Title

From Inhalation to Neurodegeneration: Air Pollution as a Modifiable Risk Factor for Alzheimer's Disease

Abstract

Air pollution, a growing concern for public health, has been linked to various respiratory and cardiovascular diseases. Emerging evidence also suggests a link between exposure to air pollutants and neurodegenerative diseases, particularly Alzheimer's disease (AD). This review explores the composition and sources of air pollutants, including particulate matter, gases, persistent organic pollutants, and heavy metals. The pathophysiology of AD is briefly discussed, highlighting the role of beta-amyloid plaques, neurofibrillary tangles, and genetic factors. This article also examines how air pollutants reach the brain and exert their detrimental effects, delving into the neurotoxicity of air pollutants. The molecular mechanisms linking air pollution to neurodegeneration are explored in detail, focusing on oxidative stress, neuroinflammation, and protein aggregation. Preclinical studies, including in vitro experiments and animal models, provide evidence for the direct effects of pollutants on neuronal cells, glial cells, and the blood–brain barrier. Epidemiological studies have reported associations between exposure to air pollution and an increased risk of AD and cognitive decline. The growing body of evidence supporting air pollution as a modifiable risk factor for AD underscores the importance of considering environmental factors in the etiology and progression of neurodegenerative diseases, in the face of worsening global air quality.

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Index Keywords

Air Pollutants; Air Pollution; Alzheimer Disease; Animals; Brain; Environmental Exposure; Humans; Neurodegenerative Diseases; Oxidative Stress; Particulate Matter; Risk Factors; heavy metal; air pollutant; air pollution; air quality; Alzheimer disease; animal model; blood brain barrier; cardiovascular disease; cognitive defect; degenerative disease; dementia; drug toxicity; environmental factor; etiology; glia cell; human; in vitro study; inhalation; nerve degeneration; nervous system inflammation; neurofibrillary tangle; neurotoxicity; nonhuman; oxidative stress; particulate matter; pathophysiology; persistent organic pollutant; protein aggregation; review; risk factor; adverse event; air pollutant; animal; brain; environmental exposure; metabolism; oxidative stress; particulate matter; pathology; risk factor; toxicity

Chemicals/CAS

Air Pollutants, ; Particulate Matter,

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