

## Three unusual cases of CO poisoning with each two victims

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### Abstract

**Aim:** Fatal accidents with CO-intoxication were typically observed after burnings, the use of defected stoves, heaters and the use of so-called indoor barbecues. On suicidal purpose CO-source of choice is often car exhaust. Extraordinary CO-sources are presented in the following three cases due to suicidal intentions as well as accidental reasons.

**Methods/Case Reports:** In the first case, two brothers were found dead in a tent which was placed in a room with an open window. In the tent, eleven broken yellow bags which were fitted with a tube at their openings were found. In the second case, a couple built a kind of stake with 10 sacks containing total 50 kg of thermite. With the intention to blow themselves they set fire to the house. Later the two dead bodies could be located under charred blankets on top of the stake. The thermite piles remained untouched by the fire. In the third case, two men were discovered dead in the morning in a transporter. A gas-powered refrigerator has been in the vehicle for the whole night.

**Results and Discussion:** In all cases, high CO-Hb-concentrations were detected in femoral blood. Further chemical investigations revealed no toxicologically relevant substances including ethanol. In the first case, the way of filling the CO-gas into the bags by the younger brother could not be reconstructed up to now. The death of the elder brother, who probably entered the room secondly and opened the window, was assumingly an accident. In the second case, the couple died because of a CO-intoxication due to the burning roof framework. In the third case, the long use of a gas-powered refrigerator in a transporter resulted in a fatal accident.

**Conclusion:** Next to the well known CO-sources new dangerous CO-producing devices can be found in the environment of victims of suicidal and accidental cases of CO-intoxications.

### 1. Introduction

Per year about 1500-2000 cases of carbon monoxide intoxications are recorded in Germany whereupon not all are fatal [1, 2]. On the one hand, the intoxications can be conditioned by accidents e.g. caused by fires, the inappropriate usage of stoves and gas heaters or by the use of so called indoor barbecues. On the other hand, carbon monoxide is also ingested due to suicidal intentions e.g. by inhalation of exhaust emissions [3, 4]. In the following, three cases of extraordinary carbon monoxide intoxications, each with two victims, are described.

### 2. Material and Methods

#### 2.1. Case No 1

A mother found both of her sons dead in a room in which a tent was built up. The setting was as follows: The window in the room was open. The younger son was lying face down with half of his upper part of the body in the tent (figure 1), the older son was lying in the tent on

his back. There were 11 bin bags (so-called “yellow bags” = “Gelbe Säcke”) in the tent which were provided with a plastic hose at the opening. The end of the hose which was reaching out of the bin bag was bent back and stuck together with sticky tape (figure 2). The bin bags were imploded and interspersed with holes. A letter saying “Caution Gas” was lying in front of the tent. Furthermore one had found two farewell letters from the older son.



Fig. 1. Tent with the destroyed bins.



Fig. 2. Discovered bins.

## 2.2. Case No 2

In the wee hours of the morning, a fire in a house was reported by pedestrians. The fire brigade found a car parked diagonally on the drive way with a letter warning about thermite stuck under the windshield. Because of the danger regarding thermite, the fire was left to burn out under supervision. At the same time, boxes packed with personnel belongings which had labels stuck to them with names of different people, were found in a shed.

After the extinction a kind of pyre was found in the center of the building (figures 3 and 4). The pyre was set up out of several layers of charcoal. About 10 5kg sacks of thermite were placed on top (figure 5). These were furnished with fuses. The pile was covered with blankets and the dead bodies of a married couple, who were the owners of above mentioned property, were lying on top.

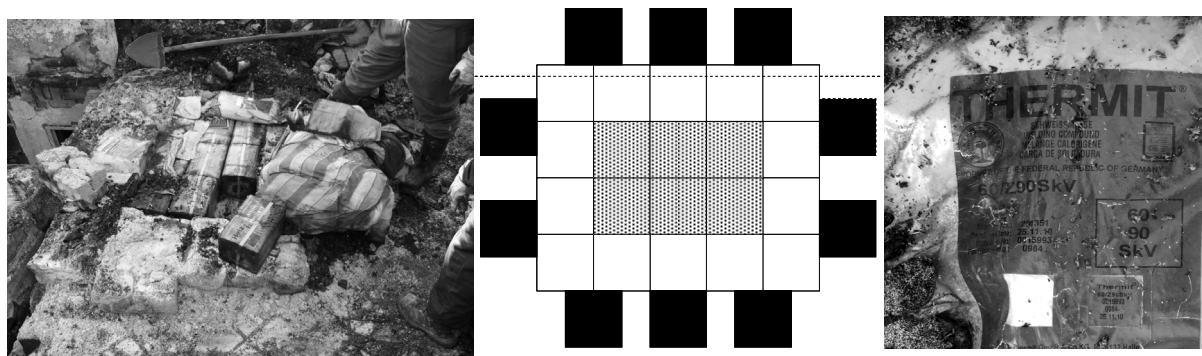


Fig. 3 (left). Discovered pyre. Fig. 4 (middle). Schematic diagram of the pyre (black: sacks of thermite, furnished with fuses, white: lump charcoal; dotted: bunched charcoal, dashed line: broken ceiling). Fig. 5 (right). Sack of thermite.

