

New Look at BTEX: Are Ambient Levels a Problem?

Study findings and implications

Benzene, toluene, ethylbenzene, and xylenes are four chemicals frequently found together and referred to as BTEX. In our review we collected studies assessing the health effects of BTEX exposure at low (everyday) levels considered safe by the US EPA.

Evidence from studies in humans suggests that we should be concerned about the connections between BTEX exposure and reproductive, developmental, respiratory, and immune effects. Specific effects include sperm abnormalities, reduced fetal growth, low birth weight, cardiovascular disease, respiratory dysfunction, asthma, sensitization to common antigens, and more. Some effects were seen from exposure to the BTEX chemicals individually, and others were from exposure to the combination.

Below are specific findings from the review and our assessment of the implications of those findings.

FINDING: BTEX exposure occurs from indoor off-gassing from household products, and exposure levels can be much higher indoors than outdoors.

IMPLICATION: Research is needed to determine the greatest sources of indoor exposure so that they can be reduced or eliminated.

IMPLICATION: Household products should not contain chemicals that have biological activity at low concentrations. For example, safe replacements are needed for chemicals in building materials (paints, wallpaper etc.), furniture, and household cleaners. Government support is needed for the development of safer alternatives to such chemicals.

FINDING: People are exposed to BTEX through vehicle exhaust, and BTEX exposure also occurs from unconventional oil and gas development (e.g. hydraulic fracturing).

IMPLICATION: As oil and gas development (UOG) advances rapidly into neighborhoods around the world, the number of people living near UOG is increasing dramatically. The government should require industry to monitor the air from UOG and enforce pollution limits that protect the health of people, wildlife and the environment.

IMPLICATION: Exposure and symptoms of citizens living in close proximity to UOG should be studied, in order to identify ways to prevent harmful exposures.

IMPLICATION: BTEX are added to gasoline to prevent the fuels from spontaneously igniting. Thus one of the highest sources of BTEX emissions is from vehicle exhaust. The

continued use of BTEX in fuel formulations should be reevaluated and safer alternatives should be developed.

FINDING: Health effects were observed at exposure concentrations considered safe by the U.S. EPA.

IMPLICATION: The current methods by which government research sets 'safe' levels of chemical exposure is flawed. Relatively high exposure levels are tested for health effects such as death or changes in organ weight. These endpoints are not sensitive enough to detect critical changes in endocrine function. By assuming that lower doses are always safer, the government has set exposure levels they hope will be safe, however these levels have not been tested for health effects that can occur from exposure to low concentrations. There is an urgent need to change the system so that chronic long-term health effects are assessed at exposure levels currently experienced by the general population.

FINDING: Many different hormones can be involved in the health effects associated with exposure to BTEX.

IMPLICATION: The endocrine (hormone) system responds to very low concentrations of chemicals. Research is needed on the hormonal mechanisms that may be responsible for the health effects associated with BTEX exposure. Such research should focus on exposure concentrations currently experienced by humans. Government funding for endocrine research is urgently needed.

FINDING: Sixty four percent of the studies reviewed found effects in children, some of whom were exposed to BTEX prenatally.

IMPLICATION: Prenatal and early childhood exposure to BTEX can lead to permanent effects. Medical and clinical professionals need to be aware of the importance of the role of exposure to endocrine disruptors during prenatal development. Recommendations for how to avoid exposures to BTEX should be developed and shared widely.