Assessment of human exposure to per- and polyfluorinated compounds (PFCs)
Exposure through food, water, dust and indoor air

av

Ingrid Ericson Jogsten

Akademisk avhandling

Avhandling för filosofie doktorsexamen i kemi, som enligt beslut av rektor kommer att förvaras offentligt fredagen den 23 september 2011 kl. 10.00,
Hörsal M, Örebro universitet

Opponent: Professor Stuart Harrad,
Division of Environmental Health & Risk Management,
School of Geography, Earth & Environmental Sciences
University of Birmingham, UK
Abstract

Ingrid Ericson Jogsten (2011): Assessment of human exposure to per- and polyfluorinated compounds (PFCs) - Exposure through food, drinking water, house dust and indoor air. Örebro Studies in Chemistry 10, 85 pp.

Per- and polyfluorinated compounds (PFCs) are detected in humans worldwide but all sources of human exposure have not been fully characterized. The aim of this thesis was to evaluate the contributions from food, water, air and dust as sources for human PFC exposure in the general population.

Up to 27 PFCs were determined at trace levels in blood (ng/mL), water (ng/L), foods (ng/g), dust (ng/g) and air (pg/m³) in a selected Catalan population and PFC intake was estimated from the measured PFC concentrations of the different sources of exposure.

The major compounds detected in human blood of the studied population were perfluorooctane sulfonate (PFOS; 7.6 ng/mL), perfluorohexane sulfonate (PFHxS; 3.6 ng/mL) and perfluorooctanoic acid (PFOA; 1.8 ng/mL). In general, PFOS was also the major compound detected in most sources of exposure.

Food was found to be the dominant pathway for human PFC exposure accounting for more than 70 % of the total intake of both PFOS and PFOA. In the most populated area (the Barcelona Province) where the highest levels were measured, tap water can contribute to the total exposure substantially with more than 50 % for adults. Indoor sources were negligible in the selected area for most PFCs when compared to food and water intake, except for toddlers under a worst case scenario where contribution from dust and food intake were equal (19 %).

Pharmacokinetic (PK) modelling resulted in exposure of 103 ng PFOS/day and 33 ng PFOA/day of adults from the internal PFC blood concentrations. This agrees well with the intake estimated from external exposure through food, drinking water, house dust and indoor air of 80 ng PFOS/day and 32 ng PFOA/day and evidently all major exposure sources for the general population were included (in this study).

Keywords: human exposure, per- and polyfluorinated compounds (PFCs), dietary intake, drinking water, indoor environment.

Ingrid Ericson Jogsten, Akademin för Natur och Teknik
Örebro University, SE-701 82 Örebro, Sweden, ingrid.ericson@oru.se