

Simultaneous Determination of Bisphenol a, Phthalates and Its Metabolites in Human Urine, by Tandem SPE Coupled to GC-MS

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Abstract : Endocrine disruptor chemicals (EDCs) are synthetic compounds that even though being initially designed for a specific function are now being linked with a wide range of side effects. The list of possible EDCs is growing and includes phthalates and bisphenol A (BPA). Phthalates are one of the most widely used plasticizers to improve the extensibility, elasticity and workability of polyvinyl chloride (PVC), polyvinyl acetates, etc. Considered non-toxic and harmless additives for polymers, they were used unrestrainedly all over the world for several decades. However, recent studies have indicated that some phthalates and their metabolic products are reproductive and developmental toxicants in animals and suspected endocrine disruptors in humans. BPA (2,2-bis(4-hydroxyphenyl)propane) is a high production volume chemical mainly used in the production of polycarbonate plastics and epoxy resins. Although BPA was initially considered to be a weak environmental estrogen, nowadays it is known that this compound can stimulate several cellular responses at very low levels of concentrations. The aim of this study was to develop a method based on tandem SPE to evaluate the presence of phthalates, metabolites and BPA in human urine samples. The analyzed compounds included: dibutyl phthalate (DBP) and di-2-ethylhexyl phthalate (DEHP), BPA, mono-isobutyl phthalate (MiBP), monobutyl phthalate (MBP) and mono-(2-ethyl-5-oxohexyl) (MEOHP). Two SPE cartridges were applied both from Phenomenex, the strata X polymeric reversed phase and the strata X A (Strong anion). Chromatographic analyses were carried out in a Thermo GC ULTRA GC-MS/MS. Good recoveries and linear calibration curves were obtained. After validation, the methodology was applied to human urine samples for phthalates, metabolites and BPA evaluation.

Keywords : Bisphenol A (BPA), gas chromatography, metabolites, phthalates, SPE, tandem mode

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