



### E60 Death Due to Unintentional Dichloromethane Inhalation: A Case Report and Cautionary Tale

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**Learning Overview:** After attending this presentation, attendees will understand the safe and thorough medicolegal death investigation practices needed to: (1) interview those in contact with the victim prior to death; (2) review the victim's social circumstances and medical records; and (3) ensure effective coordination and collaboration with emergency medical services, fire, law enforcement, and Hazardous Materials (HAZMAT). Attendees will also understand specific challenges associated with the scene evaluation, evidence collection, body transport, autopsy protocol, and toxicology testing in a case of fatal hydrocarbon intoxication.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by discussing fatal Dichloromethane (DCM, methylene chloride) exposure and the vital medicolegal death investigation procedures needed to ensure a safe and accurate evaluation of these fatalities.

The true epidemiology of hydrocarbon exposure, morbidity, and death is difficult to determine from available data sources. DCM is a halogenated hydrocarbon commonly found in paint removers, cleansers, degreasers, and aerosol propellants. Reported intoxications from DCM have occurred from inhalation, dermal, ocular, and/or oral exposure. Deaths resulting from unintentional methylene chloride inhalation appear to be relatively uncommon. A colorless, non-flammable liquid with sweet, chloroform-like odor, DCM can rapidly induce general anesthesia when inhaled.

Acute toxic effects may begin immediately upon inhalation with the development of confusion, dizziness, shortness of breath, numbness, nausea, vomiting, and fatigue. Prolonged exposure may lead to lethargy, unconsciousness, and death. The organs primarily affected by DCM are the liver and brain, although an association with cardiovascular disease has also been reported. Unlike other hydrocarbon compounds, DCM is metabolized by liver P450 mixed-function oxidase to carbon monoxide. As a result, significant, delayed, and prolonged carboxyhemoglobinemia has been described.<sup>1-3</sup>

The decedent was a 31-year-old Caucasian male found unresponsive on the floor inside the walk-in refrigerator of his cold brew coffee business. Emergency Medical Services (EMS) were notified and the victim was pronounced dead at the scene. It was determined that he had collapsed while applying a liquid, sprayable paint stripper product containing dichloromethane and methanol. On scene, EMS personnel described the presence of existing and pungent chemical fumes. A HAZMAT team responded to detect, contain, and remove the material, monitor scene safety, and decontaminate the decedent prior to transport and autopsy.

This presentation will include discussion of the history, scene, practices, and personal protective equipment used by the victim, as well as the challenges associated with safe and effective evidence collection in presumed toxic exposures. Pathology and toxicology findings specific to this case will be presented in the context of DCM fatalities previously published in the peer-reviewed literature. Education of the forensic community and the consumer regarding the proper use of hydrocarbon products and their potential hazards is critical to the prevention of toxic and perhaps fatal exposures. Coordination and collaboration with multiple agencies will be necessary for the safety of those involved as well as the accurate determination of cause and manner of death.

#### Reference(s):

1. S. Dhillon, R. Von Burg. Toxicology Update-Methylene Chloride. *Journal of Applied Toxicology*. 1995, 15(4), 329-335.
2. G. Fechner, Ortmann, A. Du Chesne, H. Köhler. Fatal Intoxication Due to Excessive Dichloromethane Inhalation. *Forensic Science International*. 2001, 122, 69-72.
3. David D. Gummin. Hydrocarbons. In: *Goldfrank's Toxicologic Emergencies*, 10th Edition. Ed.: Robert S. Hoffman et al., McGraw Hill Education, New York, NY, 1334-1345.

#### Paint Stripper, Dichloromethane, Inhalation