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ENVIRONMENTAL DAMAGE AND EFFECTS OF CHEMICAL POLLUTANTS IN THE ATMOSPHERE ON HUMAN HEALTH CONCLUSION

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Abstract. Air pollution is the main concern of the newly civilized world, with serious toxicological effects on human health and the environment. It has a number of different sources of emissions, but motor vehicles and industrial processes account for a large proportion of air pollution. According to the World Health Organization, the six main air pollutants include particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Long- and short-term exposure to airborne toxins has a variety of toxicological effects on humans, including respiratory and cardiovascular diseases, neuropsychiatric complications, eye irritation, skin disorders, and long-term chronic illnesses such as cancer. Several reports have found a direct correlation between poor air quality and increased morbidity and mortality rates, mainly due to cardiovascular and respiratory diseases. Air pollution is a major environmental risk factor in the prevalence and development of certain diseases such as asthma, lung cancer, ventricular hypertrophy, Alzheimer's and Parkinson's diseases, psychological complications, autism, retinopathy, fetal growth and low birth weight.
Keywords: toxicology, ground-level ozone, carbon monoxide, carboxyhemoglobin, sulfur dioxide,nitric oxide

Introduction: Air pollution is a major problem in recent decades and has serious toxicological effects on human health and the environment. Sources of pollution range from natural sources such as small cigarettes and volcanic activity to large-scale emissions from the engine engines of cars and industrial activities. The long-term effects of air pollution on the onset of respiratory infections and inflammations, cardiovascular dysfunctions, and cancer are widely recognized, with air pollution leading to millions of deaths worldwide each year. Air pollution has now emerged as a result of industrial activities in developing countries and is also increasing the amount of emission sources such as improper vehicles. An estimated 4.3 million people die from household air pollution and 3.7 million people die from ambient air pollution, the majority of whom (3.3 and 2.6 million, respectively) live in Asia Air pollution is defined as all the harmful effects of any source that contributes to atmospheric pollution and/or ecosystem deterioration. Air pollution is caused by human intervention and or natural phenomena. It consists in many types of contaminants including materials in solid, liquid and gaseous phases. The Pollutant Standard Index (PSI) is a numerical value and indicator of a pollutant typically used to facilitate risk assessment. This is a numeric value from 0 to 500. PSI is an air quality

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reporting manual that was first introduced by Thom and Ott in 1974. Thus, it provides a way to compare the relative contribution of each pollutant to the overall risk. The PSI calculation is based on the concentrations of five major air pollutants in the air, such as particulate matter (PM), sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and ozone (O3). Toxicology of air pollution. The impact of air pollutants on a living organism is not limited to the health of humans and animals, but also covers the entire environment. Different geographical conditions, global climate change, and environmental changes affect human health and the environment, including animal life.

Environmental Damage:Ecologically, air pollution can cause serious environmental damage to groundwater, soil, and air. It is also a serious threat to the diversity of life. Studies on the link between air pollution and species diversity decline clearly show the detrimental effects of environmental pollutants on the extinction of animal and plant species. Toxic agents that are released in the air can also have reproductive effects in animals. Acid rain, temperature inversion, and global climate change due to greenhouse gas emissions into the atmosphere are other major environmental impacts of air pollution.

Air Pollutants and Their Toxic Status**:** Any material in the air that can affect human health or have a profound effect on the environment is defined as an air pollutant. According to the World Health Organization (WHO), particulate pollution, ground-level O3, CO, sulfur oxides, nitrogen oxides, and lead (Pb) are the six major air pollutants that harm human health and the ecosystem. The air contains many pollutants of suspended materials such as dust, vapor, smoke, fog, gaseous pollutants, hydrocarbons, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and halogen derivatives, which in high concentrations cause vulnerability to many diseases, including cancer types. [29303132] The most important air pollutants and their toxic effects on various organs of the human body and related diseases are briefly described below.

