



K33 Determination of Lidocaine in Postmortem Cases: Direct Implication in the Cause of Death vs. Incidental Detection

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The goals of this presentation are to provide a review of the toxicity associated with lidocaine by multiple means of administration, highlight three postmortem examinations cases since 2007 in which lidocaine played a role in the cause of death, and briefly present an LC/MS/MS analytical method for both lidocaine and its primary metabolite, MEGX. This presentation will impact the forensic community by providing information from actual case studies to better understand and interpret the role of lidocaine in the cause of death. Additionally, comparative data between intentional ingestion versus administration of lidocaine by emergency medical services personnel will be presented to determine if there are any distinguishing factors in the measurements of lidocaine and MEGX.

Lidocaine was discovered in 1948 and today has gained widespread use as a local anesthetic and antidysrhythmic. Lidocaine poisoning results in central nervous system toxicity primarily manifested by seizures and potentially respiratory arrest. Cardiac toxicity may follow to include atrioventricular block, arrhythmias, and cardiac arrest. Toxic events have been reported via multiple routes of administration including subcutaneous, intravenous, and topical. Oral ingestion is considered to be particularly toxic due to extensive first-pass metabolism to MEGX, which is as or more toxic than lidocaine itself and may accumulate due to slower elimination.

Cases are screened for lidocaine by a standard alkaline liquid-liquid and back extraction procedure and analysis by gas-chromatography-mass spectrometry. Quantitative analysis employed a single-step liquid-liquid extraction with data collection performed by LC/MS/MS on an Applied Biosystems API2000. Separations were conducted using an isocratic mobile phase on a Phenomenex Synergi Polar RP column (75 mm, 2 mm, 4 micron). The LC effluent at 0.250 ml/min was introduced to the mass spectrometer via electrospray ionization.

Of the three cases investigated by our office, the first is a suspected case of lidocaine substitution for cocaine. The decedent was a 19-year-old Hispanic male, moderately decomposed, found at his place of residence nude and in front of a laptop computer. Large amounts of white powder and marijuana were observed in the kitchen. Two samples of the powder were tested and both contained lidocaine, benzocaine, and procaine. A trace of cocaine was found in one of the powders. It is unknown if the decedent knew that the primary component was lidocaine. The cause of death was ruled as lidocaine intoxication, manner accident.

The second case involved a 30-year-old Caucasian male with a history of ulcerative colitis who had been hospitalized for six days due to oral ulcers and pain and difficulty swallowing. Treatment included lidocaine and he was discharged with medications including 2% oral viscous lidocaine and Lortab elixir. Early the next morning he was witnessed to consume shots of Gatorade mixed with GHB. He was found unresponsive later that morning. The cause of death was ruled bronchopneumonia due to multiple drug intoxication manner accident.

The final case in the series involved a 27-year-old Caucasian female who was found unresponsive lying in the driver's seat of her car parked on a residential street. A box of diphenhydramine HCl and Bactine antiseptic liquid were recovered from the scene. Cause and manner of death are pending at the time this abstract was drafted; however, there is indication of lidocaine as the primary intoxicant leading to death.

Femoral blood lidocaine and MEGX concentrations the above cases ranged from 3.6 – 39 mg/L and 1.1 – 7.3 mg/L, respectively. Additional data from vitreous samples in all cases and tissue samples from case one will be presented. Lidocaine and MEGX concentrations from cases where administration by emergency medical services personnel is documented will be presented as a basis of comparison.

Lidocaine, Postmortem Toxicology, MEGX