



K41 Prevalence of Diltiazem in Cocaine-Positive Postmortem Cases in Maryland

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After attending this presentation, attendees will learn about the prevalence of diltiazem in cocaine-positive postmortem cases in Maryland from 1995 through June 2006.

This presentation will impact the forensic community and/or humanity by providing information about the increasing prevalence of diltiazem as a cocaine adulterant.

Diltiazem is a benzothiazepine calcium channel blocker that is indicated for the treatment of hypertension, angina, and supraventricular arrhythmias. In therapeutic situations, diltiazem is typically administered in doses of 60-240 mg daily, producing therapeutic concentrations in the range of 0.1 to 0.3 mg/L. The plasma elimination half-life ranges from 2.8 to 9.2 hours. Adverse effects that have been reported with diltiazem use include weakness, edema, dizziness, nausea, and vomiting. Bradycardia, hypotension, and cardiac failure have been associated with diltiazem overdose.

In humans, diltiazem is extensively metabolized by O- and N- demethylation, deacetylation, N-oxide formation, and conjugation. Many conjugated metabolites are excreted in the urine, while less than 1% of a dose is excreted unchanged.

The Office of the Chief Medical Examiner of the State of Maryland has seen an increase in the frequency of diltiazem in cocaine positive postmortem cases in recent years. Cocaine positive cases received from January 1, 1995 through June 30, 2006 were reviewed to determine the prevalence of diltiazem in cocaine positive cases. Diltiazem and cocaine were identified in an alkaline drug screen, which involved an alkaline extraction of specimens followed by detection with gas chromatography /nitrogen-phosphorous detection and confirmation by gas chromatography / mass spectrometry. The results are summarized below.

Year	# COC positive	# COC and DILT positive cases	% DILT positive cases
1995	446	0	0.0%
1996	464	4	0.9%
1997	496	2	0.4%
1998	493	3	0.6%
1999	443	3	0.7%
2000	382	0	0.0%
2001	235	0	0.0%
2002	446	2	0.4%
2003	483	2	0.4%
2004	444	7	1.6%
2005	422	24	5.7%
2006- 1 st half	256	45	17.6%

As seen in the above data, there has been a dramatic increase in the number of cocaine positive cases containing diltiazem in the past year. The Drug Enforcement Administration first reported cocaine seizures adulterated with diltiazem in 2004.¹ Since 2004, there have been several additional reports of diltiazem adulterated cocaine seizures in various areas of the country.²⁻⁶ When quantitated, the diltiazem content of these seizures ranged from 8 to 20 %. These reports indicated that the reason for the selection of diltiazem as an adulterant is unknown.

The cardiotoxic effects of cocaine include hypertension, myocardial infarction, ventricular and supraventricular arrhythmias and tachycardia. As a calcium channel blocker, diltiazem could potentially offer some protection from the cardiac dysrhythmias induced by cocaine. One study examined the interaction between calcium channel blockers and cocaine in humans and found that pretreatment with diltiazem did not affect cocaine induced increases in blood pressure, heart rate, pupil size or subjective "high" ratings.⁷

Although the reason for adulteration of cocaine with diltiazem is unclear, the identification of diltiazem in a case may assist with identifying the source of the illicit cocaine. While there could potentially be an interaction between the two drugs, this trend is very recent in



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Maryland and the data are too limited to determine if the use of diltiazem as a cocaine adulterant has a role in cocaine-related death cases.

References:

- 1 Peters, DE. Diltiazem HCl: An Analytical Profile. *Microgram Journal* 2004;2(1-4):11
- 2 Cocaine Containing Diltiazem in Deer Park, Texas. *Microgram Bulletin* 2005;38(12):181
- 3 Cocaine in Bamboo Sticks (From Guyana) at JFK Airport, New York. *Microgram Bulletin* 2006;39(6):73
- 4 Diltiazem, Hydroxyzine, and Methylephedrine Identified in Separate Shipments of Cocaine. *Microgram Bulletin* 2004;37(8):137
- 5 Cocaine Containing Diltiazem on the West Coast. *Microgram Bulletin* 2005;38(1):2
- 6 Unusually Sized and Packaged Cocaine Bricks in Rolla, Missouri.. *Microgram Bulletin* 2006;39(7):84
- 7 Rowbotham, MC, Hooker WD, Mendelson, J and Jones, RT. Cocaine- Calcium Channel Antagonist Interactions. *Psychopharmacology (Berl)* 1987;93(2):152

Cocaine, Diltiazem, Postmortem