, the mean daily Al intake of 13 mg and 14 mg, respectively. Both of these countries exceed the individual intake of 100mg Al/day by 50% from prepared foods alone.

Authors: Schaefer, U.; Seifert, M.
Full Source: Trace Elements and Electrolytes 2006, 23(3), 150-161(Eng)

Methylmercury exposure in Wisconsin: A case study series

Many popular varieties of commonly sold fish, including tilefish, sea bass, shark, and swordfish, contain enough mercury so that eating them once or twice a month can lead to high mercury body burdens. Because of the increased popularity of fish as a source of dietary protein, a significant percentage of the US population may be at risk of methylmercury-induced health problems. Although several studies have assessed mercury exposure among children and women of childbearing age, very little is known about mercury body burdens among men or postmenopausal women. This study examines fish consumption and mercury exposure among 14 people who consumed fish twice a week or more and 1 person who ate no fish. The results showed that steady-state blood mercury levels available for 10 adults and 1 child ranged from <5 to 58 µg/L and correlated well with dietary mercury intake estimates. Three of these individuals reported vague, sub clinical symptoms such as mental confusion, sleep difficulty, balance problems, or visual disturbances, which improved after their mercury levels returned to normal.

Authors: Knobeloch, Lynda; Steenport, Dyan; Schrank, Candy; Anderson, Henry
Full Source: Environmental Research 2006, 101(1), 113-122 (Eng)
Metal exposure through consumption of herbal medicine, and estimation of health risk among Koreans

2006-08-28

This study evaluated the health effects of metal exposure and estimated the metal contamination levels and consumption of herbal medicine in Korea. Consumption and contamination data of 34 medicinal herbs abundantly used in Oriental medicine in Korea were used in this study. Lead, mercury, arsenic, cadmium, cobalt, and chrome were identified as contaminants of potential health concerns. Even based on a conservative exposure scenario, i.e., consuming 5 times more herbal medicine with 95th percentile contamination levels, health risks associated with herbal medicine consumption were estimated to be minuscule. The results showed that herbal consumption was 0.3% of the provisional tolerable daily intake levels recommended by the Joint Expert Committee on Food Additives (JECFA) of WHO/FAO. The authors noted that there are several important assumptions and uncertainties associated with this evaluation: this study was conducted for only 34 types of medicinal herbs of which consumption and metal contamination data were available. In addition, there are no reliable herbal medicine consumption data among the Korean population. The pattern and amount of herbal (medicine) consumption in Korea need to be investigated in order to conduct a more refined risk assessment associated with metal contamination in medicinal herbs.

Authors: Park, Haemo; Choi, Kyungho; Jung, Jinyong; Lee, Sundong

Full Source: Hangug Hwangyeong Bogeon Haghoeji 2006, 32(2), 186-191 (Korean),

Effect of Short-Term Drinking Water Exposure to Dichloroacetate on its Pharmacokinetics and Oral Bioavailability in Human Volunteers: A Stable Isotope Study

2006-08-28

Dichloroacetic acid (DCAA) is a byproduct of drinking water disinfection, is a known rodent hepatocarcinogen, and is also used therapeutically to treat a variety of metabolic disorders in humans. This study measured the DCAA bioavailability in 16 human volunteers (eight men, 8 women) after simultaneous administration of oral and iv DCAA doses. Volunteers consumed DCAA-free bottled water for 2 wk to wash out background effects of DCAA. Subsequently, each subject consumed 12C-DCAA (2 mg/kg) dissolved in 500 mL water over a period of 3 minutes. Five minutes after the start of the 12C-DCAA consumption, 13C-labeled DCAA (0.3 mg/kg) was administered iv over 20 s and plasma 12C/13CDCAA concentrations measured. To simulate a low-level chronic DCAA intake, subjects consumed the DCAA 0.02 µg/kg/day for 14 consecutive days, dissolved in 500 mL water. The end point for the study was the calculation of AUC0 ? 8, apparent volume of distribution(Vss), total body clearance (Clb), plasma elimination half-life(t1/2,'), oral absorption rate (Ka), and oral bioavailability. Oral bioavailability was determined from dose-adjusted AUC ratios and by using a compartmental pharmacokinetic model after simultaneous fitting of oral and iv DCAA concentration-time profiles. The results showed that the DCAA bioavailability had large interindividual variation, ranging from 27 to 100%. In the absence of prior DCAA intake, there were no significant differences in any pharmacokinetic parameters between male and female volunteers, although there was a trend that women absorbed DCAA more rapidly (increased Ka), and cleared DCAA more slowly (decreased Clb), than men. In addition, only women were affected by previous 14-day DCAA exposure, which increased

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Sublethal exposure from microcystins to renal insufficiency patients in Rio de Janeiro, Brazil

