The Health Risks of Trichloroethylene

Trichloroethylene (TCE) is a widely used cleaner at factories, military bases and hundreds of waste sites around the world. This chemical is also harmful to the environment and people. It can pollute the air, ground and water if not used properly. Additionally, it can be released into the air from tap water and is found in certain consumer products (e.g., glues, typewriter correction fluid, and paint removers). The government has a program in place to clean up contaminated sites.

Various government agencies have been assigned to help determine the public harm from TCE exposure. Their reports help guide policy and risk management decisions. Agencies involved in this are:

- U.S. Department of Defense
- Department of Energy
- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration

Understanding of Health Effects

Studies show TCE may cause cancer in animals. When people were studied, the risk for several illnesses may increase. The following body parts may be affected by TCE:

- Kidneys-Increase risk of cancer.
- Liver-Increase risk of cancer and liver failure.
- Reproductive System-Impairs growth and reduces fertility in males and females.
- Nervous System-Reduced mental status and changes in heart rate.

- Lungs-Increase risk of cancer and decrease lung function.
- Immune System-Worsens immune diseases.

More studies are needed to further see how TCE levels and cancer are linked.

TCE Risks at Low Doses

Most of the population is exposed to low doses of TCE and it is important to estimate the risk at these doses. This requires a few steps:

1. Selecting a point where exposure will lead to increased health risks.
2. Creating a model to predict exposure levels to health risks.

The EPA guidelines call for selecting specific points of exposure at 1%, 5%, and 10% of typical exposure levels. Because how TCE acts on the body is unknown, the EPA would like to develop a model where cancer risk is linked to doses of TCE.

Enough Evidence to Find Risk

The agencies have found evidence of cancer and health risks from TCE exposure has increased since 2001. Hundreds of waste sites in the U.S. are contaminated with TCE, and it is well documented that many people are exposed. The agencies recommend that their research and guidelines be finalized to handle the growing problem.

Original at: http://coep.pharmacy.arizona.edu/tce/whatistce.html
TCE’s effects on the human body

This chart shows how the body may be affected by exposure to trichloroethylene, or TCE. The chart reflects studies of people who worked with high levels of TCE, studies of rats and mice exposed to high levels of TCE and a few studies of people exposed to lower levels of TCE in drinking water. The information comes from a draft risk assessment released by the Environmental Protection Agency in 2001. After controversy erupted over its findings, the National Academy of Sciences was asked to review the report.

Exposure

Once a person is exposed to TCE — by drinking, breathing or touching the chemical — it is distributed via the circulatory system throughout the body, where it can accumulate in fat and other tissues.

Brain: TCE was once used as an anesthetic. In short, high doses, it has a similar effect to other solvents, alcohol, others, petroleum distillates and other halogenated solvents. It has been associated with dizziness, headaches, sleepiness, confusion, blurred vision, and weakness in several human studies.

Lymphatic system: In humans, TCE was associated with an elevated, but not statistically significant, risk of non-Hodgkin’s lymphoma. Exposure was associated with lymphoma in mice.

Immune system: TCE is linked to immune system damage and increased incidence of autoimmune diseases.

Development: There is evidence of heart abnormalities in human and animal offspring exposed in the womb. Rat pups showed heart and eye malformations and behavioral changes.

Reproductive system: Some male workers showed possible reproductive effects, like reduced sperm counts. Links have been drawn to cervical and prostate cancer.

Susceptibility

Besides the size and duration of the dose of TCE, several factors may influence whether people are affected by TCE after exposure. For cancer risk assessments, the EPA assumes a 150-pound adult is exposed to TCE for 24 hours a day for 30 years.

- Some people’s genetic makeup will make them more or less likely to be affected.
- Women were more susceptible to some effects than men. Women and female rats and mice showed signs of certain immune-system related problems.
- Children could be more affected than adults because they breathe, drink and eat more than adults, relative to their body weights. Developing fetuses and babies can also be exposed in uterus and via breast milk. One study linked higher leukemia rates to prenatal exposure to TCE.
- Exposure to different chemicals, like other chlorinated solvents and alcohol, may increase the effects of TCE.
- Diabetics and those with certain other illnesses may be more susceptible.

Sources: Environmental Protection Agency; Journal research

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