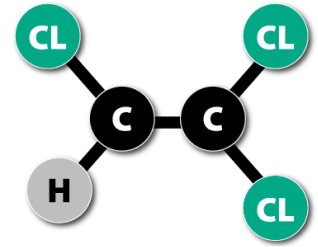


FACT SHEET: Trichloroethylene (TCE) Non-Cancerous Chronic and Sub-Chronic Health Effects



Note: $\mu\text{g}/\text{m}^3$ = micrograms per cubic metre of air. A microgram is one millionth of a gram.

What is Trichloroethylene (TCE)?

TCE is a clear, colourless liquid used mainly for degreasing of metal parts in the automotive and metal industries. It can also be found in some household products such as glues, adhesives, paint removers, spot removers, rug-cleaning fluids, metal cleaners and typewriter correction fluid.

What are the health risks associated with TCE exposure?

As with exposure to any chemical, a person's health risk depends on a number of factors including:

- How much TCE an individual was exposed to (the dose)
- How long the exposure lasted (the duration)
- How the individual was exposed - through breathing (inhalation), drinking/eating (oral) or skin contact
- Other factors associated with the individual such as: age, health, lifestyle choices, genetics and exposure to other chemicals

In 2010, The World Health Organization reported that indoor air concentrations of TCE in residential dwellings without known sources of TCE in the environment have been found to be approximately $1 \mu\text{g}/\text{m}^3$ or below. Between 2009-2011, a survey of indoor air quality in Canadian residential dwellings with no known sources of TCE was conducted in various locations throughout Canada. This study reported that an average of $0.21 \mu\text{g}/\text{m}^3$ TCE was detected in indoor air. The presence of TCE in indoor air may be caused by the release of TCE from products that are used or present in the building.

The health effects of TCE are mostly determined from epidemiological studies where people were exposed to large amounts of TCE in the air (e.g. in the hundreds of thousands of $\mu\text{g}/\text{m}^3$). Epidemiology is the study of disease, and how, when and where disease occurs. Information on health effects of TCE is also gathered from research involving animals, birds and fish. Some epidemiological studies provide evidence of a link between occupational exposure to TCE and cancer.

Chronic and Sub-Chronic Health Effects

Chronic effects are those that occur after long-term exposure such as years. Sub-chronic effects are those that occur after intermediate-term exposure such as months.

Non-cancerous chronic and sub-chronic health effects of TCE are less understood than acute health effects and research remains *ongoing* in this area. The following describes the neurological, developmental, kidney related, immunological and liver related health effects associated with exposure to TCE.

Nervous System (Neurological) Effects

Controlled human research studies and accidental exposures to TCE in the workplace have reported chronic health effects such as symptoms of central nervous system depression including: drowsiness; slow heart rate; confusion; nausea; and blurred vision. Other potential health effects consisted of reduced: attention span; reaction time; manual dexterity; and hand-eye coordination. Nerves affected by chronic exposure to TCE included nerves of the face (facial numbness), nose (loss of smell) and ears (inner ear disturbances).

Developmental Effects

A combination of [epidemiological and research studies](#) involving rodents, birds and fish have revealed health effects such as congenital malformations, particularly heart defects, weakened immune systems, decreased fetal weight and delayed formation of bones. There is some epidemiological evidence that suggested heart malformations in adults when exposed to TCE orally (drinking water) and altered immune systems in infants when exposed to TCE via inhalation. Exposure during pregnancy has been associated with multiple births, birth defects, low birth weight and embryonic or fetal mortality.

Kidney (Renal) Effects

Research suggested that proteinuria (excess protein in urine) was a non-cancerous health effect in humans when exposed to TCE. Rodents, after high doses of TCE (oral and inhalation) experienced increased kidney weight and kidney toxicity. Most research studies on kidney toxicity from TCE were focused on kidney cancer. Alcohol consumption and inhalation of TCE increases TCE toxicity and may cause 'degreaser's flush' which appears as red blotches on the skin.

Immune System (Immunological) Effects

Rodent and human research has suggested that chronic exposure to TCE may contribute to autoimmune diseases where body tissues are attacked by its own immune system - such as scleroderma and rheumatoid arthritis.

Liver (Hepatic) Effects

Hepatotoxicity (chemical-driven liver damage) from TCE exposure has been observed in rodent and human studies. In rodents, high doses of TCE (oral and inhalation) caused damage, liver enlargement and fatty infiltration of the liver. However, few studies have examined non-cancer liver toxicity following chronic exposure.

For further information, please contact:
Peterborough Public Health
705-743-1000
info@peterboroughpublichealth.ca