New SPE-LC-MS/MS method for the simultaneous determination in urine of 22 metabolites of DEHP and alternative plasticizers from PVC medical devices.

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Résumé:
DiEthylHexylPhthalate (DEHP) can leach out of plasticized PVC medical devices (MD) and may enter into contact with patients. This phthalate is known for its reprotoxic and endocrine disrupting effects. Its use in medical devices (MD) has been restricted and alternative plasticizers have been developed. Nevertheless, no published clinical studies exist concerning patient exposure to these alternative plasticizers during medical care. This is particularly worrisome when high-risk populations, such as newborns, are exposed to these new plasticizers in intensive care units. Our study aimed to develop a novel sensitive and selective method to simultaneously identify and quantify DEHP and 17 other plasticizer metabolites (free or glucuronide conjugates), which are specific biomarkers of DEHTP, TOTM, DINP, DINCH and DEHA exposure in human urine. This robust method uses turbulent-flow online extraction technology coupled to high performance liquid chromatography - tandem mass spectrometry. Special care was taken to address two major problems in plasticizer analysis: contamination and chromatographic separation of interfering analogue structures. The validation was assessed in synthetic urine and the linearity of response was demonstrated for all compounds (R2 > 0.99), with limits of quantification from 0.01 to 0.1?ng/ml. Accuracies ranged from 86% to 117% and inter- and intra-day precisions were <20%. The clinical applicability and suitability of our new method was assessed in patients in a neonatal intensive care unit to measure urinary concentrations of DEHP and alternative plasticizer metabolites. These metabolites were found in the majority of urine samples, with a median detection frequency of 95.2% (ranging from 12.5% to 100%). The high sensitivity, selectivity and ruggedness make the method suitable for large-scale biomonitoring studies of high-risk and general populations.

MeSH: Chromatography, Liquid|DiethylhexylPhthalate/metabolism/urine|Humans|Plasticizers/analysis|Polyvinyl Chloride/chemistry|Solid Phase Extraction|Tandem Mass Spectrometry
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