Estimated effects of solvents and mineral oils on cancer incidence and mortality in a cohort of aerospace workers.

By: Yingxu Zhao, Anusha Krishnadasan, Nola Kennedy, Hal Morgenstern, Beate Ritz

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Abstract

BACKGROUND: A retrospective cohort study of workers employed at a California aerospace company between 1950 and 1993 was conducted; it examined cancer mortality from exposures to the rocket fuel hydrazine. METHODS: In this study, we employed a job exposure matrix (JEM) to assess exposures to other known or suspected carcinogens-including trichloroethylene (TCE), polycyclic aromatic hydrocarbons (PAHs), mineral oils, and benzene-on cancer mortality (1960-2001) and incidence (1988-2000) in 6,107 male workers. We derived rate- (hazard-) ratios estimates from Cox proportional hazard models with time-dependent exposures.

RESULTS: High levels of TCE exposure were positively associated with cancer incidence of the bladder (rate ratio (RR): 1.98, 95% confidence interval (CI) 0.93-4.22) and kidney (4.90; 1.23-19.6). High levels of exposure to mineral oils increased mortality and incidence of lung cancer (1.56; 1.02-2.39 and 1.99; 1.03-3.85), and incidence of melanoma (3.32; 1.20-9.24). Mineral oil exposures also contributed to incidence and mortality of esophageal and stomach cancers and of non-Hodgkin's lymphoma and leukemia when adjusting for other chemical exposures. Lagging exposure measures by 20 years changed effect estimates only minimally. No associations were observed for benzene or PAH exposures in this cohort.

CONCLUSIONS: Our findings suggest that these aerospace workers who were highly exposed to mineral oils experienced an increased risk of developing and/or dying from cancers of the lung, melanoma, and possibly from cancers of the esophagus and stomach and non-Hodgkin's lymphoma and leukemia. These results and the increases we observed for TCE and kidney cancers are consistent with findings of previous studies.

Estimated effects of hydrazine exposure on cancer incidence and mortality in aerospace workers.

By: Ritz B, Zhao Y, Krishnadasan A, Kennedy N, Morgenstern H.

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Abstract

BACKGROUND: Animal studies suggest that hydrazine is a lung carcinogen, but human studies have been rare, rather small, and limited to cancer mortality.

METHODS: We examined cancer mortality and incidence in a cohort of aerospace workers with varying exposure to hydrazine contained in rocket fuels-extending previous mortality follow-up from 1994 to 2001 and investigating cancer incidence for the period 1988-2000 using population-registry data. We newly estimated hydrazine effects adjusting for occupational exposures to other carcinogens assessed through a job-exposure matrix. Rate-ratio estimates were derived from Cox proportional hazards and random-effects models using time-dependent exposure measures for hydrazine adjusting for trichloroethylene, polycyclic aromatic hydrocarbons, benzene, and mineral oil exposures.

RESULTS: Exposure to hydrazine was positively associated with lung cancer incidence (estimated rate ratio for high vs low exposure with 20-year lag = 2.5; 95% confidence interval = 1.3-4.9) and with colorectal cancer incidence (2.2; 1.0-4.6). Dose-response associations were observed for both outcomes; similar associations were found for lung cancer mortality but not for colorectal cancer mortality. Effect estimates for cancers of the pancreas, blood and lymph system, and kidneys were based on small numbers rendering our analyses uninformative, and patterns considering exposure levels and lags were inconsistent. Use of random-effect models did not change our results.

CONCLUSIONS: The findings reported here are consistent with our previous results for lung cancer mortality; our new results suggest that exposure to hydrazine increases the risk of incident lung cancers. We also found, for the first time, an increased risk of colon cancers. Results for other cancer sites are inconclusive.