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Analysis of biological material: Determination of neurotoxic pesticides and their metabolites in tissues and body fluids

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The project DENAMIC “Developmental Neurotoxicity Assessment of Mixtures in Children” investigates neurotoxic effects of low-concentration mixtures of pesticides and a number of common environmental pollutants in children. The project is especially focused on (sub-clinical) effects on learning and developmental disorders in children (e.g., ADHD, autism spectrum disorders and anxiety disorders). Perinatal and early-childhood exposure is studied in breast milk, maternal and child urine. As a model in vivo experiments using rats were performed. Pregnant rat females were fed a diet containing the mixtures of pesticides and pollutants, six months after birth the cub tissues (brain, liver, perirenal fat) and body fluids (cub urine and plasma) were collected. The possibility of a placental transfer of xenobiotics from mother to offspring was studied and the changes in natural behaviour of cubs were investigated. The analytical procedures for determination of group of neurotoxic pesticides (carbaryl, chlorpyrifos, cypermethrin, α , β -endosulfan) and their metabolites in small amount of sample have been developed. For extraction of rat tissues special mini-extractor was used, for following extract clean-up non-destructive methods were needed - gel permeation chromatography and solid-phase columns due to removing of lipids. For plasma samples solid-phases extraction was used. Metabolites of pesticides in urine were deconjugated with concentrated hydrochloric acid, extracted with methyl-tert-butyl ether and extract was cleaned on solid phase (SPE). GC-HRMS was used for determination of analytes and its metabolites, which have to be derivatized with diazomethane prior to the analysis.

Biography

Marta Seifertova is studying Environmental Chemistry at RECETOX, Masaryk University in Brno. She deals with the development of analytical methods for determination of toxic compounds in biological material, method miniaturization and trace analysis. She is working on the European project DENAMIC.

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