

Postmortem Detection of 25I-NBOMe in Fluids and Tissues of a Young Man Who Fell Seven Stories to his Death

Kelly Devers MD⁴, Elise Arbefeville MD⁴, Julia Pearson PhD⁴, Det. Eric Houston⁵, Justin Poklis MS¹, Alphonse Poklis PhD^{1,2,3}

¹Department of Pharmacology and Toxicology, ²Department of Pathology, and ³Department of Forensic Science, Virginia Commonwealth University, Richmond, Virginia
⁴Hillsborough County Medical Examiner Department, Tampa, Florida
⁵Tampa Police Department, Tampa, Florida

ABSTRACT

- We present a traumatic fatality of a 19-year-old man who had ingested blotter paper infused with "acid", which was later identified as 25I-NBOMe [2-(4-iodo-2,5-dimethoxyphenyl)-N-[2-methoxyphenyl)methyl]ethanamine] with the help of the police.
- Initial toxicologic screens of postmortem body fluids and tissues were negative by gas chromatography, mass spectrometry (GCMS) and immunoassay.
- Postmortem specimens were subsequently analyzed by high performance liquid chromatography with tandem mass spectrometry (HPLC/MS/MS) at a reference laboratory.
- Toxicology findings for fluids based on blood or urine calibrators were as follows: peripheral blood, 405 pg/mL; heart blood, 410 pg/mL; urine, 2.86 ng/mL; and vitreous humor, 99 pg/mL.
- Findings based upon the method of standard additions were: gastric contents, 7.1 µg total; bile, 10.9 ng/g; brain, 2.54 ng/g, and liver, 7.2 ng/g.
- To our knowledge, this is the first postmortem case of 25I-NBOMe intoxication documented by toxicologic analysis of tissues and body fluids.

INTRODUCTION

- Early in this decade, many new, initially non-controlled designer drugs appeared on the internet marketed as "Bath Salts", plant fertilizer, insect repellent, etc.
- Many of these drugs were sold with the disclaimer "NOT FOR HUMAN CONSUMPTION".
- Many of these new, synthetic drugs belong to the class of beta-keto derivatives of amphetamine, such as methcathinone, mephedrone, and methylenedioxy ring derivatives similar to MDMA ("Ecstasy"), methylone, et. al.
- Numerous cases of poisoning and fatal intoxication in young adults who have ingested/smoked "Bath Salts" have been reported in Europe, the US, and Japan.
- Some of these drugs are now controlled substances in Europe and the United States.
- Recently, a class of "2C" designer drugs have become easily obtainable over the internet, particularly, 25I-NBOMe (Fig.D).
- Street names include: 25I, INB-MeO, N-bomb, Smiles, Solaris, and Cimbi-5.
- These N-benzyl phenylethamine derivatives are potent serotonin 5-HT_{2A} receptor agonists.
- 5-HT_{2A} is closely linked to complex behaviors: working memory, cognitive processes, and affective disorders such as depression and schizophrenia.
- Recent reports from the popular press and "drug experience" websites indicate that these drugs are the latest in a series of designer "Bath Salt" drugs.



CASE HISTORY AND AUTOPSY FINDINGS

- The decedent was a healthy 19-year-old man with no prior history of alcohol, tobacco, or drug abuse.
- He was reportedly "Trip Sitting" for his friends who were using "acid" on the evening of his death.
- Intentionally or inadvertently, he ingested a square of blotter paper infused with "acid".
- His friends reported that his behavior became bizarre, with paranoia as a prominent feature. He ran from his friends and returned to his apartment. Moments later, witnesses heard a scream and a thud.
- His body was found seven stories below his apartment balcony, on the swimming pool deck (Fig. A).
- The autopsy was performed approximately 7 hours after the decedent's body was discovered.
- Autopsy findings included multiple blunt impact injuries to the head, torso, and extremities, including basilar skull fractures and a complete laceration of the aorta.
- A square piece of plain blotter paper was found after straining the stomach contents (Fig.B).
- Samples of body fluids and tissues were taken for toxicologic testing.
- No non-traumatic abnormalities were identified, either by gross examination or by microscopy.

