



Trichloroethylene (TCE)

Information for Health Professionals

TCE is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is mainly used to remove grease from metal parts, in adhesives, paint removers, typewriter correction fluids, and stain removers. It has also been used to clean electronic components.

TCE can enter the environment when it is manufactured, used or disposed. People can inhale TCE's vapors or get it on their skin or in their eyes during manufacturing or while using household products containing TCE. TCE that is improperly disposed can enter the soil where it can evaporate and get inside buildings or move from the soil to the groundwater where it may enter drinking water wells.

Routes of Exposure

TCE may cause adverse health effects following exposure via inhalation, ingestion, dermal or eye contact. When considering the human health effects of TCE, it is important to make a distinction between occupational exposures to relatively high levels by inhalation and dermal contact versus general environmental exposures to low levels in drinking water and ambient air.

Main Body Systems Targeted

TCE poses a potential human health hazard for non-cancer toxicity to the central nervous system, kidney, liver, immune system, male reproductive system, and the developing fetus. Studies on the effects of chronic TCE exposure to the respiratory tract and the female reproductive system are limited.¹ Studies have shown that simultaneous alcohol consumption and trichloroethylene inhalation increases the toxicity of trichloroethylene in humans.

Signs and Symptoms

No unique pattern of symptoms characterizes TCE-induced illness.

- Gastrointestinal symptoms such as nausea, vomiting, abdominal pain, and diarrhea.
- Possibly an increase in the incidence of miscarriages and fetal heart malformations.
- Skin contact with TCE for short periods may cause skin rashes.
- Inhaling small amounts for short periods may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.
- Ingesting or inhaling small amounts for long period may cause damage to the kidneys, heart, and reproductive system.
- Ingesting or breathing larger amounts for long periods may cause damage to the central nervous system, liver, or changes in mood or sleep patterns.
- Some studies in animals have found adverse health effects to the immune system.

Cancer Risk:

The U.S. Environmental Protection Agency has characterized TCE as “carcinogenic in humans by all routes of exposure.” TCE has been associated with kidney cancer, but there is less convincing evidence for non-Hodgkin’s lymphoma, and more limited for liver and biliary tract cancer.

Medical Evaluation

If a person presents symptoms that could be associated with a TCE exposure, a complete evaluation of symptoms is recommended in addition to a complete environmental, occupational and residential history. Liver and kidney function test, complete blood count and urinalysis are recommended. Recent exposures can be detected in the breath, blood or urine. Breath testing must occur within an hour or two after exposure. Blood and urine tests can find TCE and metabolites up to a week after exposure. TCE in the blood and urine has a short half-life and analysis for TCE is not useful for exposures that happened more than 5-7 days earlier. The presence of trichloroacetic acid in the urine should be interpreted with caution because certain medications (chloral hydrate and disulfiram) and other chlorinated hydrocarbons are metabolized to trichloroacetic acid, which is excreted in the urine. If blood is found in the urine, then a thorough workup should be conducted to find an etiology to rule out kidney or bladder cancer.

Treatment

- No medical treatment can remove TCE from the body. TCE is excreted primarily in breath as TCE or in urine as metabolites after an exposure occurs.

Prevention of Adverse Health Effects

- In order to reduce the risk of adverse health effects patients should be counseled on lifestyle changes such as smoking cessation, maintaining appropriate body weight, exercise, limiting alcohol consumption, and using appropriate personal protective equipment when working with chemicals. Giving the Hepatitis A and B vaccination may be prudent because of TCE’s main mode of action and target organs.

Contact:

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Additional Information

“Trichloroethylene Toxicity: How Should Patients Exposed to TCE Be Evaluated?” Agency for Toxic Substances and Disease Registry
<http://www.atsdr.cdc.gov/csem/csem.asp?csem=15&po=11>

Environmental Medicine Education for Health Professionals,
Agency for Toxic Substances and Disease Registry
http://www.atsdr.cdc.gov/emes/health_professionals/index.html



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¹ U.S. Environmental Protection Agency. Toxicological review of trichloroethylene (CAS No. 79-01-6) In support of Summary Information on the Integrated Risk Information System (IRIS), September 2011.