Poster

[P27-8] P27-8: Assay and monitoring

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[P27-8-9] Evaluation of Tof-MRM for the analysis of illicit drug substances

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Background

Drug screening plays an important role in the success of European drug treatment programs and is used to confirm compliance and to monitor other illicit drug substances. Commonly, toxicology laboratory testing includes immunoassay screening and confirmatory using LC-MS/MS techniques. Some service providers have replaced this multiple step approach with a single LC-MS/MS procedure targeted for a selection of key analytes[1]. While both of these strategies represent effective procedures for a limited panel of analytes, the approach does not provide information for a broad range of drug substances. The aim of this study was to evaluate performance of time-of-flight-multiple reaction monitoring (Tof-MRM) and its potential to meet the requirements of the existing service while providing additional capabilities of broad comprehensive screening using the same instrumentation.

Methods

Quantitative analysis was performed for 13 drugs using a QTof mass spectrometer (Waters) in both Tof-MS^E and Tof-MRM mode. Blank pooled urine samples were enriched with the drugs of interest over a range of concentrations from 0.05 - 100 ng/mL. Sensitivity was evaluated for two alternative chromatographic methods and three sample preparation methods (dilution; SPE and liquid/liquid extraction).

Results

Tof-MRM mode allows isolation of a precursor mass using the quadrupole, followed by Tof detection of fragment ions. Two exact mass product ions were monitored for each compound (qualifier/quantifier). Tof-MRM provided enhanced sensitivity over Tof-MS^E mode (range 4-100 fold). Even with the simple dilution protocol this mode had comparable sensitivity with an established targeted SPE-LC-MS/MS method, with limits of detection 2 ng/mL for all compounds. The developed Tof-MRM and standard Tof-MS^E method were applied to a series of authentic samples (n = 25) which had been previously analysed by the existing method and demonstrated good quantitative agreement. Application of the qualitative screen revealed additional drugs not present in the targeted panel, commonly these included pain medications *e.g.,* pregabalin, tramadol; benzodiazepines; antidepressants and illicit drug substances *e.g.,* MDMA, PMMA.

Conclusions

Tof-MRM mode provides a simple, sensitive method for the screening and quantification of drugs in human urine. Application of the complementary MS^E approach revealed additional drug substances for a more complete characterization of the specimen.