

## Dangerous Gases and Poisoning: A Literature Review

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### Abstract

**Introduction:** The poisonous gases is the probability of a potentially event that happened within a period of time and in a particular area. Purpose: The purpose of this study is the literature investigating the effect of poisonous gases on human health and the measures to address them.

**Material and methods:** It was conducted a review in researches in Greek and international databases (Medline and Scopus) with the following keywords: poisonous gases human health and combinations of them. Results: From literature, is shown the poisonings by dangerous gases are far too many. They especially appear in cities and many of them are fatal. If we are careful enough, there is no need to worry. In case of poisonous gases it is required citizens' direct actions, such as the immediate removal from the area and taking appropriate measures to minimize the impact on human health.

**Conclusion:** The poisonous gases have a significant impact on human health. Appropriate training for the prevention and treatment of health problems during poisonous gases, so as to minimize losses.

**Keywords:** Poisonous gases; Human health; Effects

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### Introduction

Poisonous substance enters the human organism via a variety of routes including inhalation, oral intake, parenteral administration or dermal contact [1]. To confrontation the risks, it must be possible to identify and measure the poisonous substance in order to assess its effect on the human body [2]. Nowadays, with the increasingly rapid development of technological media, the rapid growth of industry, the hundreds of cars that circulate every day in the streets of major cities, the use of pesticides and other poisonous substances for the exaggerated production of products increased the pollution of the atmosphere resulting in the daily exposure of humans to small concentrations of harmful gaseous substances such as carbon monoxide and carbon dioxide which have serious harmful effects on humans health [3]. The factors that can lead to poisoning are related to the physicochemical.

Characteristics of the substance and the conditions of exposure to the substance or poison such as the dosage, the route of entry into the body and the duration of exposure. Additionally, not only are the individual factors such as gender, age, bodyweight, diet, physical fitness major risk factors, but also environmental factors and weather conditions or chemical agents [4].

Generally, the rate of poisoning is higher in urban areas and especially in large ones. This is because the conditions in those areas help the development of poisoning. There are not recreation areas and sports grounds for children to play there freely. Moreover, life in urban areas is more stressful. In these areas, there more suicide attempts seem to be reported [5]. Although the number of poisoning cases does not seem to decrease nowadays, deaths from poisoning have decreased because there are far better and more precise treatment plans than ever [6].

### Purpose

The purpose of this review study was to list information about the effect of poisonous gases on human health and the measures to address them.

## Methodology

The study material has recently been articles on the topic were found mainly in the electronic database Medline and the Association of Greek Academic Libraries (HEAL-Link) with the following keywords: poisonous gases human health and combinations of them.

## Poisoning By Dangerous Gases

Poisoning by dangerous gases are far too many. They especially appear in cities and many of them are fatal. If we are careful enough, there is no need to worry. The most common gas poisonings that cause toxicity in our daily life are carbon monoxide and carbon dioxide poisoning, poisoning by insecticides and general everyday products [1].

### Carbon monoxide poisoning

Carbon monoxide (CO) is a poisonous gas that is generally released during incomplete combustion. Of particular importance are the exhaust emissions of cars so that in enclosed parking lots carbon monoxide levels may even reach lethal levels. Tobacco smoke and intense traffic are primarily responsible for human exposure to this substance [7].

There is wherever significant combustion occurs. For example, forest fires produce huge quantities, but because the fires are uneven in the distribution, the gases dissolve from the prevailing winds. Higher concentrations of people usually exposed (except for smoking) are observed in densely populated urban areas with high traffic congestion [2]. Tens of millions of people live in countries where air quality threatens health. Larger problems due to the concentration of carbon monoxide are faced by cities with heavy traffic congestion and poor ventilation [8].

It causes damage that is essentially due to the body's deprivation of oxygen. When inhaled, it binds blood hemoglobin, displacing oxygen. The name of the complex created by carbon monoxide and hemoglobin is called carboxyhemoglobin. The percentage of carboxyhemoglobin in blood is the best indicator of carbon monoxide exposure [9].

Depending on its concentration in the air, CO can cause cardiac and pulmonary disorders, behavioral disturbance, central nervous system involvement and movement and vision disorders, headache, fatigue, coma, breathlessness and even death. It is particularly dangerous in enclosed spaces where its presence is difficult to perceive [10]. Symptoms are often described as "flu-like" and commonly include headache, dizziness, weakness, vomiting, chest pain, and confusion. Large exposures can result in loss of consciousness, arrhythmias, seizures, or death. Long term complications may include feeling tired, trouble with memory, and movement problems [11].

