A short note on forensic-toxicology.

Marc A LeBeau *

Department of Forensic Medicine, Purdue University, West Lafayette, USA.

Accepted on 25th November, 2021

Description

This This article reviews current applications of various hyphenated low- and high-resolution mass spectrometry techniques in the field of therapeutic drug monitoring and clinical/forensic toxicology in both research and practice. They cover gas chromatography, liquid chromatography, matrix-assisted laser desorption ionization, or paper spray ionization coupled to quadrupole, ion trap, time-of-flight, or Orbitrap mass analyzers. Z-drugs have significant hypnotic effects by reducing sleep latency and improving sleep quality, though duration of sleep may not be significantly increased. Z-drugs exert their effects through increased γ-aminobutyric acid (GABA) transmission at the same GABA-type A receptor as benzodiazepines. Their pharmacokinetics approach those of the ideal hypnotic with rapid onset within 30 min and short half-life (1–7 h). Zopiclone with the longest duration of action has the greatest residual effect, similar to short-acting benzodiazepines. Neuropsychiatric adverse events have been reported with zolpidem including hallucinations, amnesia, and parasomnia. Poisoning with Z-drugs involves predominantly sedation and coma with supportive management being adequate in the majority.

Flumazenil has been reported to reverse sedation from all three Z-drugs. Deaths from Z-drugs are rare and more likely to occur with polydrug overdose. Z-drugs can be detected in blood, urine, oral fluid, and postmortem specimens, predominantly with liquid chromatography–mass spectrometry techniques. Zolpidem and zaleplon exhibit significant postmortem redistribution. Zaleplon with its ultra-short half-life has been detected in few clinical or forensic cases possibly due to assay unavailability, low frequency of use, and short window of detection. Though Z-drugs have improved pharmacokinetic profiles, their adverse effects, neuropsychiatric sequelae, and incidence of poisoning and death may prove to be similar to older hypnotics.

What is Forensic Toxicology?

Forensic toxicology concerns the application of toxicology to situations that may have medicolegal review, and as a consequence, results must stand up to scrutiny in a court of law. There are primarily three subdisciplines of forensic toxicology. Postmortem toxicology, more recently referred to as death investigation toxicology. Behavioral or human performance toxicology, which concerns Impaired driving as a result of alcohol and/or drugs consumption. Drug-facilitated sexual assault cases. Doping control. Screening of athletes for performance-enhancing substances is monitored by the World Anti-Doping Agency. In this category must be included equine and canine toxicology testing, because entire laboratories are dedicated to this specific purpose.

This paper reviews procedures for the detection or quantification of drugs, pesticides, pollutants, and/or their metabolites relevant to clinical and forensic toxicology, doping control, or bio monitoring using gas chromatography–mass spectrometry with negative ion chemical ionization (GC-MS-NICI). Papers written in English between 1995 and 2000 are reviewed. Procedures are included for the analysis of the following halogen-containing or derivatizable compounds in common bio samples, such as whole blood, plasma, or urine, and in alternative matrices such as sweat, hair, bone, or muscle samples of humans or rats: benzodiazepines, cannabinoids, opioids, acetylsalicylic acid, angiotensin-converting enzyme inhibitors, ketoprofen, methylphenidate enantiomers, tegafur, zacopride, anabolic steroids, chlorophenols, chlorpyrifos, hexachlorocyclohexanes, organochlorines, and polychlorinated biphenyls. The principal information on each procedure is summarized in three tables to facilitate the selection of a method suitable for a specific analytic problem.

*Correspondence to:

Marc A LeBeau

Department of Forensic

Medicine

Purdue University

West Lafayette, USA

E-mail: Marc323@yahoo.com