

Commentary

Experts, self-reported exposure and JEM: a quest for a more heuristic approach based on deterministic exposure models

H. Kromhout

Correspondence to:

Dr H. Kromhout

Environmental and Occupational Health Group

Institute for Risk Assessment Sciences,

University of Utrecht,

Yalelaan 2, Utrecht, The Netherlands

H.Kromhout@iras.uu.nl

In their very comprehensive review on methods for assessment of occupational exposure in case-control studies Teschke et al. state that "among the exposure estimation methods in common use today, expert assessment is usually the best approach". They do so, despite the fact that it is well known that subjective assessments by experts is of a relative nature(1) and that in order to have a more quantitative assessment the experts have to be calibrated.(2, 3) The main reason for choosing experts can be traced back to the alternative methods of self-reported exposures and generic job exposure matrices (JEM) which as they claim suffer from severe limitations. Recently, the limitations and possibilities of exposure assessment on the basis of JEM were extensively discussed.(4) From a somewhat broader perspective, expert assessment and JEM are not as different as often is being suggested. A study in which an expert judges the job history of every case and

control, is actually applying a very detailed (job) exposure matrix where the input axis is made up by exposure determinants which the expert think of as being important.

The problem with the case-by-case expert assessment is that the process of assigning exposure to an individual on the basis of determinants of exposure generally takes place in the black box made up by the mind and heart of an occupational hygienist or exposure assessor (in the best case). Teschke et al. show that recently results of determinants of exposure studies (pointing at determinants of exposure like physical properties of the agent, work environment, tasks and use of control measures including personal protective equipment) have increasingly become available to the expert and the field at large. With this in mind, I would like to propose that we use the result of such studies together with the hidden treasures in the mind and hearts of experts to elaborate deterministic exposure models. These models can subsequently be used to assign exposure to individual subjects on the basis of information collected on a priori identified determinants of exposure in standardised interviews (of next of kin) or questionnaires.(5) In other words, experts should be used collectively to devise these deterministic exposure models (DEM). The models will combine the specificity of experts and the structured approach of the JEM. Exposure assessment for case-control studies in this way will become more reproducible and reliable and less prone to biases and the resulting harsh critiques it is often (justifiably) exposed to.(6)

With occupational risk assessment becoming more quantitative, it is conceivable that case-control studies (in the general population) will become less popular. The main reason for this is that the retrospective nature and resulting limitations of the exposure assessment will at best produce semi-quantitative estimates of past exposures.

However, case-control studies on short-term health effects like reproductive effects(7, 8) as discussed by Teschke et al., point into a new direction. Banking of biological

material in large community based studies (like for instance the European Community Respiratory Health Survey) (9) together with adequate collection of deterministic information will enable the future exposure assessor to produce more quantitative estimates of (internal) exposure. In addition, much needed expert calibration studies have been shown to be possible with the introduction of simple sampling methods based on passive monitoring.(7) Self-assessment of occupational exposure(10) and a more rigorous use of experts as described above are needed in order to have a future for community based occupational case-control studies. Nevertheless, everyone considering such a study should not go along that way without consulting the insightful review of exposure assessment methods by Teschke and her colleagues.

References

1. Kromhout H, Oostendorp Y, Heederik D, Boleij JS. Agreement between qualitative exposure estimates and quantitative exposure measurements. *Am J Ind Med* 1987;12(5):551-62.
2. Hawkins NC, Evans JS. Subjective estimation of toluene exposures: a calibration study of industrial hygienists. *Appl Ind Hyg* 1989;4:61-68.
3. Post WK, Heederik D, Kromhout H, Kromhout D. Occupational exposures estimated by a population specific job exposure matrix and 25 year incidence rate of chronic nonspecific lung disease (CNSLD): the Zutphen Study. *Eur Respir J* 1994;7(6):1048-55.
4. Kromhout H, Vermeulen R. Application of job-exposure matrices in studies of the general population: some clues to their performance. *Eur Respir Rev* 2001;11:80-90.
5. Stewart PA, Stewart WF, Siemiatycki J, Heineman EF, Dosemeci M. Questionnaires for collecting detailed occupational information for community-based case control studies. *Am Ind Hyg Assoc J* 1998;59(1):39-44.
6. Cherrie JW, Kromhout H, Semple S. The importance of reliable exposure estimates in deciding whether trichloroethylene can cause kidney cancer. *J Cancer Res Clin Oncol* 2001;127(6):400-4.
7. Tielemans E, Heederik D, Burdorf A, Vermeulen R, Veulemans H, Kromhout H, et al. Assessment of occupational exposures in a general population: comparison of different methods. *Occup Environ Med* 1999;56(3):145-51.
8. Veulemans H, Steeno O, Masschelein R, Groeseneken D. Exposure to ethylene glycol ethers and spermatogenic disorders in man: a case-control study. *Br J Ind Med* 1993;50(1):71-8.

9. Burney PG, Luczynska C, Chinn S, Jarvis D. The European Community Respiratory Health Survey. *Eur Respir J* 1994;7(5):954-60.
10. Liljelind IE, Stromback AE, Jarvholm BG, Levin JO, Strangert BL, Sunesson AL. Self-assessment of exposure--a pilot study of assessment of exposure to benzene in tank truck drivers. *Appl Occup Environ Hyg* 2000;15(2):195-202.