

Mercury and Alzheimer's disease: a look at the links and evidence

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Abstract

This review paper investigates a specific environmental-disease interaction between mercury exposure and Alzheimer's disease hallmarks. Alzheimer's disease is a neurodegenerative disorder affecting predominantly the memory of the affected individual. It prevails mostly in the elderly, rendering many factors as possible causative agents, which potentially contribute to the disease pathogenicity cumulatively. Alzheimer's disease affects nearly 50 million people worldwide and is considered one of the most devastating diseases not only for the patient, but also for their families and caregivers. Mercury is a common environmental toxin, found in the atmosphere mostly due to human activity, such as coal burning for heating and cooking. Natural release of mercury into the atmosphere occurs by volcanic eruptions, in the form of vapor, or weathering rocks. The most toxic form of mercury to humans is methylmercury, to which humans are exposed to by ingestion of fish. Methylmercury was found to exert its toxic effects on different parts of the human body, with predominance on the brain. There is no safe concentration for mercury in the atmosphere, even trace amounts can elicit harm to humans in the long term. Mercury's effect on Alzheimer's disease hallmarks formation, extracellular senile plaques and intracellular neurofibrillary tangles, has been widely studied. This review demonstrates the involvement of mercury, in its different forms, in the pathway of amyloid beta deposition and tau tangles formation. It aims to understand the link between mercury exposure and Alzheimer's disease so that, in the future, prevention strategies can be applied to halt the progression of this disease.

Keywords: Alzheimer's; Environment-disease interaction; Inorganic mercury; Methylmercury; Neurodegenerative diseases.

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