### Interventions [12]:

- Removes the person from the poisoning area.
- If it does not breathe, it is necessary to perform artificial respiration.

- Advice together, you should notify a doctor or transfer the victim to hospital.
- The poisoned person ought to stay in hospital for observation and supportive therapy.
- In severe cases, hypothermia might be caused.
- Closely monitor of the patient after his recovery from the poisoning.

The place where there is risk of carbon monoxide poisoning must often be sufficiently ventilated. Each and every person should never sleep with a lit oil or gas stove.

### Carbon dioxide poisoning

Carbon dioxide is a gaseous component of the earth's atmosphere, colorless, odorless and tasteless under normal conditions of pressure and temperature and is also one of the greenhouse gases. Because carbon dioxide is soluble in water, it occurs naturally in groundwater, rivers and lakes, ice caps, glaciers and seawater. It is present in deposits of petroleum and natural gas. Carbon dioxide is odorless at normally encountered concentrations, however, at high concentrations, it has a sharp and acidic odor [13].

CO<sub>2</sub> is a slightly toxic gas. Only by long term inhalation of carbon dioxide many a person suffer from ailments such as headaches, anxiety, emesis, dizziness, etc. Carbon dioxide poisoning may be caused by the inhalation of air that contains an excessive concentration of carbonaceous gas or by impaired excretion of carbon dioxide through the human body. A similar type of poisoning is particularly manifested by prolonged inhalation of carbon dioxide in a confined space. Obviously, is clinical manifestations are excessive sweating, airway obstruction, and even respiratory or cardiac arrest [14].

CO<sub>2</sub> is an asphyxiate gas and in concentrations up to 1% (10,000 ppm), it will make some people feel drowsy and give the lungs a stuffy feeling [15]. Concentrations of 7% to 10% (70,000 to 100,000 ppm) may cause suffocation, even in the presence of sufficient oxygen, manifesting as dizziness, headache, visual and hearing dysfunction, and unconsciousness within a few minutes to an hour [16].

There are few studies of the health effects of long-term continuous CO<sub>2</sub> exposure on humans and animals at levels below 1%. Occupational CO<sub>2</sub> exposure limits have been set in the United States at 0.5% (5000 ppm) for an eight-hour period [17]. At this CO<sub>2</sub> concentration, International Space Station crew experienced headaches, lethargy, mental slowness, emotional irritation, and sleep disruption [18].

**Household products:** Every day, we use many household products at home. Some of these substances are either of lower or higher toxicity. Especially in Greece, due to the economic crisis and the increase in the price of oil and natural gas, many Greeks who do not respond to the economic weight of heating in winter use fireplaces. This has the effect of creating an inbred environment both inside and outside the home. From the beginning

of the crisis to the present, the deaths from carbon monoxide poisoning have increased and the incidence of hospitals has increased [19].

### Poison control centers

These centers should be staffed by physicians who are skilled in treating patients that are poisoned. These doctors ought to have an extensive reference material and a database at their disposal. Furthermore, they must have rapid access to a laboratory toxicological analysis in cases that need more extensive research [20].

A poison control center is a medical facility that is able to provide immediate, free, and expert treatment advice and assistance over the telephone in case of exposure to poisonous or hazardous substances. Poison control centers answer questions about potential poisons in addition to providing treatment management advice about household products, medicines, pesticides, plants, bites and stings, food poisoning, and fumes [21].

### Prevention of pharmaceutical poisonings with dangerous gases

Prevention and precautionary measures are important elements regarding the problem of poisonings. The precautionary measures and poisoning prevention are in close connection with both knowledge and information. It is vital the highly vulnerable groups and professional employment groups be informed [22]. There are many chemicals and highly toxic gases that cause poisoning. Household chemicals that are widely used in daily life for various household and health needs for personal hygiene are amongst these substances. We must be very careful not to allow

these preparations to penetrate the human body because they can cause serious disorders and even death. These problems are successfully solved. It is necessary people follow the following rules that are designed to prevent the human organism from highly toxic gases and chemical poisoning [23].

The prevention of carbon monoxide poisoning includes [24]:

- We must close tightly the stove door and open the diaphragm of the chimney as much as possible.
- We must not stay for a long time or sleep in the car while the engine is running.

