1,3-Butadiene and leukemia among synthetic rubber industry workers: exposure-response relationships.

Abstract

Previous research updated the mortality experience of North American synthetic rubber industry workers during the period 1944-1998, determined if leukemia and other cancers were associated with several employment factors and carried out Poisson regression analysis to examine exposure-response associations between estimated exposure to 1,3-butadiene (BD) or other chemicals and cancer. The present study used Cox regression procedures to examine further the exposure-response relationship between several unlagged and lagged, continuous, time-dependent BD exposure indices (BD parts per million (ppm)-years, the total number of exposures to BD concentrations >100 ppm ("peaks") and average intensity of BD) and leukemia, lymphoid neoplasms and myeloid neoplasms. All three BD exposure indices were associated positively with leukemia. Using continuous, untransformed BD ppm-years the regression coefficient (beta) from an analysis that controlled only for age was 2.9 x 10(-4) (p<0.01); the regression coefficient adjusted for all covariates (age, year of birth, race, plant, years since hire and dimethyldithiocarbamate) was similar in magnitude (beta=3.0 x 10(-4), p=0.04). Lagging exposure had minimal impact on the results for leukemia for any of the three BD exposure indices. In models that controlled only for age, lymphoid neoplasms were associated with BD ppm-years and myeloid neoplasms, with BD peaks, but neither trend was statistically
significant after adjusting for multiple covariates. The present results support the presence of a causal relationship between high cumulative exposure and high intensity of exposure to BD and leukemia.

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