Literature Review: The Relationship Between Exposure to Aerosol Air Pollutants and Immune System Disorders

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Abstract

Aerosol air pollutants are microscopic solid or liquid particles suspended in the air that pose potential health risks, particularly to the immune system. These particles originate from sources such as road dust, vehicle emissions, biomass burning, and industrial outputs. This review aims to examine the relationship between exposure to aerosol pollutants and immune system disorders. A literature review method was employed by analyzing various reputable scientific sources (scientific articles and academic journals), limited to publications from the past ten years to ensure data relevance. Inclusion criteria focused on studies addressing immunological effects and aerosol pollutants such as coarse particulate matter (PM10), fine particulate matter (PM2.5), especially Diesel Exhaust Particles (DEP). These pollutants enter the body primarily through the respiratory tract or skin absorption, triggering inflammation and oxidative stress, which ultimately disrupt immune cell function—including T lymphocytes ($CD4^+$, $CD8^+$), neutrophils, and increased activity of T helper type 2 (Th2) and type 17 (Th17) cells. Long-term exposure is associated with increased susceptibility to allergic respiratory diseases, atopic dermatitis, and autoimmune diseases such as lupus and rheumatoid arthritis. This review highlights the importance of air quality control as a preventive strategy to safeguard immunological health. Further research is needed to develop and implement evidence-based strategies to mitigate immunological risks associated with air pollution.

Keywords: Aerosols, air pollutants, immune system disorders