



Cadmium Poisoning: Understanding the Silent Threat to Human Health

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DESCRIPTION

Cadmium is naturally occurring in the Earth's crust, but human activities such as mining, smelting, and manufacturing have greatly accelerated its release into the environment. Occupational exposure in industries like battery manufacturing, metal refining, and plastics production is a notable concern. Additionally, cigarette smoking, due to the presence of cadmium in tobacco leaves, remains a major source of cadmium exposure for smokers and those exposed to secondhand smoke. Furthermore, cadmium contamination in the food chain is a significant avenue for exposure. Plants, such as rice, vegetables, and leafy greens, can accumulate cadmium from contaminated soil, water, and fertilizers. Consuming these contaminated foods can lead to gradual accumulation of the heavy metal in the body over time. Cadmium poisoning primarily affects the kidneys, bones, and respiratory system. Once ingested or inhaled, cadmium can accumulate in the kidneys, leading to impaired renal function. Chronic exposure may cause kidney damage, ultimately leading to a condition known as cadmium-induced nephropathy. This can result in decreased kidney function, proteinuria (the presence of excess protein in urine), and even kidney failure. Furthermore, cadmium has a tendency to replace calcium in bones, interfering with bone mineralization and causing a condition called Itai-Itai disease. This disease was first identified in Japan among individuals consuming cadmium-contaminated rice and suffering from excruciatingly painful bone fractures. Such effects on the skeletal system can lead to brittle bones, fractures, and increased susceptibility to osteoporosis. The respiratory system is also vulnerable to cadmium toxicity, especially in occupational settings with inhalation exposure. Prolonged inhalation can lead to chronic obstructive pulmonary disease (COPD) and other respiratory issues, as cadmium particles can damage lung tissues and impair lung function. Mitigating cadmium exposure is critical to preventing its toxic effects on human health. Several strategies can help reduce the risk of cadmium poisoning. Spreading awareness about

potential sources of cadmium exposure, especially among at-risk populations such as industrial workers and smokers, is essential. Education can empower individuals to make informed choices regarding their lifestyle and occupational safety. Cadmium primarily affects the kidneys, bones, and respiratory system. Prolonged exposure, even to low levels, can lead to kidney damage and dysfunction, causing proteinuria, a condition where excessive protein is excreted in urine. The metal accumulates in bones, disrupting their structure and weakening them, potentially leading to fractures. Furthermore, inhalation of cadmium particles, often from industrial processes like mining and smelting, can result in respiratory problems and even lung cancer. Notably, smokers face an increased risk of cadmium poisoning as tobacco plants readily absorb the metal from the soil. This elevated exposure can exacerbate the toxic effects, as cadmium is known to synergistically interact with other harmful chemicals present in cigarette smoke. Preventing cadmium poisoning necessitates strict regulations on industrial emissions, proper waste disposal, and monitoring of food and water sources. Additionally, individuals can reduce their risk by adopting a healthy lifestyle, avoiding smoking and exposure to polluted environments. Since tobacco contains cadmium, quitting smoking and avoiding exposure to secondhand smoke can significantly decrease cadmium intake. Industries that involve cadmium-based processes should implement stringent safety measures, including proper ventilation, personal protective equipment (PPE), and regular monitoring of workers' health. For agricultural areas with a history of heavy metal contamination, soil testing and appropriate soil management techniques can prevent the uptake of cadmium by crops.

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CONFLICT OF INTEREST

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