

## **A novel method for reducing the number of agents to be studied in an occupational epidemiologic study.**

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A novel screening tool method to select chemicals for exposure reconstruction was developed and validated using data generated for a hypothetical work force consisting of 10 job classes (ranging from 10,000 to 55,000 person-years). To achieve the required efficiency in the reconstruction of exposures, this method treats each product (defined as a part or process) as an “exposure.” Exposure to 10 products was assigned to each job class at random using a computer program. The expected rate of a given disease was assumed to be constant throughout the job classes (tested at five levels), and the observed numbers of cases in the job classes were generated based on neutral deviations from background with error rates of  $\pm 1\%$  to 16%. One job class was assigned to be the “excess-class” and the number of cases in that class was increased by a factor of  $Q$ , which was set at levels that ranged from 1.25 to 5. All of the experimental conditions were replicated 10,000 times in a Monte Carlo scheme for scenarios in which each job class had been designated as the excess-class. Following each run, significant excesses (if any) were determined using a modified version of Daniel’s method, and the percentages of false positive and false negative identifications were tabulated. We found that the sensitivity of the method is largely dependent on the relative risk ( $Q$ ) associated with the exposure. Specifically, the results indicate that as the relative risk increases, the percentage of false negative identifications of the excesses is reduced to nearly 0% and the percentage of false positive identifications is approximately 13%. When applied to real data, should an association be detected between any product and a health outcome, this preliminary analysis will yield a reduced “product” set that can then be investigated in detail and the agents involved considered further for quantitative reconstruction. The proposed method is highly efficient and has the potential to benefit future complex exposure reconstruction studies, particularly when there is no predetermined exposure associated with an observed increase in a cause-specific health end point.

[Supplementary materials are available for this article. Go to the publisher’s online edition of the Journal of Occupational and Environmental Hygiene for the following free supplemental resource: a Word file containing a table giving the percentages of false positive and false negative identifications.]

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