CASE REPORT

Vincent J. M. DiMaio,[1] *M.D. and Suzanna E. Dana,*[1] *M.D.*

Deaths Caused by Carbon Monoxide Poisoning in an Open Environment (Outdoors)

REFERENCE: DiMaio, V. J. M. and Dana, S. E., **"Deaths Caused by Carbon Monoxide Poisoning in an Open Environment (Outdoors),"** *Journal of Forensic Sciences*, JFSCA, Vol. 32, No. 6, Nov. 1987, pp. 1794-1795.

ABSTRACT: Three deaths as a result of inhalation of carbon monoxide from the exhaust fumes of automobiles are reported. All deaths occurred outside and not in a structure. The individuals were white males, ages 24 to 26 years. Blood carboxyhemoglobin concentrations ranged from 58 (in a decomposing body) to 81%. The three cases illustrate the fact that even in the outdoors death from carbon monoxide inhalation can occur if an individual is in close proximity to a rich source of carbon monoxide.

KEYWORDS: pathology and biology, carbon monoxide, suicide

Most deaths as a result of carbon monoxide are accidental in manner, occurring during a fire. Less common are suicides. Inhalation of carbon monoxide as a method of suicide generally ranks fourth in frequency, behind shooting, hanging, and ingestion of drugs. Regional differences do occur, however. Both accidental and suicidal deaths as a result of carbon monoxide almost invariably occur in a structure or vehicle, that is, a closed environment. In suicides, the most common source of carbon monoxide is automobile exhaust. The individual either starts a vehicle in a closed garage or runs a hose from the exhaust into the cab.

In the past year, the Bexar County Medical Examiner's Office has had three suicides caused by carbon monoxide from inhalation of automobile exhaust where the death occurred outdoors.

Case 1

Case 1 was a 24-year-old white male found dead in an open field, lying on his back, with his head and right arm adjacent to the exhaust pipe. The right arm, which was just under the bumper, had been seared and blackened by the hot gases from the exhaust. The body was lying at a tangential angle to the left rear end of the car, such that only the deceased's waist was under the car, with his head approximately 1 to 2 ft (0.3 to 0.6 m) back from the bumper and exhaust pipe.

Received for publication 19 Feb. 1987; accepted for publication 7 April 1987.

[1]Chief medical examiner and deputy chief medical examiner, respectively, Bexar County Medical Examiner's Office, San Antonio, TX.

A complete autopsy was performed. Toxicological examination of the blood for alcohol: acid, basic, and neutral drugs and cannabinoids revealed blood concentrations of 79% carboxyhemoglobin, 2.1 ng/mL of tetrahydrocannabinol, and 124.4 ng/mL of carboxytetrahydrocannabinol.

Case 2

Case 2 was a 26-year-old white male found behind his car in the parking lot of his apartment. He was face down on a pillow, with his body from the waist down under the rear of the vehicle. A vacuum cleaner hose ran from the exhaust pipe to the left side of the face, with a brick holding down the end of the pipe. There were burns on the back of the left elbow as a result of the hot gases of the exhaust.

A complete autopsy and toxicological studies were performed. Toxicological screening of the blood for alcohol: acid, basic, and neutral drugs revealed a carboxyhemoglobin concentration of 81%, alcohol of 0.03 g/dL, 0.77 mg/L of propoxyphene, 0.71 mg/L of norpropoxyphene, and 0.187 mg/L of nordiazepam.

Case 3

Case 3 was a 25-year-old white male found lying completely under a car with his head in the area of the exhaust pipe. The body was in a moderate state of decomposition.

A complete autopsy was performed. A toxicological examination of the blood for alcohol was done. Acid, basic, and neutral drugs and narcotics revealed only the presence of carboxyhemoglobin at a concentration of greater than 58%.

Discussion

The affinity of hemoglobin for carbon monoxide is from 250 to 300 times that for oxygen. The percentage of carbon monoxide in the exhaust of gasoline engines is greater in an idling automobile than in a moving one. The amount of carbon monoxide in such an exhaust may range up to 7% (70 000 parts per million). In Japan, the limit for carbon monoxide in automobile exhaust gas is estimated at less than 4.5% for an idling engine [*1*]. Breathing such an atmosphere in a closed environment can lead to a fatal level of carboxyhemoglobin in less than 15 min. Before these 3 cases, all the suicides from carbon monoxide the authors have encountered were in closed structures, for example, a house, a garage, a car. These 3 cases illustrate the fact that death from carbon monoxide can occur in the outdoors if an individual is in close proximity to a rich source of carbon monoxide.

Reference

[*1*] Tsunenari, S., Kanda, M., Yonemitsu, K., and Yoshida, S., "Suicidal Carbon Monoxide Inhalation of Exhaust Fumes," *American Journal of Forensic Medicine and Pathology,* Vol. 6, No. 3, Sept. 1985, pp. 233-239.

Address requests for reprints or additional information to
Vincent J. M. DiMaio, M.D.
Bexar County Medical Examiner's Office
600 N. Leona
San Antonio, TX 78207