

# The Scientific Facts About the Dry-Cleaning Chemical Perc

*By ACSH Staff — July 1, 2001*

## **Executive Summary**

Perchloroethylene (PCE, or perc) has been the subject of close government and public scrutiny for more than 20 years. But government agencies in the U.S. and around the world have not agreed about the potential of environmental exposure to PCE to cause adverse health effects, including cancer, in humans. This report summarizes and evaluates the evidence behind these disparate views, and provides a balanced assessment of the possible risks of PCE based on the best available science.

- Inhalation of high levels of PCE, and chemically similar solvents, can cause neurological effects such as nausea, headache and dizziness. High inhaled doses also have been linked to changes in blood chemistry indicating that the liver and kidneys have been affected.
- These effects have been seen almost exclusively in workers, particularly in the dry-cleaning and chemical industries. There also have been claims that reproductive difficulties are associated with occupational exposure to PCE.
- The claim that PCE is a carcinogen has received the most public and governmental attention. Concern has been expressed that environmental exposures to PCE in ambient and indoor air, and in drinking water, can be carcinogenic in humans.
- Carcinogenicity claims are largely based on studies performed in rats and mice in which the rodents were exposed daily over a lifetime to very high air concentrations of PCE. The results of these experiments suggested that PCE exposure was associated with liver cancers in mice, and with kidney tumors in male, but not female, rats.
- In addition, results of some epidemiological studies of dry cleaning and chemical workers exposed to PCE have been interpreted to suggest a relationship between occupational exposure and various types of cancer. Careful examination of the conduct of these studies reveals serious problems including uncertainties about the amounts of PCE to which people were exposed, lack of consideration of exposures to other chemicals at the same time, and failure to take into account known confounders. Due to these deficiencies, these studies do not support a link between PCE and cancer or other adverse effects.
- Studies on metabolism and mechanism of action have shown that the metabolism of PCE to trichloroacetic acid (TCA) occurs preferentially at high doses and to a much greater extent in rodents, particularly mice, than in humans; and it is likely the TCA that causes the adverse effects on the liver. Other studies have shown that PCE combines with glutathione much more rapidly in rodents than humans and that male rats have the unique ability to accumulate a protein known as alpha-2 globulin in the kidney findings which likely explain the occurrence of kidney tumors in male rats only.

- The differences between humans and rodents in the metabolism and mechanisms of action of PCE make it unlikely that the carcinogenic effects seen in mice and rats administered high levels of PCE will occur in humans exposed at environmentally relevant levels.
- A number of government agencies have investigated the risks of PCE exposure in humans but their conclusions vary greatly. A careful examination of the science behind such differences reveals that the more data that are considered, the lower the estimated risk. Indeed, the agency that incorporates the most data, Health Canada, concludes that PCE poses little or no risk to the public.
- A careful and balanced evaluation of the possible risks of PCE to the public based on occupational data, epidemiological studies, laboratory animal experiments, and biochemical research finds no credible evidence that adverse public health effects, including cancer, are caused by environmental exposure to PCE.

### [The Scientific Facts About the Dry-Cleaning Chemical Perc](#) <sup>[1]</sup>

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