AN EXPOSURE-RESPONSE ANALYSIS OF CANCER MORTALITY AMONG A COHORT OF WORKERS EXPOSED TO ETHYLENE OXIDE

L. STAYNER, K. STEENLAND, A. GREIFE, R. HORNUNG, R. HAYES, S. NOWLIN, J. MORAWETZ, V. RINGENBURG, L. ELLIOT, W. HALPERIN

Leslie STAYNER, Kyle STEENLAND, Alice GREIFE, Richard HORNUNG, Richard B. HAYES, Sue NOWLIN, John MORAWETZ, Virginia RINGENBURG, Larry ELLIOT, William HALPERIN, NIOSH, 4676 Columbia Parkway, C-15, Cincinnati, OH 45226, USA

Ethylene Oxide (EtO) is widely used in the production of chemicals, and in the sterilization of medical devices and pharmaceuticals. An excess in leukemia, lymphoma and other cancers has been observed in experimental studies of animals exposed to EtO. Excess leukemia mortality has also been reported in some studies of workers exposed to EtO. We previously reported the results from the largest cohort mortality study of EtO-exposed workers conducted to date. Here we extend our previous work by quantitatively examining the relationship between cancer mortality and EtO exposure estimated by an industrial hygiene based model. Historical exposures to EtO were estimated for all cohort members based on a regression model. Standard life-table analysis was used to examine the cancer mortality in three categories of cumulative exposure to EtO. The Cox proportional hazards model was also used to examine cumulative and other measures of EtO exposure as continuous predictors of cancer mortality. A weak positive trend in all lymphatic and hematopoietic cancer mortality with cumulative EtO exposure was observed in the life-table analysis. This trend was only evident for males with SMRs of 95 (95%CI=26-243) in the lowest exposure category (<1200 ppm-days) and 143 (95% CI=62-283) in the middle exposure category (1200-8500 ppm-days) and 196 (95% CI=101-343) in the highest exposure category (>8500 ppm-days). A significant exposure - response relationship with cumulative EtO exposure ($\beta=1.1X10^{-5}$, $x^2=4.96$, $p=0.03$) was observed for all lymphatic and hematopoietic neoplasms when exposures were lagged 10 years in the Cox model. The most pronounced relationship was observed for cumulative EtO exposure lagged 5 years with a model combining lymphocytic leukemia and non-Hodgkin's lymphoma ($\beta=1.2X10^{-5}$, $x^2=8.44$, $p=0.004$). Duration, average and maximum exposure were not found to significantly predict mortality from all lymphatic and hematopoietic neoplasms in the Cox model. Mortality from all leukemias, stomach, pancreatic, kidney and brain cancers were not found to have a significant positive association with any of the exposure measures. We believe our findings provide some support for the hypothesis that exposure to EtO increases the risk of mortality from lymphatic and hematopoietic neoplasms.

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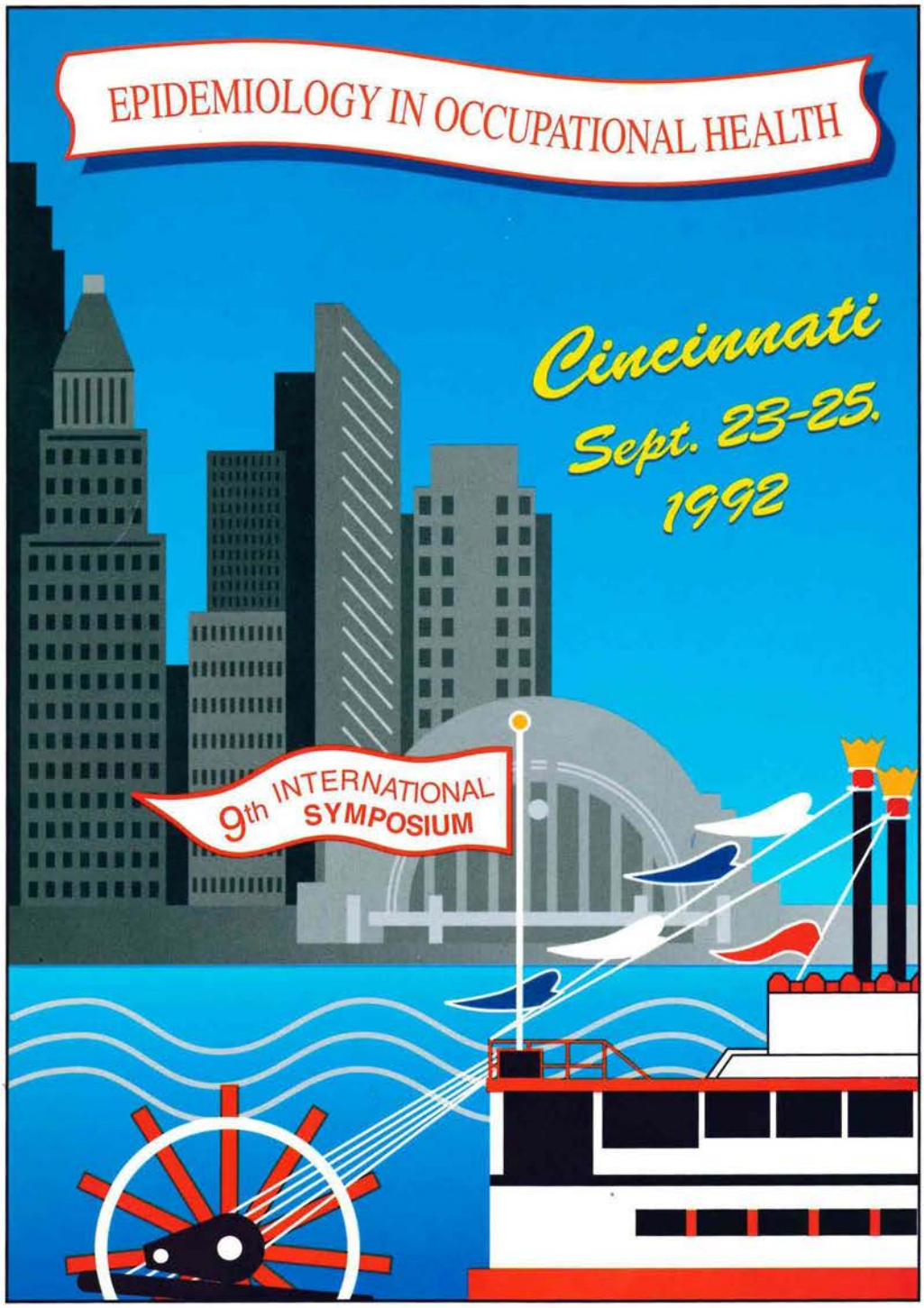

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