Abuse of Methylenedioxymethamphetamine in Taiwan — Analytical Approaches and Analytes Distribution in Antemortem and Postmortem Specimens

Dong-Liang Lin*[1]* *and Ray H. Liu[1,2], [1]Institute of Forensic Medicine, Ministry of Justice, Taipei, Taiwan. [2]Graduate Program in Forensic Science, Department of Justice Sciences, University of Alabama at Birmingham, Birmingham, AL, U.S.A.*

With increasing requests for the analysis of various specimens related to fatal and non-fatal abuse of methylenedioxymethamphetamine (ecstasy, MDMA), the toxicology laboratory of the Institute of Forensic Medicine has established appropriate protocols for the analysis of MDMA and related compounds in hair, urine, and various postmortem specimens.

Analytical protocols included extraction, derivatization, and GC-MS using deuterated analogs as internal standards. Analytical data include (a) postmortem distribution of MDMA and MDA in heart blood, gastric content, urine, and bile in 14 cases; (b) other drugs found in the heart blood from these 14 fatal cases; and (c) the concentrations of MDMA and MDA in 25 antemortem urine and several hair specimens. Data shown in Table 1 are compared to those reported in the literature. The MDA/MDMA concentration ratio observed in hair specimens appear to be higher than those found in other specimens. Compared to other commonly abused drugs, e.g., cocaine and heroin, the metabolite/parent drug concentration ratio (MDA/MDMA) in hair is significantly higher than the ratios in other specimens, such as urine and blood. This observation is consistent with the relative drug/metabolite incorporation rates reported for cocaine/benzoyl-ecgonine, tetrahydrocannabinol /tetrahydrocannabinoic acid, and MDMA/MDA [8].

Table 1. Highest MDMA level and MDA/MDMA ratio in ante- and postmortem specimens reported from our laboratory

Specimen	Highest MDMA concentration[a]	MDA/MDMA ratio observed Range	Mean	Std dev	Literature reference
Urine (n = 10)	67.115	0.011–0.174	0.061	0.050	[1]
Bile (n = 3)	16.021	<0.001–0.063	0.033	0.027	[2]
Gastric (n = 9)	40.515	<0.001–0.463	0.094	0.154	[3]
Heart blood (n = 10)	4.971	<0.002–0.205	0.082	0.060	[4,5]
Hair (n = 6)[b]	59.91	0.128–0.211	0.160	0.032	[6,7]
Urine (n = 23)[b]	34.454	0.018–0.228	0.101	0.052	

[a] In ng/mg for hair; in μg/mL for other specimens.
[b] Antemortem specimens.

Reference

1. Kunsman G.W. et al. *J Anal Toxicol* 20:517; 1996.
2. Moore K.A. et al. *Forensic Sci Int* 83:111; 1996.
3. Forrest A.R.W. et al. *Forensic Sci Int* 64:57; 1994.
4. Henry J.A. et al. *Lancet* 340:384; 1992.
5. Rohrig T. and Prouty R.W. *J Anal Toxicol* 16:52; 1992.
6. Rothe M. et al. *Forensic Sci Int* 89:111; 1997.
7. Kikura R. et al. *Forensic Sci Int* 94:165; 1997.
8. Nakahara Y. and Kikura R. *Arch Toxicol* 70:841; 1996.

Key Words: MDA, MDMA, Postmortem distribution