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Fast and easy extraction of antidepressants from whole blood using ionic liquids as extraction solvent

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Abstract

This study aims to prove that ILs can be used in an IL-DLLME-LC-MS/MS method for the quantification of a large group of antidepressants in whole blood samples. The sample preparation procedure consisted of adding 1.0 mL aqueous buffer pH 3.0 and 60 μ L of IL (1-butyl-3-methylimidazolium hexafluorophosphate) to 1.0 mL whole blood. Subsequently, a 5-min rotary mixing step was performed followed by centrifugation. The lower IL phase was collected, diluted 1:10 in methanol and 10 μ L was injected into the LC-MS/MS. The following analytes were included in the full-quantitative method: agomelatine, amitriptyline, bupropion, clomipramine, dosulepin, doxepin, duloxetine, escitalopram, fluoxetine, imipramine, maprotiline, mianserin, mirtazapine, nortriptyline, paroxetine, reboxetine, trazodone and venlafaxine. Selectivity was checked for 10 different whole blood matrices. Additionally, possible interferences of deuterated standards or other antidepressants were evaluated. Overall, no interferences were found. For each analyte a matrix-matched calibration curve was constructed (7 levels, $n = 6$), covering therapeutic and low toxic concentrations. Accuracy and precision were evaluated over eight days, at three concentration levels ($n = 2$). Bias, repeatability and intermediate precision results met with the proposed validation criteria, except for fluvoxamine, which was therefore only included in the semi-quantitative method. LOQs were set at the lowest calibrator concentration and LOD values were - for most analytes - within a range of 1 - 2 ng/mL. Recoveries (RE) and matrix effects (ME) were evaluated for five types of donor whole blood, at two concentration levels. RE values were within a range of 53.11 – 132.98 %. ME values were within a range of 61.92 – 123.24 %. In conclusion, this study proves the applicability of ILs as extraction solvents for a large group of antidepressants in complex whole blood matrices.

Graphical abstract

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