In 2001, a cyanobacterial bloom dominated by Microcystis and Anabaena infected the water in the Funil Reservoir and the Guandu River, both of which supply drinking water to Rio de Janeiro, Brazil. ELISA was used to detect the concentration of microcystins in the water. The concentration was found to be 0.4µg/L in the drinking water, whereas a concentration of 0.32 µg/L was detected in activated carbon column-treated water for use at the renal dialysis center of Clementino Fraga Filho Hospital (HUCFF). In this study, 44 hemodialysis patients who received care at this center were believed to be exposed. Initial ELISA analyses confirmed the presence of serum microcystin concentrations g0.16µg/mL in 90% of the serum samples collected from these patients. Twelve patients were selected for continued monitoring over the following 2-month period. The results demonstrated serum microcystin concentrations ranged from <0.16 to 0.96 ng/mL during the 57 days after documented exposure. ELISA positive samples were found throughout the monitoring period, with the highest values detected 1 month after initial exposure. Although microcystin was found in the serum, no fragmentation patterns typical of microcystins were identified using MS/MS. LC/MS analyses of MMPB for control serum spiked with MCYSTLR, and patient sera revealed a peak at retention time of 8.4 min and a mass of 207 m/z. These peaks are equivalent to the peak observed in the MMPB standard analysis. The authors conclude that taken together ELISA, LC/MS, and MMPB results indicate that these renal dialysis patients were exposed to microcystins.

Health effects of subchronic exposure to environmental levels of hardwood smoke

Hardwood smoke is a contributor to both ambient and indoor air pollution. As part of a general health assessment, the National Environmental Respiratory Centre conducted a series of health assays on rodents exposed to environmentally relevant levels of hardwood smoke. The study investigated exposure, general indicators of toxicity, bacterial clearance, cardiac function, and carcinogenic potential in the rodents. Hardwood smoke was generated from an uncertified wood stove, burning wood of mixed oak species. Animals were exposed to clean air (control) or dilutions of whole emissions based on particulate (30, 100, 300, and 1000 µg/m3). F344 rats, SHR rats, strain A/J mice, and C57BL/6 mice were exposed by whole-body inhalation 6 hours/day, 7 days/wk, for either 1 week or 6 months.

The results demonstrated only a mild effect of exposure on general indicators of toxicity, bacterial clearance, cardiac function, and carcinogenic potential. Exposure-related effects included increases in platelets and decreases in blood urea nitrogen and serum alanine aminotransferase. There were several other significant responses, which met screening criteria for exposure effects.
but were not consistent between genders or exposure times and were not corroborated by related parameters. Pulmonary histopathology revealed very little accumulation of hardwood smoke particulate matter. Parallel studies demonstrated mild exposure effects on bronchoalveolar lavage parameters and in a mouse model of asthma. The authors concluded that the findings indicate that only a few modest health hazards from short-term to subchronic exposures to realistic concentrations of hardwood smoke.

Authors: Reed, M. D.; Campen, M. J.; Gigliotti, A. P.; Harrod, K. S.; McDonald, J. D.; Seagrave, J. C.; Mauderly, J. L.; Seilkop, S. K.

Full Source: Inhalation Toxicology 2006, 18(8), 523-539 (Eng)

Study on chemical composition of indoor PM10 in some residential houses in Beijing

This study investigated the chemical composition and sources of indoor PM10 particulates in some residential houses in Beijing, China. The PM10 samples were collected using cascade impactors in smokers' and non-smokers' homes in winter. The mass concentrations and enrichment characteristics of nineteen elements, such as Al, Si, and S in airborne particles were analyzed by proton induced x-ray emission (PIXE) and enrichment factor. The concentrations of 19 elements were higher in smokers' homes than those in non-smokers' homes in winter; K and S concentrations, were 2-4 times of those in non-smokers' homes. Al, Si, S, K, Ca, and Fe made greater contribution to concentrations of elements in PM10, of which K and S accounted for 72% of total elements in smokers' homes, while Al, Si, and Ca amounted to 57% of total elements in non-smokers' homes. Al, Si, Ca, Ti, and Fe come from natural sources, while S, Zn, Pb, Cr, Cu, As, Cl, and P originated from anthropogenic sources such as smoking, coal combustion, and oil combustion.

Authors: Zhao, Hou-yin; Shao, Long-yi; Yao, Qiang

Full Source: Huanjing Yu Jiankang Zazhi 2006, 23(1), 14-17 (Ch)

Low serum concentrations of di-(2-ethylhexyl)-phthalate in women with uterine fibromatosis

This study investigated the role of exposure of a monoethylhexylphthalate (MEHP), a primary metabolite of the plastizer, di-(2-ethylhexyl)-phthalate (DEHP), on women's reproductive function. Serum of women with uterine fibromatosis was tested to determine the concentrations of DEHP and/or MEHP. Two groups of women were enrolled in the study: (i) women with uterine fibromatosis undergoing surgical menopause (n = 15) and (ii) healthy women (n = 20). Serum DEHP and MEHP concentrations were measured by high performance liquid chromatography. The results indicated that patients with uterine fibromatosis showed significantly lower serum MEHP concentrations. Likewise, serum DEHP concentrations in women with fibromatosis were found to be significantly lower than in controls (The authors concluded that these findings indicate that serum DEHP and MEHP concentrations are lower in women with uterine fibromatosis, suggesting a possible correlation between phthalate esters and fibromatosis pathology.

Authors: Luisi, Stefano; Latini, Giuseppe; de Felice, Claudio; Sanseverino, Francesca; di Pasquale, Dorina; Mazzeo, Pietro; Petraglia, Felice

Full Source: Gynecological Endocrinology 2006, 22(2), 92-95 (Eng)