

Analytical strategies to identify analytes of forensic interest in routine pharmacotoxicology laboratories

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The major tasks in analytical forensic toxicology are the detection, identification and quantification of potentially harmful substances in biological or other relevant specimens. To date, the efforts in the detection and identification of analytes of forensic interest in non-biological samples and in conventional and non-conventional matrices of consumers have emerged as a global analytical challenge involving both classical psychotropic drugs and a large range of NPS. One of the main problems related to the diffusion of NPS is the difficulty of their analytical identification, both in non-biological products and in biological samples collected in cases of intoxication or misuse potentially related to their consumption.

Generally, the detection and identification of psychotropic drugs in conventional and non-conventional matrices include two analytical steps: a preliminary screening aiming to maximize the “diagnostic sensitivity” and identify all “presumptive positives” (even at the cost of including “false positives”), followed by a confirmation step aiming to maximize the “diagnostic specificity” and identify, among the presumptive positives, the “true positives”. The forensic screening step can include colorimetric and immunoassay methods on one hand and chromatographic mass spectrometric screening on the other.

Chromatographic assays coupled to mass spectrometric detection prove to be more suitable due to high flexibility, sensitivity and selectivity for identification of both classical drugs of abuse and NPS and/or their metabolites. A combination of LC-MS, LC-MS/MS, GC-MS, and GC-MS/MS represent the elective techniques and are useful in creating a complete toxicological image. The combination of analytical strategies to confirm the consumption of psychotropic drugs is useful for increased specificity in drug identification, drug metabolite analysis, and also for structural determination.

The described methods and the results presented for real cases suggest that methods for the determination in biological and non-biological matrices need to be continuously updated to include all the substances that continue to emerge on the illegal internet market. Furthermore, analytical methodologies for intoxication or post-mortem cases should be fully developed and validated prior to routine use.

For Forensic Use