Introduction

Forensic drug testing traditionally relies on an immunoassay screening followed by GC/MS and more recently tandem MS screening analysis. However, new designer drugs of abuse can easily be modified structurally and synthesized, which creates a challenge for their analysis using standard forensic drug screening. As the number of these analytes increases, there is a need for the fast incorporation of such new analytes into the screening panels as well as the increased need for specificity and sensitivity of the screen while maintaining the speed of the traditional technologies. The Agilent RapidFire High-Throughput Mass Spectrometry System is an ultrarapid SPE/MS/MS system capable of analyzing samples with cycle times under 15 seconds. In the present study, we evaluated the ability of this ultrarapid SPE/MS/MS system to screen for new designer drug panel analytes (both salts) and synthetic cannabinoids (spice) in urine with very fast sample cycle times.

Experimental

Mass spectrometry and SPE methods were optimized separately for panels of both salts (Methylone, methoxetamine, methylenedioxymethamphetamine, and methylenedioxymethylamphetamine) and spice (JWH-018, JWH-073, RCS-4, RCS-5, RCS-6, RCS-8, RCS-9, RCS-10, RCS-11, RCS-12, RCS-14, RCS-15, and RCS-28). The samples were analyzed in triplicate over a four day period. Standard curves in urine had excellent linearity within the measured range (0-2000 ng/mL) with an R² value greater than 0.998. Inter- and intra-day accuracies determined were within 15% and coefficient of variation values were all less than 5% for concentrations within the measured range.

Results and Discussion

Spice: Standard curves were analyzed to obtain intra- and interday precision and accuracy values on the Agilent RapidFire High-Throughput Mass Spectrometry System. The samples were analyzed in triplicate over a four day period. Standard curves in urine had excellent linearity within the measured range (0-7000 ng/mL) with an R² value greater than 0.995. Inter- and intra-day accuracies determined were within 15% and coefficient of variation values were all less than 5% for concentrations within the measured range.

Conclusions

Pans of both salts and spice were quickly, accurately and precisely measured in urine using a simple dilute and shoot method on the Agilent RapidFire/MS/MS system with the potential to add more analytes to these panels. At a peak to peak injection cycle time of less than 15 seconds, the sampling method in capillary chromatography greater than 2000 samples per hour. Using this SPE/MS/MS methodology, increased sensitivity and specificity were achieved compared to traditional screening methods without compromising throughput and speed.

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