

Benzene and human health: A historical review and appraisal of associations with various diseases

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Abstract

Over the last century, benzene has been a well-studied chemical, with some acute and chronic exposures being directly associated with observed hematologic effects in humans and animals. Chronic heavy exposures to benzene have also been associated with acute myelogenous leukemia (AML) and myelodysplastic syndrome (MDS) in humans. Other disease processes have also been studied, but have generally not been supported by epidemiologic studies of workers using benzene in the workplace. Within occupational cohorts with large populations and very low airborne benzene exposures (less than 0.1–1.0 ppm), it can be difficult to separate background disease incidence from those occurring due to occupational exposures. In the last few decades, some scientists and physicians have suggested that chronic exposures to various airborne concentrations of benzene may increase the risk of developing non-Hodgkin's lymphoma (NHL) (Savitz and Andrews, 1997, *Am J Ind Med* 31:287–295; Smith et al., 2007, *Cancer Epidemiol Biomarkers Prev* 16:385–391), multiple myeloma (MM) (Goldstein, 1990, *Ann NY Acad Sci* 609:225–230; Infante, 2006, *Ann NY Acad Sci* 1076:90–109), and various other hematopoietic disorders. We present a state-of-the-science review of the medical and regulatory aspects regarding the hazards of occupational exposure to benzene. We also review the available scientific and medical evidence relating to benzene and the risk of developing various disorders following specific levels of exposure. Our evaluation indicates that the only malignant hematopoietic disease that has been clearly linked to benzene exposure is AML. Information from the recent “Benzene 2009,” a symposium of international experts focusing on the health effects and mechanisms of toxicity of benzene, hosted by the Technical University of Munich, has been incorporated and referenced.

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