

Analysis of Papers Linking Exposure to Beryllium and Lung Cancer

Over the past several years an on-going scientific debate over the potential cancer risk from exposure to beryllium is revealing new findings that can markedly improve future cancer risk assessments. Dr. Rothman, Professor of Epidemiology - Boston University and adjunct faculty member of the Department of Medical Epidemiology, Karolinska Institute, in Stockholm is a world renowned expert in epidemiology. Dr Rothman analyzed the two NIOSH studies cited most often as a basis for classifying beryllium as a human carcinogen. The two studies analyzed were:

Sanderson WT, Ward EM, Steenland K, Petersen, MR: Lung cancer case-control study of beryllium workers. *Am J Ind Med* 2001;39:133-144.

Schubauer-Berigan MK, Couch JR, Petersen MR, Carrion T, Jin Y, Deddens JA. Cohort mortality study of workers at seven beryllium processing plants: update and association with cumulative and maximum exposure. *Occup Environ Med* 2011;68:345-353

Dr. Rothman's analysis of the original data in the first study identified serious confounding, which questions the validity of the studies. Confounding is a term used when comparisons between two groups of subjects are distorted, or incorrect, because the groups differ in some important characteristic not considered by the study. In this study failure to consider differences in date of date of birth and date of hire led to the incorrect conclusion that exposure to beryllium resulted in an increase risk of lung cancer among beryllium production workers in the United States.

In the second study he found that the strongest observation, that lung cancer was related to time from first employment, was inaccurate due to "sparse data bias". Sparse data bias can occur when too little data is divided up between too many adjustment categories with the result that many of the categories have rates of zero, due to lack of cases in the categories. This expert finding calls into serious question the validity of the entire study.

The analyses by Dr. Rothman have included cautions to the scientific community to take extra care to control for data factors which can result in an erroneous analysis and therefore lead to erroneous or misleading conclusions.

In contrast to the conclusions of Sanderson and Schubauer-Berigan, the most recent authoritative review of all of the peer-reviewed literature on the evidence of carcinogenicity due to beryllium exposure was published in 2012 by Dr. Paola Boffetta et al. Dr. Boffetta was Chief of the Unit of Environmental Cancer Epidemiology at the International Agency Cancer Research (IARC), Visiting Scientist at the Division of Cancer Epidemiology and Genetics, US National Cancer Institute, Division Head of Clinical Epidemiology for the German Cancer Research Center, and is affiliated with noted universities such as: Harvard, Vanderbilt, University of Turin, and the University of Ottawa. He currently serves Mount Sinai School of Medicine as Professor and Associate Director for Population Sciences of the Tisch Cancer Institute and Director of the Institute for Translational Epidemiology. The conclusion of his expert review is: "Overall, the available evidence does not support a conclusion that a causal association has been established between occupational exposure to beryllium and the risk of cancer"