

Subtle Shades of Impairment Childhood Tetrachloroethylene Exposure May Cause Subclinical Deficits in Adult Vision

People come into regular contact with tetrachloroethylene (also known as perchloroethylene, or PCE) through dry-cleaned clothes, and the chemical has become a frequent contaminant in surface and ground-water, often due to improper disposal. PCE has been associated with neurologic and visual impairment in exposed adults. Now investigators have detected visual impairment in adults whose exposure to PCE-contaminated drinking water had occurred years earlier—from gestation through age 5 years [*EHP* 120(9):1327–1332; Getz et al.].

Some 660 miles of improperly cured vinyl-lined drinking water pipes installed between 1968 and 1980 leached PCE into the water delivered to residences at different parts of the Cape Cod region of Massachusetts. Previous studies of this cohort—exposed and unexposed adults born to Cape Cod parents from 1969 through 1983—have detected evidence that PCE exposure may contribute to other neurologic impairments, including post-traumatic stress disorder, bipolar disorder, and diminished performance on tests of memory, learning, and visuospatial functioning.

In this study, the investigators tested the visual acuity (sharpness of vision), contrast sensitivity (ability to distinguish gradations of

light and dark), and color discrimination (ability to correctly identify colors) in 25 exposed and 40 unexposed members of the cohort. The researchers used an algorithm to estimate PCE exposure based on each individual's residence during gestation and early childhood, since the presence and degree of PCE contamination in drinking water varied by locale.

Tests of color discrimination revealed that high PCE exposure was significantly associated with color confusion, with all major errors occurring in blue–yellow discrimination. Only the highest PCE exposure level was associated with impaired contrast sensitivity, but these results were not statistically significant. Visual acuity did not appear to be affected; most study participants had 20:20 vision, and no differences were observed between exposure groups. The measured vision impairments are subclinical, meaning they would not have directly noticeable effects on an individual's vision.

Previous studies have only assessed relationships between PCE exposure and vision in either childhood or adulthood. The results of this retrospective study must be confirmed, given its small sample size, but the findings suggest that childhood PCE exposure may cause long-term visual impairment. Further study of this or other exposed populations is necessary to understand the long-term effects of early-life exposure to PCE.

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Followup in Southern California Decreased Birth Weight following Prenatal Wildfire Smoke Exposure

In fall 2003 wildfires blazed in Southern California, sending pollutant-laden smoke directly into the heavily populated Los Angeles and Orange counties. A new study of birth records from the area shows a decreased average birth weight among infants carried *in utero* during the wildfires [*EHP* 120(9):1340–1345; Holstius et al.].

Chronic maternal exposure to ambient particulate matter (PM) and indoor biomass smoke during pregnancy has been linked to decreased infant birth weight, although similar effects attributable to wildfire smoke have been little studied. In this study, researchers analyzed 886,034 birth records of babies delivered between 2001 and 2005 in the South Coast Air Basin, an area that overlaps the wildfire-affected regions. They compared the average birth weight of infants carried *in utero* during the wildfires with that of infants who were either born before or conceived after the wildfires. They also compared birth weights of infants exposed during the first, second, and third trimesters of pregnancy.

After adjusting for infant sex, gestational age at birth, and other factors known to influence birth weight, the researchers found that

exposed infants weighed an average of 6.1 g (0.2 oz) less at birth than unexposed infants. Infants exposed during the second trimester showed the largest average reduction, at 9.7 g. Infants exposed during the third trimester showed an average reduction of 7.0 g, and those exposed during the first trimester showed an average reduction of 3.3 g (the latter was not statistically significant). The trends were corroborated by a sensitivity analysis that compared pregnant mothers according to whether the air-pollution monitor nearest their residence recorded high or low PM levels during the wildfires.

The small reductions in birth weight attributed to the wildfires are unlikely to have serious health effects in any given individual. However, wildfires are predicted to increase in frequency and severity as climate change progresses, and the researchers note that the proportion of low-birth-weight babies—those weighing less than 2,500 g (5.5 lb) at birth—could rise as a result. This could have important populationwide repercussions because these babies are at increased risk for a variety of poor health outcomes.

PM and carbon monoxide are among pollutants released by wildfires that could plausibly contribute to the birth-weight decrease. However, the researchers note that other pathways are possible and worthy of investigation, among them the increased stress that living through a wildfire may place on pregnant women.

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Smoke from wildfires burning across Southern California, 27 October 2003