

# SIMULTANEOUS DETERMINATION OF PERFLUORINATED COMPOUNDS, OXIDIZED PHTHALATE METABOLITES, BIS-PHENOL A AND COTININE IN SMALL VOLUMES FROM SERUM BANKS FOR USE IN EPIDEMIOLOGICAL STUDIES

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**Background and Aims:** Perfluorinated compounds (PFCs), phthalates and bis-phenol A are suspected endocrine disrupters and may therefore induce health effects such developmental and neurobehavioral disorders, obesity, diabetes, asthma etc. Moreover, smoking is often an important confounder in studies of these diseases. There is often a large lag between the exposure and the development of the disease. Furthermore, for many diseases it is believed that it is the exposure of the mother during pregnancy that is of importance. It is therefore desirable to measure exposure back in time. There are many samples stored in freezers in serum banks which may be used for this purpose. However, the stored volumes are often very limited. Methods for analysis of these samples should therefore preferably use only a small volume as well as being possible to be applied for many different compounds of interest. The aim of this study was to develop such a method for simultaneous analysis of a number of different suspected endocrine disrupters as well as the tobacco smoke indicator cotinine.

**Methods:** For the analysis of perfluorinated compounds, oxidized phthalate metabolites, bisphenol A and cotinine aliquots of 100  $\mu$ l serum were added with glucuronidase, ammonium acetate buffer and a water:acetonitrile (50:50) solution containing  $^2\text{H}$ - $^{13}\text{C}$ - or  $^{18}\text{O}$ -labeled internal standards for all evaluated compounds. The samples were then digested at 37°C for 90 min. The proteins were precipitated with 175  $\mu$ l acetonitrile and vigorously shaking for 30 min. The samples were thereafter centrifuged and 3  $\mu$ l of the supernatant was injected on a triple quadrupole linear ion trap mass spectrometry equipped with a TurbolonSpray source (Sciex QTRAP 5500).

**Results:** The method developed is easy and fast to perform. The precisions were better than 10% for most analyzed compounds and the detection limits were sufficiently low to be able to detect most of the analyzed compounds in a majority of the samples from the general populations, at least in Sweden, Ukraine, Poland and on Greenland. For the compound where it was possible the method was applied in inter-laboratory control programs with results within the tolerance limits.

**Conclusions:** The developed method may be valuable in epidemiological studies on associations between exposure to PFCs, phthalates and bis-phenol A and health effects.