

Rapid Detection and Quantitation of Drugs-of-abuse in Urine and Oral Fluid

Drug analysis is an essential task in controlling of drug abuse. Nowadays, drug analysis is commonly performed by a two-step strategy, preliminary screening followed by confirmatory analysis, in order to deal with large number of samples and ensure reliability of analytical results. However, the current methods for preliminary screening, including antibody-based on-site screening devices and immunoassay, have the problems of generation of false positive and false negative results, and the present analytical methods in confirmatory analysis, including gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS), commonly require extensive sample preparation for reduction of matrix interference and analyte enrichment that could be time-consuming and laborious. For these reasons, development of simple, rapid and reliable methods for drug analysis has been an important task in drug abuse control.

In this project, we investigated the application of our recently developed analytical method, wooden-tip electrospray ionization mass spectrometry (WT-ESI-MS), for rapid analysis of six common abused drugs, i.e., ketamine, methylamphetamine, cocaine, MDMA, cannabis and heroin, in urine and oral fluid. The WT-ESI-MS involves only little sample preparation and no chromatographic separation, allowing analysis of one body fluid sample within one minute. The experimental conditions of WT-ESI-MS were optimized and a complete experimental protocol was setup for rapid drug analysis. This method was demonstrated to have a broad linear range (3 orders of magnitude) and good accuracy and precision. The sensitivity of this method is generally adequate for real sample analysis of ketamine, norketamine, methylamphetamine and MDMA in urine and oral fluid as well as cocaine in oral

fluid. For analysis of benzoylecgonine and the other two drugs, THC and heroin, and metabolites of these two drugs, further improvement in sensitivity is required to fulfill the analytical requirement recommended for reliable determination. In summary, WT-ESI-MS could be used for rapid detection and quantitation of some drugs-of-use in urine and oral fluid. Further development of more sensitive techniques for rapid and reliable analysis of various drugs-of-abuse is ongoing in our research group.