

Summary

Flame retardants have been used in the Czech Republic since the 1980s and 1990s as a part of the polymer matrix of plastic materials to decrease their combustibility and thus the risk of fire. Brominated flame retardants (BFR) are commonly used, polybrominated diphenyl ethers (PBDEs) are the most abundant flame retardants in plastic materials. The human population is exposed to these compounds particularly via diet containing fatty fish, meat and dairy products and via inhalation of dust particles. Another aspect is the duration of the exposure: it is known that human beings can be exposed to BFRs from infancy through prolonged breast feeding because breast milk can be contaminated by these compounds.

This study was performed to investigate the concentrations of the main representatives of BFRs occurring in human adipose tissue and to compare these values with the concentration of chlorinated contaminants (PCBs, DDTs). The pollutants levels were newly measured in solid adipose tissue removed during surgery. A total of 107 samples of fat were taken from 19 – 76 year-old volunteers mostly obese women. A total of 16 PBDEs congeners were determined, of which only six occur in more than 38 % of fat tissue samples. The total PBDEs level attained an average value of 3.31 ng/g, which is 25 % less than was measured in 2009. On the other hand, there was an increase in the levels of two PCBs congeners, which caused an increase in the total PCBs concentration from 625.5 ng/g, published in 2009, to the current level of 776 ng/g. The amounts of DDTs have decreased and currently correspond to 467.4 ng/g, which is about 24 % less than in 2009.

The second scope of this work includes chronic diseases, such as diabetes mellitus and atherosclerosis. Hyperglycaemia stimulates non-enzymatic glycation of plasma proteins, which are completely different compounds from original proteins. We investigated the use of chiroptical methods for detection of these changed proteins molecules: electronic circular dichroism, Raman optical activity, infrared spectroscopy and Raman spectroscopy. The results were compared with results of standard electrophoresis analysis and results of chiroptic methods were 100 % valid to clinic diagnosis for group of 12 patients and 8 controls. Chiroptical methods were used for sensitive detection of microalbuminuria of diabetics.