

Perchlorate – Frequently Asked Questions

Q. Is perchlorate toxic?

A. It's important to remember that it's the amount of a substance, not just its mere presence, that determines whether there is a toxic effect. Vitamin C can be harmful at excessively high levels, for example, but poses no risk in smaller doses.

- ♦ **In the case of perchlorate, it is well-established scientifically that, at low levels, perchlorate has no toxic or adverse effects.** This is shown in 50 years of scientific, peer reviewed research and was confirmed by a select panel of the national preeminent scientific body, the National Academy of Sciences (NAS).
- ♦ **The NAS panel conducted a comprehensive review of the scientific literature, held public hearings, and issued a report in 2005.** At high levels, perchlorate can block the thyroid gland's ability to absorb iodine. Over time, a sustained lack of iodine could result in hypothyroidism (hypothyroidism is described as an adverse effect by the NAS). NAS emphasized in its report that inhibition of iodide uptake by the thyroid has been the only consistently documented effect of perchlorate exposure in humans and that other effects, including hypothyroidism, have not been demonstrated in humans exposed to perchlorate.¹

Q. Is perchlorate rocket fuel?

A. Perchlorate is a salt, which exists naturally in some fertilizers and can be man made. Because of the large amounts of oxygen in its chemical make up, it is used as an oxidizer to help solid rocket fuel burn, but it is not rocket fuel.

Q. What would be considered a “high level” of perchlorate, high enough to potentially pose a risk of adverse health effects?

A. NAS identified the “No Observed Adverse Effect Level” for perchlorate at 0.4 milligrams per kilogram per day. This is equal to about 14,000 parts per billion (ppb).

Q. Is perchlorate present in food and drinking water at levels high enough to potentially pose a risk of adverse health effects?

¹ See National Research Council report “Health Implications of Perchlorate Ingestion,” January 2005, page 110. View online at <http://lab.nap.edu/nap-cgi/discover.cgi?term=perchlorate&restric=NAP>

A. According to separate research from the U.S. Food and Drug Administration² and the U.S. EPA³, the answer is no.

- ♦ **The FDA study, “Dietary Intake of Perchlorate and Iodine” did not find evidence that anyone, adult or child, is exposed to unsafe perchlorate levels from food.** In light of the FDA findings, it is probable that even if drinking water perchlorate levels exceeded 12 ppb to 20 ppb, total perchlorate exposures would not exceed 24.5 ppb - the “Reference Dose” which NAS indicated should be a safe daily level of consumption for everyone, including children, pregnant women and fetuses.
- ♦ **Further, of 34,193 water samples EPA tested from US public water systems, only 637 samples (1.86%) had perchlorate levels above 4 ppb.** Half of those 637 samples (i.e., 319) were in the range of 4 ppb to 6.4 ppb. Thus, perchlorate levels were less than 6.4 ppb in more than 99% of water samples.
- ♦ **Taken together, the results of the FDA diet study and the EPA water study indicate that there is little or no likelihood of individuals ingesting perchlorate at daily doses higher than 24.5 ppb.** Further, even if exposure does go slightly above 24.5 ppb, that exposure does not automatically mean there is a health risk. NAS has indicated adverse health effects aren’t a risk until exposure exceeds approximately 14,000 ppb.

Q. People have been talking about a CDC study, and some have said the study found that low levels of perchlorate are causing adverse effects. Is that true?

A. Any such claims would be entirely erroneous, as is shown by simply reading the study itself.⁴ As the study’s principal author, Benjamin C. Blount, has stated publicly, it measured no adverse health effect. Further, the study neither found nor discussed a causal link between perchlorate exposure and abnormal thyroid function. The terms “cause” and “causal” are not used anywhere in the text. Instead the authors clearly and repeatedly refer to “associations”, *i.e.*, statements that indicate a statistical relationship of uncertain direction and relevance.⁵

² CW Murray et al: US Food and Drug Administration’s Total Diet Study: Dietary intake of perchlorate and iodine. *J Expo Sci Environ Epidemiol*, 2008.
(<http://www.nature.com/jes/journal/vaop/ncurrent/pdf/7500648a.pdf>)

³ Office of Water: *The Analysis of Occurrence Data...* (EPA 815-D-06-008); EPA, 2006;
(http://www.epa.gov/safewater/ccl/pdfs/reg_determine2/report_ccl2-reg2_ucmr1_occurrencereport.pdf).

⁴ BC Blount et al: Urinary perchlorate and thyroid hormone levels in adolescent and adult men and women living in the United States. *Environ Health Perspect* 114:1865-1871, 2006.
(<http://www.ehponline.org/members/2006/9466/9466.pdf>).

⁵ The distinction between causation and association is a critical concern of epidemiology. (e.g., KJ Rothman, S Greenland: *Modern Epidemiology*; Lippincott-Raven, 1998, pp. 7-28).

Q. Some have claimed the NAS report and the safe level NAS proposed need to be updated because they were developed prior to the CDC study. Is that true?

A. The NAS report stands as the single most authoritative and comprehensive examination of the health implications of perchlorate ingestion ever conducted.

- ♦ **The NAS select panel comprised 15 world-renowned experts in toxicology, thyroid health and other areas of science directly related to perchlorate.** They reviewed 50 years of relevant research and peer-reviewed studies, and heard public testimony. As part of its findings, the NAS recommended that research continue, while determining that the existing scientific data was sufficient to recommend levels of perchlorate that would be safe for everyone.
- ♦ In April 2007 - *after* publication of the CDC study - NAS panelist Dr. Robert Utiger, senior physician with the Harvard Institutes of Medicine, testified before Congress and stated: "I continue to believe that a reference dose of 0.007 mg/kg/day (24.5 ppb) is quite adequate."
- ♦ The American Thyroid Association in 2007 concluded that the CDC study findings were "intriguing," but limited in their application to the setting of exposure standards.⁶

Q. Has anything been done to regulate perchlorate?

A. Some have suggested perchlorate is not now regulated, leaving the impression that its use is unrestricted and unmonitored. This is not correct.

- ♦ Several states with recurring perchlorate issues—most notably, California, which has numerous military facilities that used the substance in the past--have set drinking water standards that are enforceable by the government or private parties. Other states monitor perchlorate through regulatory guidance levels, which are to be applied for cleanups, for example.
- ♦ **The U.S. EPA has set a reference dose for perchlorate, based on the National Academy of Science recommendations of 0007 milligram/kilogram-day.** EPA translated this to a Drinking Water Equivalent Level (DWEL) of 24.5 parts per billion.⁷ The DWEL is used to calculate cleanup levels in the federal government cleanup program. EPA is currently deliberating whether to set, in addition, a national drinking water standard for perchlorate under the Safe Drinking Water Act.

⁶ ATA Public Health Statement: *Update on the Question of Perchlorate Exposure and Potential Effects ...*; 2006. (http://thyroid.org/professionals/publications/statements/06_12_13_perchlorate.html).

⁷ See http://www.epa.gov/fedfac/pdf/perchlorate_guidance.pdf

Whether or not USEPA takes that step, and during the agency's deliberation, perchlorate will continue to be regulated in the various ways cited.

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For more information, visit www.perchlorateinformationbureau.org