Particle Pollutants: Particle pollutants are major components of air pollutants. Simply put, they're a mixture of particles found in the air. Particulate pollution, also known as PM, is linked to the majority of lung and heart-related morbidities and deaths. They mostly ranged from 2.5 to 10 mm (PM2.5 to PM10). The volume of particulate pollutants is directly related to the onset and development of lung and heart diseases. Particles of smaller size reach the lower respiratory tract and therefore have more potential to cause lung and heart disease. In addition, numerous scientific data have shown that fine particulate pollutants cause premature death in people with heart and or lung disease, including cardiac dysrhythmias, non-fatal heart attacks, exacerbated asthma, and decreased lung function. Depending on the level of exposure, particulate pollutants can cause mild to severe disease. Wheezing due to breathing problems, coughing, dry mouth, and restriction of activity are the most common clinical signs of respiratory illnesses caused by air pollution. Long-term exposure to current environmental PM concentrations can lead to a significant decrease in life expectancy. Increased mortality from cardiopulmonary and lung cancer are the main reasons for the decline in life expectancy. Decreased lung function in children and adults leading to asthmatic bronchitis and chronic obstructive pulmonary disease (COPD) are also serious diseases that lead to reduced quality of life and reduced life expectancy. Strong evidence on the effects of long-term exposure to PM on cardiovascular and cardiopulmonary mortality comes from cohort studies.

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Ground-level ozone: With the chemical formula O3, O3 is a colorless gas that is the main component of the atmosphere. It is located at ground level and in the upper parts of the atmosphere, called the troposphere. Earth-level ozone (GLO) is formed as a result of a chemical reaction between nitrogen oxides and VOCs released from natural sources and/or due to human activities. GLO is believed to have a reliable association with an increased risk of respiratory diseases, particularly asthma. As a strong oxidant, O3 accepts electrons from other molecules. In the surface fluid coating of the cell membranes, located in the respiratory tract and the lining fluid, there is a high level of polyunsaturated fatty acids. The double bonds present in these fatty acids are unstable. O3 attacks unpaired electrons to form ozonides and pass through the unstable zvitterion or trioxolan (depending on the presence of water). This eventually recombines or breaks down to lipohydroperoxides, aldehydes, and hydrogen peroxide. These pathways are thought to trigger the release of lipid radicals and the autooxidation of cell membranes and macromolecules. It also increases the risk of DNA damage in epidermal keratinocytes, leading to impaired cell function. O3 causes a variety of toxic effects in humans and experimental animals at concentrations that occur in many urban areas. These effects include morphological, functional, immunological and biochemical changes. Because of its low water solubility, much of the inhaled O3 penetrates deep into the lungs, but its reactivity is cleared by the nasopharynx of resting rats and humans by around 17% and 40%, respectively. Ecologically, O3 can reduce carbon absorption in trees, which could have an impact on global food security in the long term.

Carbon monoxide:CO is a colorless and odorless gas produced by fossil fuels, especially when combustion is not right, as is the case with burning coal and wood. The affinity of CO to hemoglobin (as an oxygen carrier in the body) is about 250 times greater than that of oxygen. Depending on the concentration of CO and the duration of exposure, mild and severe poisoning may occur. Symptoms of CO poisoning can include headache, dizziness, weakness, nausea, vomiting, and finally loss of consciousness. Symptoms are very similar to other illnesses, such as food poisoning or viral infections. Carboxyhemoglobin (COHb) levels below 2% have not been affected on human health, while levels above 40% can be fatal. Hypoxia, apoptosis, and ischemia are known mechanisms of CO toxicity. Such a toxicity mechanism is the loss of oxygen due to the competitive binding of CO to hemoglobin gem groups. Cardiovascular changes can also be observed in exposure to CO, which produces more than 5% COHb. In the early 1990s, the Institute for Health Effects conducted a series of studies related to cardiovascular disease to determine the potential for angina pectoris, which has COHb levels in the range of 2–6%. The results showed that early angina may occur in these cases, but the likelihood of the occurrence of ventricular arrhythmias remains unknown. Thus, a decrease in environmental CO may reduce the risk of myocardial infarction in predispositive individuals.

