



Pathology/Biology Section - 2015

H54 Hydrogen Sulfide Fatality From a Domestic Sink Drain Exposure

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After attending this presentation, attendees will be aware of the potential lethal effects of sewer gas in the home setting. Attendees will learn of the potential hazards of hydrogen sulfide exposure, autopsy findings, and toxicology sampling and results.

This presentation will impact the forensic science community by stressing the importance of scene investigation, autopsy findings, and toxicology results in order to determine the cause of death in hydrogen sulfide exposure from sewer gas in a home death.

Often referred to as “pit gas” or sewer gas, hydrogen sulfide is a highly toxic gas. It is naturally produced by decaying organic material in the absence of oxygen and is a byproduct of many industrial processes. Its toxicity most often occurs in occupational settings such as petroleum refineries, commercial fishing holds, and pools of sewage sludge or liquid manure. Fatalities often involve exposure to high concentrations of hydrogen sulfide (>150ppm).

Hydrogen sulfide concentration as low as 0.03ppm can be easily detected by its characteristic rotten egg odor. Respiratory tract irritations occur between 50-100ppm. Olfactory nerve paralysis, causing a loss of ability to smell the characteristic odor, occurs between 100-150ppm. Pulmonary edema occurs within 300-500ppm; levels of 600-800ppm are promptly fatal.

Clinical presentation of hydrogen sulfide toxicity includes headache, nausea, and vomiting. High-dose exposure may result in unconsciousness, seizure, and coma. Massive exposure can cause cardiovascular and respiratory failure leading to death. Diagnosis of hydrogen sulfide poisoning is generally made on the basis of history and clinical presentation. Laboratory diagnosis is helpful and is made through measurement of sulfide, thiosulfate, and sulfhemoglobin concentrations.

A 44-year-old White female with a past history of asthma was attempting to unclog a drain under a kitchen sink in her residence. She was discovered by her roommate unconscious on the kitchen floor with her head inside the cabinet under the sink. The drain pipes and drain trap had been removed by the subject and a solution known as “Liquid Fire” had been poured in the drain. Her roommate called 911 and the police and fire department arrived at the scene. The responding officer described the horrific sewer gas smell coming from the house. The subject was immediately transported to a local hospital where she was pronounced deceased.

An autopsy revealed a dusky gray-green discoloration to the gray matter of the cerebral hemispheres due to sulfur compounds. Histologically, the cortical neurons exhibited focal early hypoxic changes. The lungs exhibited moderate pulmonary edema and focal bronchioles with mucus plugs consistent with a history of asthma.

Toxicological analyses in hydrogen sulfide poisonings include measurement of sulfide and thiosulfate in various body fluids and tissues. Thiosulfate, in urine, is considered better than sulfide in the detection of sulfide exposure. Thiosulfate concentrations reported in fatalities range from 2.8-72.6mcg/mL. Sulfhemoglobin is another marker for hydrogen sulfide exposure. In unexposed subjects, the concentration of sulfhemoglobin is <1% in blood. In this case, the urine thiosulfate concentration was 15.5mcg/mL and the blood sulfhemoglobin concentration was 6.3%. The drug screen was positive for cannabinoids and methamphetamine (378mg/mL).

Based on the circumstances surrounding the death and the findings at autopsy, the subject of this case report died as a result of hydrogen sulfide intoxication with methamphetamine abuse and asthma as contributing factors. The manner of death was accidental.

Pathology, Sewer Gas, Hydrogen Sulfide