Automated and High-throughput Urine Drug Screening using Paper Spray Mass Spectrometry

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Spike and recovery experiments for oxazepam, morphine, and codeine glucuronide were carried out in 200 rimellent clinical urine specimens. Recoveries of >70% was achieved in nearly all cases.

Conclusions

• Rapid glucuronide hydrolysis and automated paper-spray mass spectrometry facilitated a high rate of urine drug screening.

• Cut-off levels were below federally mandated requirements and commonly used forensic laboratory standards.

• Throughput was comparable with immunoassays for large batches with the option of screening for a much wider array of drugs at significantly lower concentrations.

• This method may prove useful for forensic laboratories as an alternative to traditional MS techniques as it allows for up to 10 times the throughput of complex samples without extraction, separation, and sample cleanup.

References and Acknowledgements


Figure 5. Recoveries of codeine (blue), morphine (red), and oxazepam (purple) in clinical urine specimens spiked with respective glucuronides.

The effects of inhibitor compounds on enzyme activity sporadically yielded lower than expected recovery. Significant inhibition of IMCSzyme®RT was infrequent (n=9) and recoveries of <40% were not observed in any urine specimens. Further dilution of urine specimens to reduce inhibition was counterproductive in absence of subsequent sample reclamation.

The method was validated according to SWGTOX guidelines. Limits of quantification were defined as 10 times the standard error of the intercept divided by the slope of the calibration curve.