



### K39 Suicide by Acute Cyanide Ingestion in a 40-Year-Old Male

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Attendees will learn of the use of an unusual compound in the commission of suicide at the workplace and the methods used to analyze this compound.

This presentation will impact the forensic community and/or humanity by providing a reminder that autopsy findings in acute cyanide ingestions do not necessarily reveal the nature of the poison and not all toxicology laboratories are equipped to perform cyanide screening. It is therefore essential that the circumstances of the fatality and case history be closely examined.

Ingestion of cyanide is a rapid and effective means of suicide. While cyanide is not readily available in the average place of employment, certain occupations do employ its use and subsequently provide access to this deadly poison. This report describes the autopsy findings and laboratory results of an individual with suicidal intent and occupational opportunity to choose cyanide as the means of his demise.

The deceased was a 40-year-old Caucasian male employed in an electroplating facility where potassium cyanide, silver cyanide, and sodium cyanide were routinely used. According to a supervisor at the workplace, the decedent had a history of depression and had recently exhibited suicidal tendencies. A family member stated that the decedent's brother had committed suicide in 1979. During the morning break period at the electroplating facility, the decedent slipped away unnoticed and was found minutes later unresponsive at his desk. The medical response team initiated CPR and observed a bluish facial color and foaming at the mouth. He was transported to the Lake County Coroner's Office for autopsy. External examination of the body was unremarkable, with notation of an oral endotracheal tube and a 1½-inch irregular laceration of the left posterior parietal scalp. Internal examination revealed severe pulmonary edema. Examination of the gastro-intestinal system gave no indication of esophageal or gastric mucosa inflammation. Microscopic description of the lung indicated intra-alveolar hemorrhage and vascular congestion. No other significant findings were reported.

Routine toxicology testing, including a volatile screen, drugs of abuse screen and general drug screen, was performed on postmortem blood with negative results. Qualitative detection of cyanide was performed using the Merckoquant Cyanide Test [Merck KGA, Darmstadt, Germany] with a blue/lavender color indicating the presence of dissociable cyanide ions. The limit of detection of the qualitative method is 0.2 mg/L. Confirmation and quantitation of positive results was achieved by separation using microdiffusion and measurement with an electrode selective for cyanide ions. A five point curve utilizing 0.5, 2.0, 10, 50, and 100 ppm blood calibrators was generated; correlation coefficient = 0.99556. A low control of 1.0 ppm and a high control of 20.0 ppm were included. The limits of detection and quantitation were determined to be 0.1 ppm and 0.2 ppm, respectively. Linearity was demonstrated from 0.1 – 100 ppm. Analysis of available biological fluids and tissues was performed with the following cyanide results: blood (cardiac) 261.3 mg/L, blood (femoral) 13.7 mg/L, gastric contents 7024 mg/L, urine 1.3 mg/L, vitreous humor 4.5 mg/L, lung 25 mg/kg, liver 6.3 mg/kg, spleen 314 mg/kg. The death was ruled a suicide caused by acute cyanide intoxication.

Cyanide can be detected in the general population in blood concentrations of 0.040 mg/L or lower, with elevated results common in smokers. Reports of suicide in the U.S. by cyanide ingestion are infrequent, and, as this fatality demonstrates, are generally associated with individuals in occupations that employ the use of hydrocyanic acid and its sodium and potassium salts (such as chemists, metal polishers, exterminators, jewelers, and electroplaters). Autopsy findings in acute cyanide ingestions do not necessarily reveal the nature of the poison and not all toxicology laboratories are equipped to perform cyanide screening. It is therefore essential that the circumstances of the fatality and case history be closely examined.

#### **Cyanide, Suicide, Occupational Opportunity**