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Low-level chemical sensitivity: a perspective from behavioral toxicology.

Weiss B

University of Rochester School of Medicine and Dentistry, New York, USA.

Low-level chemical sensitivity is hardly a new issue in environmental toxicology. It is, in fact, the focus of risk assessment. The risk assessment process is designed explicitly to estimate the health threats posed by low exposure levels, typically by extrapolating from high experimental or environmental levels. The conventional risk assessment structure, however, was designed primarily around cancer. It is only awkwardly applicable to neurobehavioral toxicants because of the multiplicity of endpoints that have to be considered in evaluating neurotoxicity. At the same time, neurotoxic risk assessment maintains certain advantages over cancer risk assessment because of diminished uncertainties over dose extrapolation. It does not have to depart as far from the range of observable data. The main problem with extending the risk assessment model to issues such as Multiple Chemical Sensitivity (MCS) and Sick Building Syndrome (SBS) is the absence of a specific chemical whose concentration can be measured and then manipulated. A prototypical agent, however, such as a volatile organic solvent, might be selected and studied. Beyond the choice of agent, however, is the question of which behavioral criteria are likely to yield the most useful information. Although neuropsychological test batteries provide one source of data, they typically are administered in a setting other than the one allegedly provoking the syndrome. A different approach invokes what might be called a miniature work situation. Here, a test subject is evaluated in a setting that emphasizes sustained performance testing in the presence of target chemicals. Experimental design is another factor to be considered. Two features are especially critical. The most sensitive design, at least for the current stage of knowledge, would probably emphasize consistency of response, and would choose as subjects individuals who claim to be afflicted with low-level sensitivity. Consistency in a single individual may be more informative than significance tests in a large sample. In addition, consistency as a criterion helps overcome the problem that, in any such sample, only a minor proportion of the subjects may truly exhibit such sensitivity. At a later stage, a broader range of subjects might be targeted. Research on behavioral disorders evoked by food additives illustrates the importance of such questions. It also demonstrates that the methods currently used to assess the potential toxicity of many substances, including food additives, typically ignore subtle, and often sensitive, neurobehavioral measures.

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