

Abstract

Bárány, E. 2002. *Trace elements in adolescents*. Doctor's dissertation.
ISSN 1401-6257, ISBN 91-576-6354-8.

The major aim of the thesis was to monitor toxic and essential trace elements in a cohort of adolescents by blood and serum analyses, and describe the impact of different factors on the element concentrations. The adolescents were from the Swedish cities Uppsala and Trollhättan which represent different socioeconomic and environmental conditions, and were investigated at age 15 and 17.

It was shown that an inductively coupled plasma mass spectrometry method was suitable for simultaneous determination of 13 elements in blood or serum. The elements were cobalt, copper, zinc, selenium, rubidium, rhodium, palladium, cadmium, tungsten, platinum, mercury, thallium, and lead.

The concentrations of the toxic elements cadmium, mercury and lead were low in the adolescents. Cadmium in blood was strongly positively influenced by smoking habits and by the mother's education. In contrast to smokers, blood cadmium in non-smokers did not increase between the sampling at age 15 and that at 17. The blood lead was one of the lowest reported and decreased about 10% between the samplings, perhaps due to temporal changes in environmental exposure, or a dilution of body burden in the growing adolescents. Consumption of fish with dietary restrictions due to elevated mercury levels and other, "non-restricted", fish predicted blood mercury. Blood mercury also increased with fish consumption in those who consumed only non-restricted fish. Mercury in serum was predicted by dental amalgam, consumption of non-restricted fish, and selenium concentrations.

The levels of the essential elements cobalt, copper, zinc and selenium in blood and serum were within the reference intervals, and were not influenced by socioeconomic status. However, age, gender, and residential area had significant influences on the levels, differently for different elements. Fish consumption did not influence selenium concentrations.

A large part of the analytical data for rhodium, palladium, platinum and thallium were below the detection limits, thus restricting the interpretation of the results. There were increases in the levels of rhodium, palladium and platinum in serum, as the mean concentrations of these elements were above the detection limits at age 17 but not at age 15.

Keywords: Blood, dental amalgam fillings, essential elements, fish consumption, ICP-MS, serum, smoking, Sweden, toxic elements.

Author's address: Ebba Bárány, Department of Pharmacology and Toxicology, Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences, SE-751 23 Uppsala, Sweden.