MATERIALS AND METHODS

- Initial evaluation of the postmortem specimens was via GC, GCMS and immunoassay, yielding negative results.
- Law enforcement was contacted and the lead detective was able to obtain another square of non-ingested blotter paper from the same source.
- Analysis of this blotter paper by GCMS revealed the presence of 25I-NBOMe.
- Samples were sent to an outside reference laboratory in Virginia for further analysis.
- Using internal standards for 25I-NBOMe, postmortem samples were extracted and quantitative analysis was performed using HPLC/MS/MS.
- Calibrators prepared in drug-free whole blood were used to quantify 25I-NBOMe in blood, bile, gastric contents, vitreous humor, and brain and liver homogenates.
- Method validation was performed using the SWGTOX guidelines.

RESULTS

- Initial toxicologic screens of postmortem body fluids and tissues were negative by gas chromatography, mass spectrometry (GCMS) and immunoassay.
- Only bile salts were detected on the blotter paper from the gastric contents. 25I-NBOMe was detected by GCMS on the blotter paper submitted by law enforcement.
- Based on history, a targeted analysis for lysergic acid diethylamide (LSD) by immunoassay and LCMS/MS was performed by an outside reference laboratory, with negative results.
- Toxicology findings as determined by direct analysis and the method of standard addition are listed in Fig. F.



Specimen	TOXICOLOGY FINDINGS	
	25I-NBOMe Direct Analysis	pg/mL or pg/g Standard Addition
Heart Blood	410	ND
Peripheral Blood	405	ND
Urine	2860	ND
Vitreous humor	99	ND
Brain	2780	2540
Liver	5640	7200
Bile	12100	10900
Gastric contents	ND	7.1 µg (total)

CONCLUSIONS

- We present the circumstances of death, autopsy findings, methods, and results of toxicologic analysis from a fatality associated with the ingestion of the novel designer drug 25I-NBOMe.
- Negative postmortem toxicology results in fatalities associated with bizarre behavior or symptoms attributable to hyperstimulation of the sympathetic nervous system should prompt the forensic pathologist to have a high index of suspicion for intoxication with these types of drugs.
- Collaboration with law enforcement can be of great utility in these instances.
- To our knowledge, this is the first postmortem case of 25I-NBOMe intoxication documented by toxicologic analysis of tissues and body fluids.

REFERENCES

- Kelly A, Eisenga B, Riley B, Judge B. Case series of 25I-NBOMe exposures with laboratory confirmation, Clin. Toxicol. (2012)
- Murphy C, Dulaney A, Beuhler M, Kacinko S. Bath salts and plant food products: the experience of one regional US poison center, J. Med. Toxicol. (2013) 9; 42-48.
- Pearson J, Hargraves T, Hair L, Masucci C, Frazee C, Garg U, Pietak B. Three fatal intoxications due to methylone, J. Anal. Toxicol. (2012) 36; 444-451.
- Poklis J, Charles J, Wolf C, Poklis A. High performance liquid chromatography tandem mass spectrometry method for the determination of 2C-NBOMe and 25I-NBOMe in human serum, Biomed. Chromatogr. (2013) Jul 25. doi: 10.1002/bmc.2999. [Epub ahead of print]
- Poklis J, Devers K, Arbefeville E, Pearson J, Houston E, Poklis A. Postmortem detection of 25I-NBOMe [2-(4-iodo-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl)methyl]ethanamine] in fluids and tissues determined by high performance liquid chromatography with tandem mass spectrometry from a traumatic death. Forensic Sci Int. (2014) Jan; 234: e14-20.
- Zuba D, Sekula K, Buczek A. 25C-NBOMe – New potent hallucinogenic substance identified on the drug market, Forensic Sci. Int (2013) 227; 7-14.