K9 Fatal Ephedrine Intoxication in a Chronic Ephedrine User Who Had Cardiovascular Disease

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After attending this presentation, attendees can be expected to enhance their understanding of the possible risk factors for fatal ephedrine intoxication.

This presentation will impact the forensic community and/or humanity by providing additional information to the public indicating a possible risk factor associated with the use of a drug commonly found in dietary supplements.

Introduction: Ephedrine is an alkaloid present in some dietary supplements which has been widely used for body weight reduction and energy enhancement. Although serious adverse reactions have been described in the literature, there is still some controversy over the prevalence of such adverse events and the factors that increase the risk to users of the drug. This presentation describes a fatal ephedrine intoxication in a subject who had arteriosclerotic cardiovascular disease.

Case Study: A 40-year-old male Caucasian was found unconscious and a resuscitative attempt was unsuccessful. The decedent was reported to have used the non-prescription drug "MaxAlert" that purportedly contains 25 mg ephedrine hydrochloride and 100 mg guaifenesin per tablet [1].

An autopsy, conducted approximately 9 hours postmortem, revealed arteriosclerotic cardiovascular disease with the left anterior descending artery 60% occluded with plaque and the right coronary artery 100% occluded. The heart weighed 550 grams. Examination of other organs, including neuropathological analysis of the brain, was unremarkable. Toxicological analysis of cardiac blood was negative for alcohol and disclosed the presence of ephedrine (10.0 mg/L) and phenylpropanolamine (0.8 mg/L). The urine tested positive for ephedrine and phenylpropanolamine.

Toxicological results of autopsied brain and scalp hair: Hair strands, cut close to the scalp, were individually aligned (root-to-tip) and segmented into one inch segments. The resulting three segments were sequentially washed with 3 x 1 mL 1% SDS, 3 x 3 mL MilliQ water, 3 x 3 mL methanol [2]. Deuterated internal standards were added to 20-mg hair, followed by addition of 2 mLs 0.1 N HCl, and subsequent overnight incubation at 37° C. Specimens were buffered to pH 5.5, extracted with a solid-phase procedure, and screened for a panel of selected drugs by liquid chromatography (LC) atmospheric pressure ionization - electrospray (API - ES) mass spectrometry (MS). Ephedrine and methamphetamine, respectively, were detected at the following concentrations: Segment #1, 34.3, and 1.6 ng/mg; Segment #2, 35.9 and 1.8 ng/mg; Segment #3, 41.9 and 1.6 ng/mg hair.

Tissue homogenates (occipital cortex) were also prepared, deuterated standards added, and specimens immediately extracted using the extraction and MS procedures described above with minor modifications. Ephedrine alone was detected in brain at 10.2 ng/mg tissue.

Discussion: The results of the toxicological analyses indicate that the subject used ephedrine both acutely (blood and brain drug positive) and chronically (hair segments drug positive). In addition, the analyses disclosed evidence of some chronic, but not acute, exposure to methamphetamine.

It was proposed at the 2004 AAFS workshop on ephedrine that toxicity to the drug might commonly occur in asymptomatic individuals who have an undiagnosed underlying disease. The findings of the case study are consistent with this possibility as the autopsy disclosed severe cardiovascular disease, a condition that would be expected to predispose the drug user to complications arising from the sympathomimetic property of ephedrine. Nevertheless, the alternate possibility has to be considered that the high concentration of ephedrine found in the deceased could have been sufficient, on its own, to have caused death. In this regard, the concentrations of ephedrine found in blood and brain of this case are similar to those reported in a fatal ephedrine intoxication in which no underlying pathology could be observed at autopsy [3].

The final cause of death was ruled for this case to be ephedrine intoxication and arteriosclerotic heart disease.

Conclusion: The case study finding provides additional support to the proposal that fatal ephedrine intoxication can occur in a subject having underlying cardiovascular disease.

References:

1 http://www.fda.gov/foi/warning_letters/d1218b.pdf

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2 *J Forensic Sci* 2004;49:1106-12.
3 *J Forensic Sci* 1997;42:157-9.

Ephedrine, Cardiovascular, Fatality

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