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By

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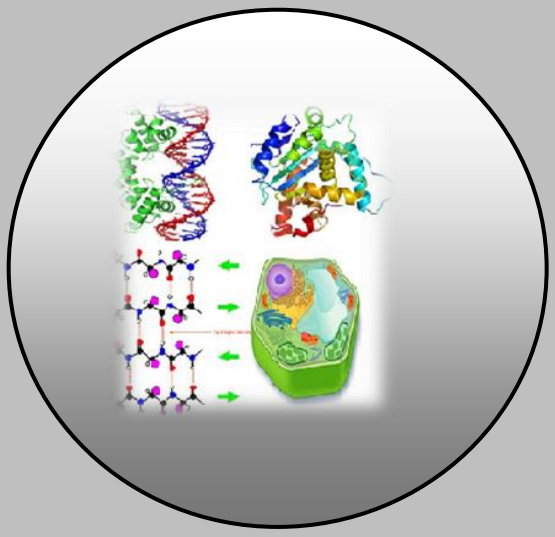

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Lead: An Environmetal Toxicant

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ABSTRACT

Industrial Estates are planned, zoned areas that are set aside for a variety of industries, offices, and production. These areas, also known as industrial parks, are frequently built outside of major population areas or residential neighborhoods and are easily accessible via roads, rail, and boat. Industrial estates are often governed by regulatory regimes that are set up to advance and encourage industry. Industrial parks contain a large variety of businesses ranging from food production to heavy metal smelting. The Multilateral Investment Guarantee Agency of the World Bank recommends that industrial estates have effluent treatment centers, proper infrastructure for containing and disposing of toxic waste, emissions standards, proper monitoring and reporting systems, and clear emergency preparedness plans[16]. If the proper precautions are taken, industrial estates can reduce community and environmental impacts by isolating potentially hazardous processes in areas far away from residential neighborhoods and by ensuring safety and environmental standards for all of the industries in the zone. Unfortunately, in many low- and middle-income countries, industrial estates have little to no waste treatment and disposal infrastructure, and they are often located near populated areas. In the case of an industrial estate that has no pollution control mechanisms, lead, which is often a main contaminant caused by industrial estates, can be released into surrounding air, soil, water, and food. There are a large variety of industries within industrial estates that may be responsible for lead contamination. When industries are located in such close proximity, it is very hard to distinguish which one or ones, in particular, are responsible for pollution. Cont…….

In order to avoid placing blame on the wrong industry, industrial estates are clumped together as one industry group in the Blacksmith inventory, making the isolation of one single lead contamination–causing process impossible. Typical industries that produce high amounts of lead and that may be found in industrial estates include lead-acid battery production and recycling (which accounts for more than two thirds of global lead use); lead smelting and casting; manufacturing of lead-glass and lead compounds; manufacturing of pigments, paint, and ceramic glazes; and recycling of e-waste that contains Cathode Ray Tubes. E health effects of exposure to lead can be both acute and chronic, and the problems caused by lead poisoning are particularly dangerous and severe for children. Acute lead poisoning can happen immediately and is often caused by inhaling large quantities of lead dust or fumes in the air. Chronic lead poisoning, however, occurs over longer periods of time and can result from very low-level, but constant, exposure to lead. Chronic poisoning is far more common than acute exposure and can be caused by persistent inhaling or ingestion of lead, or, over much longer periods, can result in lead accumulation in the bones. Health problems associated with lead poisoning can include reduced IQ, anemia, neurological damage, physical growth impairments, nerve disorders, pain and aching in muscles and bones, memory loss, kidney disorders, retardation, tiredness and headaches, and lead colic, which impacts the abdomen[19]. Severe exposure to high concentrations of lead can lead to dire health risks, including seizures, delirium, coma, and in some cases, death. Neurological damage is especially pronounced in children suffering from lead exposure, with even small amounts of lead poisoning capable of causing lifelong developmental and cognitive problems. Exposure to lead in utero can also cause birth defects.

Keywords: Neurotoxicity, Gastrointestinal problems, Tetra methyl lead, Lead sulphide, Paints, Anaemia.

