HEI

STATEMENT

Synopsis of Research Report 108

HEALTH EFFECTS INSTITUTE

Case-Cohort Study of Styrene Exposure and Ischemic Heart Disease

INTRODUCTION

In this report, Drs Matanoski and Tao present results of a study designed to follow up several occupational studies that had indicated a possible relation between styrene exposure and death from ischemic heart disease. For example, in a previous study Matanoski and coworkers reported that while mortality of styrene-exposed workers from atherosclerotic heart disease was less than mortality of the overall US population, it was significantly higher among a subgroup of black workers than would be expected based on general population rates. Although results have not been consistent, other investigators have also found evidence of an association between styrene exposure and heart disease. This study was undertaken to investigate that association further.

APPROACH

In the current study, Drs Matanoski and Tao examined workers exposed to styrene while working in styrene-butadiene polymer manufacturing plants between 1943 and 1982. Workers who had died from ischemic heart disease were compared to a subgroup of all men employed in two styrene-butadiene polymer manufacturing plants during that time. Individual exposure histories were determined from job records. When exposure data were missing, a statistical method was used to estimate exposure. This method is based on the assumption that exposure concentrations in all jobs in a plant are normally distributed and that processing methods throughout the rubber industry did not change appreciably during the time under consideration.

RESULTS AND INTERPRETATION

Drs Matanoski and Tao found that the incidence of death from ischemic heart disease was lower in subjects in their study than in the US general population. This discrepancy is often found in such studies because workers tend to be healthier than the general population (the healthy worker effect). However, they also found that a subgroup of nonwhite men had elevated rates of death from chronic ischemic heart disease when compared with the overall US population. Workers who were still employed at the time of death and had worked for more than 5 years had increased risk for death from acute ischemic heart disease. Further analysis suggested that intensity of exposure was a more important risk factor for death from ischemic heart disease than total exposure. Dr Matanoski estimated an increased risk of 4% to 8% for each additional part per million of styrene exposure over 1 year. The investigators discuss the study's implications for the general population.

Drs Matanoski and Tao successfully carried out a difficult occupational cohort study with an appropriate and well-designed approach. The study found associations between styrene exposure and death from acute ischemic heart disease. The lack of correlation between styrene and butadiene exposures rules out the possibility that the findings are related to coexposure to butadiene. However, limitations of the data make it difficult to assess the roles of factors such as diet, smoking, physical activity, blood pressure or type of job within the industry. Although the results are statistically significant, uncertainties regarding the causes of the associations will need to be addressed before extrapolating results to the general population (whose average exposures are several orders of magnitude lower than occupational exposures).

This Statement, prepared by the Health Effects Institute, summarizes a research project conducted by Dr Genevieve M Matanoski of Johns Hopkins University, Baltimore MD. The complete report, *Case-Cohort Study of Styrene Exposure and Ischemic Heart Disease*, can be requested from HEI (see reverse side).

Research Report 108

Case-Cohort Study of Styrene Exposure and Ischemic Heart Disease

INVESTIGATORS' REPORT

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