Chemical Workers in the U.S. and Western Europe: A Meta-analysis of Cohort Studies Describing Mortality and Cancer Incidence

Raymond S. Greenberg¹, Jack S. Mandel², Harris Pastides³, Nicole L. Britton⁴, Larisa Rudenko⁴, and Thomas B. Starr⁵. ¹Medical University of South Carolina; ²Exponent; ³School of Public Health, University of South Carolina; ⁴The Life Sciences Consultancy LLC; ⁵TBS Associates.

The objective of this study was to evaluate the mortality and cancer incidence experience of persons employed in the chemical industry in the United States and Western Europe, as reported in the peer-reviewed literature between 1966 to 1997 (>1 million workers and >15 million person-years). Observed and expected numbers of cases for each of 35 mortality and 23 cancer incidence endpoints were abstracted from cohort studies (n=461) and grouped (n= 185) so that specific populations could be traced from the earliest to the most recently published report. Standardized mortality ratios (SMRs) or standardized incidence ratios (SIRs) and 95% confidence intervals were abstracted/generated, and meta-analyses were undertaken for the entire cohort as well as subcohorts (e.g., gender, latency, or duration of employment). Fewer than expected deaths from all causes, cardiovascular disease, noncancer respiratory disease, cirrhosis of the liver, and external causes were observed, some or all of which may be attributed to a “healthy worker effect.” Meta-analyses revealed weak to moderate excesses of lung and bladder cancers likely due to occupational exposure to known human carcinogens. A 10%-15% increase in lymphatic and hematopoietic cancers was also observed. With few exceptions, the observed cause-specific mortality and site-specific cancer incidences were reassuring: overall, 10% fewer deaths were observed than expected. Additional research is required to gain a more complete understanding of the apparent increases in certain cancers, and the potential role that methodology and environmental or occupational influences may play in the associations observed in this study. To our knowledge, this is the first comprehensive overview of the health of chemical workers, and can serve as the basis for further investigations into specific issues associated with the health of this population. It has also raised important methodologic issues associated with reporting and publication of epidemiologic data, including the treatment of incomplete reporting and “publication bias.” This manuscript has been accepted for publication in the journal Epidemiology, and is due to be published in the November 2001 edition. The overall analysis and manuscript preparation took approximately 2.5 years to complete.

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