## 2.3. Case No 3

In the morning before a motocross-race, two dead men were found on the area of a motocross-race track in the back of a van lying in sleeping bags. According to witnesses, the two men

had laid down in the van the evening before to sleep. On the loading space of the van a gas-powered fridge and the according gas bottle were found.

## 2.4. Chemical Analysis

A routine chemical-toxicological analysis was performed in all cases in blood, urine and other tissues (immunological investigations, GC/MS-Screening (Pfleger-Maurer-Weber), HPLC-DAD-Screening (Pragst-Erxleben), LC/MS-MS-Screening (Cliquid), determination of ethanol and cyanid). Furthermore a photometric CO-Hb analysis in femoral blood was performed.

## 3. Results and Discussion

### 3.1. Results of the Autopsy

All of the corpses showed correspondingly light-red livor mortis, cherry-red livor mortis in the area of the nailbeds as well as a salmon colored musculature and cherry-red heartblood. Furthermore, brain and lungs featured distinct increased blood- and water-content and the blood-content in the inner organs was highly increased.

As far as a judgment was possible, none of the corpses had indications for a death causative internal affection. Neither did they show an external forceful impact which may have caused the death and taken place immediately beforehand.

### 3.2. Results of the Toxicological Analysis

In all cases high CO-Hb-concentrations were detected in femoral blood. The results of the photometric analysis are listed in table 1. In further chemical investigations no toxicologically relevant substances including ethanol were detected.

Tab. 1. Results of the photometric CO-Hb analysis.

Case	CO-Hb [%]
Case No 1	
Older Son	78 % CO-Hb
Younger Son	75 % CO-Hb
Case No 2	
Husband	56 % CO-Hb
Wife	70 % CO-Hb
Case No 3	
First Man	72 % CO-Hb
Second Man	80 % CO-Hb

### 3.3. Possible Course of Events

*Case No 1.* The older son built up the tent in his room, filled 11 bin bags with CO-containing gas and went into the tent which he then sealed with sticky tape. He perforated the bags, inhaled the gas and died. His younger brother came into the room looking for him. As he saw the note warning about gas he opened the window. Despite the open window the CO-

concentration in the tent was still too high, and when he leaned into the tent he also inhaled a fatal CO amount.

Questionable until today is how the older brother got in possession of the CO-gas and how he filled it into the bin bags. All bags were provided with plastic tubes at the opening. The end of the tube which was reaching out of the bag was bent back and stuck together with sticky tape. Neither gas bottles nor other chemicals were found in the household.

*Case No 2.* Thermite is a mixture consisting out of ferric oxide and aluminium grit. It is used for welding and in order to connect iron parts (e.g. railway tracks) because of its extremely high heat development (up to 2400 °C) after only a few seconds leading to pure, white-glowing iron. The ignition is carried out by magnesium. The thermite-reaction was discovered by Hans Goldschmied in the 1890's and was patented in 1895 [5]. Due to the manufacturers labelling on the plastic bag (figure 5) and the batch-number, one could determine that the product was mainly sold to local track work companies. Through the internet thermite can be purchased without any restrictions.

Obviously the married couple had decided to depart their lives together. They placed thermite at several places in the house and built up a pyre in the centre in front of which a bowl filled with charcoal was lit. The couple died due to the carbon monoxide ingestion which was produced during the combustion of the charcoal. The fire brigade did not extinguish the fire immediately, they let it spread across the whole house producing a huge amount of debris, which covered the pyre and stopped the thermite from exploding.

*Case No 3.* The two men wanted to spend the night in their van which had a gas-powered fridge (propane gas) on the loading area. Because of the inappropriate build up i.e. there was no sufficient aeration and because all windows of the van were closed due to the cold outside temperature, the CO-concentration increased inside of the van during the night which caused the death of the two men.

#### 4. Conclusions

In summary, all three cases show that carbon monoxide intoxications are a frequent cause of death despite or rather because of the high degree of familiarity and popularity. In addition to the well known carbon monoxide sources, e.g. exhaust emissions or broken ovens, there are numerous other sources that are less common but not the less a health hazard.

#### 5. References

- [1] Muggenthaler K-H, Busch R, Helm M, Lackner Chr K. Akute Kohlenmonoxid-Vergiftung, In: König B, Reinhardt D, Schuster H-P (Hrsg.). Kompendium der praktischen Medizin, Springer, Heidelberg, 2000, 1469-1477.
- [2] Schmidt P, Musshoff F, Dettmeyer R, Madea B. Ungewöhnliche CO-Intoxikationen. Arch Kriminol 2001;208:10-23.
- [3] Hartwig S, Tsokos M. Suicidal and accidental carbon monoxide poisonings due to charcoal fires in closed spaces. Arch Kriminol 2008;222:1-13.
- [4] Brooks-Lim EW, Sadler DW. Suicide by burning barbecue charcoal: three case reports. Med Sci Law. 2009;49:301-306.
- [5] Holleman A F, Wiberg E. Lehrbuch der Anorganischen Chemie, 100. Auflage, Walter de Gruyter, Berlin New York; 1985, 869-870.