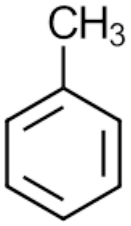
CAS 108-88-3

Toluene

C_7H_8

VERMONT DEPARTMENT OF HEALTH



Summary of Health Effects

Toluene can affect how human babies develop. In people who work with or who abuse toluene, it can affect the heart and blood vessels, brain and nervous system, reproductive system, and how unborn babies develop. In animals, toluene can affect the brain and nervous system, reproductive system, kidneys, and how babies develop.

How is toluene used?

Toluene is widely used as a solvent in paints, coatings, adhesives, inks and cleaning agents.[1,2] It is found in common household products such as paints, adhesives, synthetic fragrances, and nail polish. Toluene has also been found in a variety of children's products such as clothing and toys.[3]

Toxicity: What are its health effects?

Toluene is listed as a developmental toxicant on California's Proposition 65 list.[4]

Animals exposed to toluene showed various neurological, reproductive and developmental effects or reduced body weight gain in acute inhalation and dermal exposure studies.[3,5,6]

A National Toxicology Program study on the effects of toluene over 13 weeks found hepatocellular hypertrophy (increase in the size of liver cells) in rats that survived the full 13 weeks, and kidney disease in those that did not survive.[7]

Symptoms such as fatigue, muscle weakness, confusion, impaired coordination, enlarged pupils, nausea, mental confusion and coma have been noted in humans who have abused or have been occupationally or accidentally exposed to toluene. Case reports show cardiovascular, neurological, developmental and reproductive effects in humans.[3,8-10] Human babies born to mothers who have abused toluene may experience perinatal death, preterm delivery, small brain size at birth, low birth weight, and neurodevelopmental delays.[1,2]

Exposure: How can a person come in contact with it?

A person can come in contact with toluene by breathing it in, drinking contaminated water, eating contaminated food and from skin contact.[3]

Toluene has been detected in consumer products, indoor air and dust, drinking water, and the natural environment.[3]

High concentrations of toluene have been found in indoor air, which may be due to the use of toluene in common household products such as paints, adhesives, synthetic fragrances, and nail polish.[10,11]

Toluene has been detected in blood, urine, breast milk and fat tissue by biomonitoring studies including the 2015 National Health and Nutrition Examination Survey (NHANES) and Health Canada biomonitoring.[12,13]

Toluene is a high production volume chemical and is listed on the Environmental Protection Agency (EPA) Toxic Release Inventory.[14] The Danish EPA has detected toluene in children's products including infant jackets, mittens, school supplies, tents, and slimy and wooden toys.[15]

References

1. U.S. Environmental Protection Agency, Integrated Risk Information System (IRIS) (2005). *Toxicological review for toluene*. Retrieved from cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=118
2. Agency for Toxic Substances and Disease Registry (2000). *ATSDR Toxicological profile for toluene*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services. Retrieved from www.atsdr.cdc.gov/toxprofiles/tp.asp?id=161&tid=29
3. U.S. National Library of Medicine (2016). *Hazardous Substance Data Bank (HSDB) for toluene (CASRN: 108-88-3)*. Retrieved from toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
4. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. *List of chemicals known to the state to cause cancer or reproductive toxicity*. Retrieved from oehha.ca.gov/proposition-65/proposition-65-list
5. Yoon, J., Seo, H., Lee, J., Moon, C., Lee, K. (2016). Acute high-level toluene exposure decreases hippocampal neurogenesis in rats. *Toxicology and Industrial Health*, 32(11), 1910-1920. DOI: 10.1177/0748233715599087
6. Kyrklund, T., Kjellstrand, P., Haglid, K. (1987). Brain lipid changes in rats exposed to xylene and toluene. *Toxicology*, 45(2), 123-133. Retrieved from www.ncbi.nlm.nih.gov/pubmed/3603578
7. U.S. Department of Health and Human Services, National Toxicology Program (1990). *NTP Toxicology and carcinogenesis studies of toluene (CAS No. 108-88-3) in F344/N rats and B6C3F1 mice (inhalation studies): National Toxicology Program technical report series*, *371*, 1. Retrieved from ntp.niehs.nih.gov/results/pubs/longterm/reports/longterm/tr300399/abstracts/tr371/index.html
8. Goodwin, T.M. (1988). Toluene abuse and renal tubular acidosis in pregnancy. *Obstetrics & Gynecology*, 71(5), 715-718. Retrieved from www.ncbi.nlm.nih.gov/pubmed/3357661
9. Suzuki, T., Kashimura, S., and Umetsu, K. (1983). Thinner abuse and aspermia. *Medical Science, and the Law*, 23, 199-202. DOI: 10.1177/002580248302300308
10. Plenge-Bonig, A. and Karmaus, W. (1999). Exposure to toluene in the printing industry is associated with subfecundity in women but not in men. *Occupational Environmental Medicine*, 56, 443–448. Retrieved from www.ncbi.nlm.nih.gov/pmc/articles/PMC1757762/
11. U.S. Environmental Protection Agency, Technology Transfer Network (1992). *Hazard summary for toluene*. Revised 2012. Retrieved from www.epa.gov/sites/production/files/2016-09/documents/toluene.pdf

12. Centers for Disease Control and Prevention (2015). *Fourth national report on human exposure to environmental chemicals: Updated tables February 2015*. Atlanta, GA. Retrieved from www.cdc.gov/exposurereport/
13. Health Canada (2013). *Health Canada second report on the human biomonitoring of environmental chemicals in canada*. Minister of Health, Ottawa, ON. Retrieved from www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/environmental-contaminants/second-report-human-biomonitoring-environmental-chemicals-canada-health-canada-2013.html
14. U.S. Environmental Protection Agency, TRI Toxics Release Inventory Program (TRI). *TRI Chemicals*. Retrieved from www.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals
15. Danish Ministry of the Environment, Environmental Protection Agency. *Surveys on chemicals in consumer products; Reports 46, 60, 67, 68, and 84*. Retrieved from eng.mst.dk/chemicals/chemicals-in-products/consumers-consumer-products/danish-surveys-on-consumer-products/