The prevention of chemical gas poisonings includes [20]:

- Wear gloves and special attire in order to protect our skin from direct contact with the chemical substance.
- Wash carefully our special clothes and underwear.
- Comply with the rules of personal hygiene such as washing one's hands and taking a shower after one's work. Health professionals can contribute in many ways to reducing the harmful effects of toxic gases.

### Conclusion

The problem of poisoning by dangerous gases is intense. The poisoning treatment aims at the stabilization of the patient's condition by the selection of the appropriate therapeutic measures. Any delay in treatment, may cause unpleasant effects that can even be fatal for the sufferer. Also, the treatment of poisoning is one of the most urgent incidents in the daily practice of health professionals.

### References

- 1 Iliadis C, Monios A, Tsaloglidou A, Koukourikos K, Georgoudi A, et al. (2017) Poisoning by Dangerous Gases. Euro-Mediterranean Conference for Environmental Integration. EMCEI 2017: Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions pp: 1981-1983.
- 2 Kostika X (2013) Study of vulnerability from long-term exposure to toxic gaseous substances and more specifically for the case of nitrogen dioxide (NO<sub>2</sub>). Chania.
- 3 Melas D (2007) Atmospheric Diffusion and Dispersion. University Publication. Aristotle University of Thessaloniki.
- 4 Kourkouta L, Iliadis CH, Monios A, Ouzounakis P (2017) Poisonings in Children. SCIREA J Health 2: 5-12.
- 5 Vlachos P (2005) Poisoning, truths and bias. Publications myrtle: Athens.
- 6 Karathanase S (2006) Air Pollution: Definition, Impacts, Sources of Industrial & Craft Activities, Counter Technology, Legislation. TZOLA Publishing.
- 7 Lazaridis M (2005) Atmospheric Pollution with Elements of Meteorology. Tziola Publications, Thessaloniki.
- 8 Gentekakis I (2010) Atmospheric Pollution: Impacts, Control & Alternative Technologies. Kleidarithmos Publications.
- 9 Zarvos S (2012) Temporal variation of carbon monoxide CO in the region of Thessaloniki during the period 2001 - 2003. Critical Care Clinics. 28: 537-548.
- 10 Bleecker ML (2015) Carbon monoxide intoxication. Handbook of clinical neurology 131: 191-203.
- 11 Rhyee S (2015) General approach to drug poisoning in adults. In: Post TW, ed. UpToDate. Waltham, MA: UpToDate.
- 12 [http://195.134.76.37/chemicals/chem\\_carbondioxide.htm](http://195.134.76.37/chemicals/chem_carbondioxide.htm)
- 13 Klouras N (2002) Basic Inorganic Chemistry. Traylos & SIA Athens.
- 14 [https://inspectapedia.com/hazmat/Carbon\\_Dioxide\\_Hazards.php](https://inspectapedia.com/hazmat/Carbon_Dioxide_Hazards.php)
- 15 Carbon Dioxide as a Fire Suppressant: Examining the Risks. U.S. Environmental Protection Agency.
- 16 [https://inspectapedia.com/hazmat/Carbon%20Dioxide\\_Exposure\\_Limits.php](https://inspectapedia.com/hazmat/Carbon%20Dioxide_Exposure_Limits.php)
- 17 Law J, Watkins S, Alexander D (2010) In-Flight Carbon Dioxide Exposures and Related Symptoms: Association, Susceptibility, and Operational Implications. NASA/Johnson Space Center.

- 18 Carbon Dioxide Poisoning. Available in <https://www.thoughtco.com>.
- 19 Klepac T, Busllgeta I, Macan J, Plavec D, Turk R (2000) Household chemicals--common cause of unintentional poisoning. *Arh Hig Rada Toksikol* 51: 401-407.
- 20 Iliadis C, Monios A, Kourkouta L (2014) *Pharmaceutical Poisoning. Monograph*, Lambert Academic Publishing. Saarbruken: Germany.
- 21 American Association of Poison Control Centers (AAPCC) National Poison Data System (NPDS) Annual Report, 2009.
- 22 [https://www.quora.com/How-is-CO<sub>2</sub>-released-into-the-atmosphere](https://www.quora.com/How-is-CO2-released-into-the-atmosphere)
- 23 Tierney M, McPhee S, Papadakis M (2005) *Current Medical Diagnosis & Treatment*. Lange.
- 24 Rau A, Mathieu-Nolf M, Hampson B, Thom R (2000) Carbon monoxide poisoning—a public health perspective. *Toxicology* 145: 1-14.