Sulfur dioxide: SO2 is a colorless, highly reactive gas which is regarded as an essential air pollutant. It is mainly released as a result of fossil fuel consumption, natural volcanic activity, and industrial processes. SO2 is very harmful to plant life, animal and human health. People with lung disease, children, the elderly, and those who are more exposed to SO2 are at higher risk of skin and lung diseases. The main health problems associated with exposure to high concentrations of SO2 include respiratory irritation and dysfunction, as well as exacerbation of existing cardiovascular diseases. SO2 is mainly absorbed in the upper airways.

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As an emotional irritation, it can cause bronchospasm and mucus secretions in humans. Residents of industrialized areas exposed to low concentrations (<1 ppm) of SO2 in the polluted ambient air are likely to experience high levels of bronchitis. The entry of SO2 into the lungs is greater during oral breathing compared to nasal breathing. In deep and rapid breathing, an increased airflow increases the penetration of gas into the deep lungs. Therefore, people who exercise in polluted air breathe more SO2 and suffer from more irritation. When SO2 is deposited in the airways, it dissolves into a surface coating liquid such as sulfites or bisulfites and is easily dispersed throughout the body. Sulfites interact with sensitive receptors in the airways, causing bronchoconstriction locally and centrally mediated.**Nitric oxide:**Nitrogen oxides are important pollutants of the ambient air that can increase the risk of respiratory infections. They are mainly emitted from engine engines and are therefore transport-related air pollutants. They are deep lung irritant substances that can cause swelling in the lungs if inhaled at a high level. They are generally less toxic than O3, but NO2 can cause obvious toxicological problems. Exposure at 2.0–5.0 ppm has been shown to affect T-lymphocytes, specifically CD8+ cells and natural killer cells that play an important role in host defense against viruses. While these levels may be high, epidemiological studies show the impact of NO2 on respiratory infections in children. Coughing and wheezing are the most common complications of nitric oxide toxicity, but irritation of the eyes, nose, or throat, headache, dyspnea, chest pain, diaphoresis, fever, bronchospasm, and pulmonary edema can also occur. Another report suggests that nitric oxide levels between 0.2 and 0.6 ppm are harmless to human populations.

Lead: Pb, or salt, is a toxic heavy metal that is widely used in various industries. Pb contamination can come from both internal and external sources. It is emitted from engine engines, especially those that use gasoline containing Pb tetraethyl. Melting plants and battery plants, as well as irrigation water wells and wastewater are other sources of Pb's emissions to the environment. An assessment of blood Pb levels in traffic police officers indicates that environmental pollution can be considered as a source of Pb exposure. Fetuses and children are highly susceptible to Pb, even at low doses. Pb accumulates in the blood, bones and soft tissues in the body. It is not easily excreted because Pb can also affect the kidneys, liver, nervous system and other organs. Absorption of PB by the lungs depends on the particle size and concentration. Respirators are small enough to retain about 90% of the Pb particles in the ambient air. Pb absorption through the alveoli is absorbed, causing toxicity. Pb is a potent neurotoxic, especially in infants and children as high-risk groups. Mental retardation, learning disabilities, memory impairment, hyperactivity, and antisocial behavior are all adverse effects of Pb in childhood. Therefore, it is very important to reduce the level of ambient air Pb. Effects of Pb are often chronic with no obvious symptoms. It can affect various parts of the body, including the cardiovascular, kidney, and reproductive systems, but the primary target of Pb toxicity is the nervous system. Pb disrupts the normal function of intracellular secondary messenger systems via inhibition of N-methyl-D-aspartate receptors. Pb can also replace calcium as calcium second messenger resulting from protein modification through various cellular processes including activation or deactivation of protein kinase. Abdominal pain, anemia, aggression, constipation, headache, irritability, loss of concentration and memory, decreased sensations, and sleep disturbance are the most common symptoms of Pb poisoning. Exposure to Pb manifests itself with a multitude of problems, including high blood pressure, infertility, indigestion and kidney dysfunction, and muscle and joint pain.

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