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Application of a rapid μ-SPE clean-up for multiclass quantitative analysis of sixteen new psychoactive substances in whole blood by LC–MS/MS

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Abstract

Europe is an important market for illegal drugs, and nowadays a lot of new different psychoactive substances (NPS) are widespread. This work reports the development of a method to determine simultaneously different classes of NPS, as synthetic cannabinoids (SC) and their metabolites, cathinones and phenetylamines, directly on whole blood (WB) without anti-coagulants and using miniaturized solid phase extraction (μ-SPE). In order to demonstrate the feasibility of the method 16 different NPS belonging to the mentioned classes were selected for the analysis. Recoveries ranged from 21 to 70% while matrix effect was lower than 15% for all the analytes. LOQ values were 5 ng mL^{-1} for cathinones and phenetylamines, between 0.25 and 1 ng mL^{-1} for SCs and up to 2.5 ng mL^{-1} for SC metabolites.
The performance of μ-SPE was compared with different clean-up strategies (i.e. protein precipitation (PPT), liquid liquid extraction, PPT/SPE hybrid) in term of recovery, matrix effect and suitability for multi-class analysis.The developed method was validated according to SWGTOX guidelines. The validation data demonstrated that this approach is potentially very useful as confirmation method for multiclass analysis in WB and post mortem specimens. In fact only 100 μL of human WB are used, sample preparation involves few rapid steps and the method is easily implementable for the determination of other NPS.

Keywords: Whole blood, new psychoactive substances, cathinones, synthetic cannabinoids, μ-SPE, LC-MS/MS.