G88 Diesel Fumes Do Kill: A Case of Fatal Carbon Monoxide Poisoning Directly Attributed to Diesel Fuel Exhaust

Sean M. Griffin, MS, and Donna M. Hunsaker, MD, Office of the Chief Medical Examiner and the University of Louisville Department of Pathology and Laboratory Medicine, 810 Baxter Avenue, Louisville, KY 40204-1702; Kiran Charturvedi, MD, University of Kentucky Medical Center Department of Pathology and Laboratory Medicine, University of Kentucky, 800 Rose Street, Lexington, KY 40536; Michael K. Ward, BS, KY State Forensic Toxicology Laboratory, 100 Sower Boulevard, Frankfort, KY 40601; and Andrea R. Terrell, PhD, American Institute of To xicology, 2265 Executive Drive, # A, Indianapolis, IN 46241*

The goal of this presentation is to present a novel case of fatal carbon monoxide (CO) poisoning directly attributable to diesel fuel exhaust, a previously unreported and perhaps under-recognized source of CO.

This presentation will impact the forensic community and/or humanity by reporting to the forensic community an under-recognized and potentially fatal source of CO poisoning. Exhausts emitted from diesel fuel, although possessing lower levels of CO than exhaust from gasoline fuel, are nevertheless a conceivably dangerous source of CO. Through this three-part research project prompted by this single case, the authors aim to promote further awareness that CO intoxication can occur from inhalation of diesel exhausts, similar to open-air intoxication and, most importantly, to emphasize that it is preventable.

This presentation will fully examine a case of CO poisoning brought to autopsy as a possible work-related natural death in Louisville, Kentucky. The death was initially considered to be caused from complications of ischemic heart disease (IHD), pending toxicological analysis that included a CO level. The CO was ordered at the time of autopsy because the victim was found in the secure cab of a running diesel engine semi-trailer truck at a rest stop. When the toxicology results showed high levels of blood carboxyhemoglobin, the death was recertified as CO intoxication secondary to inhalation of [diesel] vehicular exhaust fumes. This case will illustrate how diesel fuel can potentially serve as a source of CO in fatal and nonfatal poisonings.

Often called the "*silent killer*," CO is the most common fatal poisoning in the United States, claiming 1,000 - 3,500 lives every year. Although suicides constitute the majority of fatalities in CO poisoning, accidents account for approximately 30% of annual deaths. CO is produced by the incomplete combustion of organic material, and high concentrations can rapidly accumulate under many different scenarios. The most common sources of fatal CO intoxication are from inhaled fumes in fires or motor vehicle emissions. Typical accidental poisonings usually involve unsuspected increased CO levels in enclosed environments, which can include secured motor vehicles, closed residential or parking garages, car washes, homes, and even tents. Open air CO intoxication is a wellknown potential hazard in boating-related activities. CO poisoning has been notoriously attributed to the inhalation of fumes emitted from the gasoline powered motor vehicular exhaust when personal-use automobiles were involved, even when the engine possessed a catalytic converter. In the U.S., a very small fraction of personal automobiles have a diesel engine. While it is known that diesel fuel combustion engines produce much lower levels of CO than gasoline engines, these CO emissions could certainly rise to lethal levels given a sufficient amount of time in an enclosed space and under suitable environmental conditions.

The case involves a moderately decomposed 52-year-old male truck driver found prone between the sleeper and driver compartments of a secure tractor trailer truck. The initial cause of death attributed to IHD was amended after the toxicology results from the Kentucky Office of Forensic Toxicology (OFT) showed a blood carboxyhemoglobin saturation of 67% by differential spectrophotometry. The amended cause of death was attributed to CO intoxication sustained from inhalation of motor vehicular exhaust. IHD was considered a significant factor contributing to his death.

Because of the unique source of fatal CO intoxication in this case, the contributory IHD, and the possible contaminants in the putrefied blood, a 10 year retrospective review was conducted of all non-fire related CO deaths autopsied at the Office of the Chief Medical Examiner in Louisville, KY from 1994-2003. The review compared this case to gross autopsy and toxicological findings and scene investigation of 116 postmortem cases. Specifically examined were severity of heart disease, degree of postmortem decomposition, and evidence of cherry red skin discoloration present at autopsy and scene description. In addition, for confirmation of the validity of the carboxyhemoglobin detection method used by the Kentucky OFT, blood samples from cases representing varying degrees of decomposition along with controls were submitted to two different commercial laboratories and one federal laboratory. The carboxyhemoglobin concentrations were measured using three different laboratory methods. The results from the commercial and federal laboratories were compared to the Kentucky OFT results and were found to show no statistically significant differences in measured carboxyhemoglobin concentration. Lastly, an extensive

 ** Presenting Author*

literature search and personal communication yielded no reported cases of fatal CO poisoning, accidental or suicidal, attributed to diesel fuel exhaust.

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 ** Presenting Author*