INTRODUCTION

During the last century, lead emissions to ambient air have caused considerable pollution, mainly due to lead emissions from petrol. Children are particularly susceptible to lead exposure due to high gastrointestinal uptake and the permeable blood–brain barrier. Blood levels in children should be reduced below the levels so far considered acceptable, recent data indicating that there may be neurotoxic effects of lead at lower levels of exposure than previously anticipated. Although lead in petrol has dramatically decreased over the last decades, thereby reducing environmental exposure, phasing out any remaining uses of lead additives in motor fuels should be encouraged (http://www.miga.org). The use of lead-based paints should be abandoned, and lead should not be used in food containers. In particular, the public should be aware of glazed food containers, which may leach lead into food. Lead has been used for at least 5000 years, early applications including building materials, pigments for glazing ceramics, and pipes for transporting water. In ancient Rome, lead acetate was used to sweeten old wine, and some Romans might have consumed as much as a gram of lead a day.

The general population is exposed to lead from air and food in roughly equal proportions. Earlier, lead in foodstuff originated from pots used for cooking and storage. During the last century, lead emissions to ambient air have further polluted our environment, over 50% of lead emissions originating from petrol. Over the last few decades, however, lead emissions in developed countries have decreased markedly due to the introduction of unleaded petrol. Subsequently blood lead levels in the general population have decreased. Occupational exposure to inorganic lead occurs in mines and smelters as well as welding of lead painted metal, and in battery plants (http://www.unep.org) Low or moderate exposure may take place in the glass industry.

High levels of air emissions may pollute areas near lead mines and smelters. Airborne lead can be deposited on soil and water, thus reaching humans via the food chain.

Up to 50% of inhaled inorganic lead may be absorbed in the lungs. Adults take up 10–15% of lead in food, whereas children may absorb up to 50% via the gastrointestinal tract. Lead in blood is bound to erythrocytes, and elimination is slow and principally via urine. Lead is accumulated in the skeleton, and is only slowly released from this body compartment. Half-life of lead in blood is about 1 month and in the skeleton 20–30 year. In adults, inorganic lead does not penetrate the blood–brain barrier, whereas this barrier is less developed in children. The high gastrointestinal uptake and the permeable blood–brain barrier make children especially susceptible to lead exposure and subsequent brain damage. Organic lead compounds penetrate body and cell membranes (http://www.hse.gov.uk).

Tetramethyl lead and tetraethyl lead penetrate the skin easily. These compounds may also cross the blood–brain barrier in adults, and thus adults may suffer from lead encephalopathy related to acute poisoning by organic lead compounds.

HEALTH HAZARDS

The symptoms of acute lead poisoning are headache, irritability, abdominal pain and various symptoms related to the nervous system. Lead encephalopathy is characterized by sleeplessness and restlessness. Children may be affected by behavioural disturbances, learning and concentration difficulties. In severe cases of lead encephalopathy, the affected person may suffer from acute psychosis, confusion and reduced consciousness. People who have been exposed to lead for a long time may suffer from memory deterioration, prolonged reaction time and reduced ability to understand. Individuals with average blood lead levels under3 µmol/l may show signs of peripheral nerve symptoms with reduced nerve conduction velocity and reduced dermal sensibility. If the neuropathy is severe the lesion may be permanent. The classical picture includes a dark blue lead sulphide line at the gingival margin. In less serious cases, the most obvious sign of lead poisoning is disturbance of haemoglobin synthesis, and long-term lead exposure may lead to anaemia. Recent research has shown that long-term low-level lead exposure in children may also lead to diminished intellectual capacity. Acute exposure to lead is known to cause proximal renal tubular damage. Long-term lead exposure may also give rise to kidney damage Blood lead levels in children below 10 µmg/ dl have so far been considered acceptable, but recent data indicate that there may be toxicological effects of lead at lower levels of exposure than previously anticipated (Falcke, 1999).

There is also evidence that certain genetic and environmental factors can increase the detrimental effects of lead on neural development, thereby rendering certain children more vulnerable to lead neurotoxicity.

CONCLUSION

Due to the scale and variety of industries, addressing pollution problems from industrial estates can be a challenging task. The key interventions in this area involve working with local governments, NGOs, and industry leaders to improve the levels of control, treatment facilities, and health and safety management at the estates. Successful examples of these kinds of programs involve strong leadership from international companies to adhere to global standards. In addition to leadership and effective management, industrial estates must also have the proper finances in order to upgrade to environmentally safe equipment. Proper enforcement of environmental and health standards, however, needs adequate political support, and buffering cooperation between government and industry can lead to improvements in these areas.

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