K5 Cocaine Overdose: A Fatal Record

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Learning Overview: After attending this presentation, attendees will better understand how high human tolerance can be to cocaine in chronic consumers.

Impact on the Forensic Science Community: This presentation will impact the forensic science community due to the extraordinary case reported: a blood cocaine concentration of 333mg/l was found, the highest recorded concentration of cocaine ever found in overdose death.

The decedent was a 48-year-old White male who police reported had a long history of cocaine abuse; he was found dead in his bathroom between the toilet bowl and the shower, with the door of his house closed from the inside and no evidence of a break-in. Furthermore, his ex-wife reported that he hid drugs under his shoe insoles. Police also discovered some white powder on a bathroom cabinet, which was determined to be cocaine.

The autopsy revealed pulmonary edema and generalized visceral congestion, no foreign body in the airways, and no violent injuries on the corpse. White crystals were found on the decedent's nostrils. A nasal swab and a pulmonary artery blood sample of 25cc were taken and stored at -20°C. Both samples were submitted to the toxicology laboratory of Bari for analysis; samples of vitreous humor, urine, hair, and abdominal fat were taken for further testing.

Due to appropriate fluidity and the suitable quantity of blood taken, the blood sample did not require any dilution in order to be tested. Standard screening protocols were applied during blood testing: Headspace/Gas Chromatograph/Flame Ionization Detector (HS/GC/FID) was used to search for alcohol and the immunochemical method was used to search for drugs (cocaine, methadone, cannabinoids, opiates, barbiturates, benzodiazepines, amphetamines, and tricyclic antidepressants). Positive results were found for cocaine and further testing was conducted by Gas Chromatography/ Mass Spectrometry (GC/MS); a blood concentration for cocaine of 333mg/l, Ecgonine Methyl Ester (EME) of 35.1mg/l, and Benzoylecgonine (BE) of 69.1mg/l was reported. Testing on the nasal swab by GC/MS/FID resulted positive for cocaine, EME and BE, confirming that the drug was administered (or possibly self-administered) intranasally.

The outstanding concentration observed prompted a review of scientific literature to compare it with the ones previously reported. Spiehler and Reed measured blood cocaine concentrations exceeding 20mg/l in three fatalities.[1] Mittleman and Wetli found a blood cocaine concentration as high as 30.9mg/l in their review of 60 cocaine-related overdose deaths.[2] Amon et al. reported a blood concentration of 211mg/l after an ingested bag of cocaine broke in a victim's intestine.[3] The highest blood concentration reported so far in literature was by Peretti et al. of 330mg/l, 1.5 times greater than Amon et al., found in a young woman who had a long history of cocaine abuse.[4]

The last case mentioned jointly with the present one, which records the new highest cocaine blood concentration, offer new insights on human tolerance to cocaine in chronic consumers. Analyzing literature, it seems that nobody but chronic consumers could tolerate doses of cocaine in the order of 10^2mg/l. To confirm this hypothesis, it would be appropriate for the scientific community to report cocaine intoxication cases as much as possible.

Reference(s):

1. V.R. Spiehler and D. Reed. Brain concentrations of cocaine and benzoylecgonine in fatal cases. *Journal of Forensic Sciences*, no. 30 (1985): 1003-1011.
2. R.E. Mittleman and C.V. Wetli. Death caused by recreational cocaine use: an update. *JAMA*, no. 252 (1984): 1889-1893.
3. C.A. Amon, L.G. Tate, R.K. Wright, and W. Matusiak. Sudden death due to ingestion of cocaine. *Journal of Analytical Toxicology*, no. 10 (1986): 217-218.
4. F.J. Peretti, D.S. Isenschmid, B. Levine, Y.H. Caplan, and J.E. Smialek. Cocaine fatality: an unexplained blood concentration in a fatal overdose. *Forensic Science International*, no. 48 (1990): 135-138.

Cocaine Overdose, Toxicology, Highest Blood Concentration

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