

Health Risk Assessment and the Practice of Industrial Hygiene

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It has been claimed that there may be as many as 2000 airborne chemicals to which persons could be exposed in the workplace and in the community. Of these, occupational exposure limits have been set for approximately 700 chemicals, and only about 30 chemicals have limits for the ambient air. It is likely that some type of health risk assessment methodology will be used to establish limits for the remainder. Although these methods have been used for over 10 yr to set environmental limits, each step of the process (hazard identification, dose-response assessment, exposure assessment, and risk characterization) contains a number of traps into which scientists and risk managers can fall. For example, regulatory approaches to the hazard identification step have allowed little discrimination between the various animal carcinogens, even though these chemicals can vary greatly in their potency and mechanisms of action. In general, epidemiology data have been given little weight compared to the results of rodent bioassays. The dose-response extrapolation process, as generally practiced, often does not present the range of equally plausible values. Procedures which acknowledge and quantitatively account for some or all of the different classes of chemical carcinogens have not been widely adopted. For example, physiologically based pharmacokinetic (PB-PK) and biologically based models need to become a part of future risk assessments. The exposure evaluation portion of risk assessments can now be significantly more valid because of better dispersion models, validated exposure parameters, and the use of computers to account for complex environmental factors. Using these procedures, industrial hygienists are now able to quantitatively estimate the risks caused not only by the inhalation of chemicals but also those caused by dermal contact and incidental ingestion. The appropriate use of risk assessment methods should allow scientists and risk managers to set scientifically valid environmental and occupational standards for air contaminants.