



### K64 Inhalant Abuse: Cases Analyzed for Toluene Over a Three-Year Period

*Justine M. Titko, MSFS\*, NMS Labs, Willow Grove, PA 19090; Lee M. Blum, PhD, NMS Labs, Willow Grove, PA 19090; Dennis J. Miller, DeKalb County Coroner's Office, Sycamore, IL 60178; Ayako Chan-Hosokawa, MS, NMS Labs, Willow Grove, PA 19090*

**Learning Overview:** After attending this presentation, attendees will understand the toluene blood concentrations in suspected overdose death cases and the benefits of pursuing an unknown chromatographic peak observed during the toxicological analysis of a postmortem specimen.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by providing statistical information associated with toluene findings in postmortem cases and provide insight into a specific case of toluene abuse.

This presentation focuses on a review of 56 cases over a three-year period in which toluene was detected via dual column headspace Gas Chromatography with Flame Ionization Detection (GC/FID) (RL=0.3mcg/mL). Of these cases, 52 provided information in the case history about the decedent's gender; 85% ( $n=44$ ) were males, while 15% ( $n=8$ ) were females. The 56 cases were then subdivided into three subcategories based on case history: Huffing or Solvent Abuse Suspected Deaths ( $n=11$ , 20%); Other Causes of Death ( $n=5$ , 9%); and No Case History Provided ( $n=40$ , 71%).

To assess toluene concentrations in postmortem cases, the 11 postmortem cases in which huffing or solvent abuse was suspected were examined. The mean ( $\pm$ SD) blood concentration of toluene in this subset of cases ( $n=11$ ) was  $16.8 \pm 36.2$ mcg/mL (median=3.1mcg/mL; range: 0.63mcg/mL–130mcg/mL). Of the 11 cases, 82% were male and 18% were female. The ages provided for 73% of the cases averaged 45.5 years old (range; 22–62 years old) with the median and mode both at 50 years old. Additional findings observed in these cases included other volatile organic compounds, ethanol, acetone, isopropanol, methanol, prescribed medications, and drugs of abuse.

There was one specific case that illustrated the importance of pursuing an unidentified chromatographic peak during a toxicological examination. The case involved a 63-year-old male found unresponsive at his residence after his mother called the police to perform a welfare check on him. He was found in the basement with a plastic bag over his head and a jar nearby containing a clear liquid that smelled like paint thinner. The decedent had a history of huffing paint thinners for approximately 13 years, and toluene is a known ingredient in some types of paint thinners. Autopsy findings included, but were not limited to, a decomposed body with autolysis of organs, pulmonary edema and congestion, and prostatic hypertrophy.

A routine postmortem toxicology drug panel indicated non-lethal amounts of ethanol and caffeine in cavity blood and a non-lethal amount of ethanol in vitreous fluid. However, the investigation of an unknown substance in an analysis for alkane constituents of solvents resulted in supplemental testing in the cavity blood. First, the blood specimen was analyzed by Gas Chromatography/Mass Spectrometry (GC/MS) using full-scan mode that identified toluene and isovaleraldehyde. Then, the presence of these findings was quantitated by dual column headspace GC/FID. The toluene measured, 2.53mcg/mL, was likely an underreported value because of the volatility of the substance and the handling of the specimen multiple times prior to the analysis for toluene. The cause of death was determined to be toluene intoxication.

Toluene has been abused through the years (e.g., glue sniffing and huffing) because of its ease of accessibility and low cost. Specimens from individuals suspected of inhalant solvent abuse require specialized handling and testing due to the volatile nature of these compounds. Such considerations need to be considered when investigating these types of cases.

#### Toluene, Inhalant, Overdose