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ES&T News

Perchlorate found in vitamins and elsewhere

Perchlorate is turning up everywhere. The presence of the anion in water was first linked to rocket fuel and ammunition, but recent studies have shown that it also forms naturally. Now, researchers have found perchlorate in over-the-counter vitamins. Although most of the vitamins contain low levels of perchlorate, some prenatal vitamins for pregnant women deliver a daily dose equal to one-third of the U.S. EPA's safe level for adults. However, these vitamins also contain iodine, which should help counteract any potential health effects of the generally small amounts of perchlorate, say scientists.

Shane Snyder, SNWA

In studies of over-the-counter vitamins for children, pregnant women, and the general population, researchers found some with high levels of perchlorate.

"This is just one more unexpected exposure route" for perchlorate, says Southern Nevada Water Authority (SNWA) analytical chemist Shane Snyder, who led the vitamins research to be published this spring in a special issue of *Analytica Chimica Acta*. The researchers found the contaminant in over-the-counter vitamins purchased from stores in Las Vegas, Nev., and Seattle. They tested 27 vitamins and 4 flavor-enhancing salts and found the highest levels of perchlorate among the 12 prenatal vitamins. "Our study is by no means representative," cautions Snyder. "We really don't know how common these high values are."

Perchlorate in sufficient amounts inhibits the uptake of iodide, an essential component of hormones produced in the thyroid. Thyroid hormones regulate metabolism in adults, but pregnant women face a special risk because these hormones help guide the brain and nerve development of their fetuses.

EPA's safe daily dose for perchlorate is 0.7 micrograms (mcg) per kg body weight per day; this standard was adopted in February 2005 amid great controversy. The perchlorate-contaminated vitamins have levels too low to exceed that standard. However, when Snyder's group followed the label instructions for the prenatal vitamins with the highest perchlorate concentration, they calculated a dose of 18 mcg per day, 37% of the EPA reference dose for a 154-lb woman. Snyder would not reveal the name of those vitamins.

U.S. Food and Drug Administration spokesperson Sebastian Cianci says that manufacturers are responsible for ensuring the safety and proper labeling of supplements such as vitamins. Human-health researchers say that this study emphasizes the need to consider perchlorate and iodine together. “Although it is impossible to be sure, I suspect that the very low levels of perchlorate detected in multivitamins are not clinically significant,” says Boston University endocrinologist Elizabeth Pearce. “I would be more concerned about the presence of perchlorate in prenatal multivitamins that do not contain iodine,” she notes, adding that about one-third of prenatal multivitamins marketed in the U.S. do not contain any iodine. Of those with iodine, most have 150 mcg, which is less than the recommended daily allowance of 220 mcg per day for pregnant women, says Pearce.

The results are interesting, agrees chemist Purnendu “Sandy” Dasgupta, at Texas Tech University, but the perchlorate levels in vitamins fail to account for concentrations that his group found in a survey of breast milk from U.S. mothers. He echoes Pearce in saying that future moms should take vitamins with iodine and not worry about perchlorate.

The source of the perchlorate in the vitamins is not known, but Dasgupta suggests that seaweed could be a likely source. His group recently surveyed various species of seaweeds harvested from a bay in northern Maine. “Although most seaweed samples contain some amount of perchlorate, the great majority contains iodine in so much higher amounts that seaweed consumption should result in net beneficial iodine nutrition,” he says. Further, the perchlorate in the seaweed washes off much more effectively than the iodide.

Meanwhile, researchers are on the hunt for additional sources of perchlorate. During a test of a new analytical method, Centers for Disease Control and Prevention (CDC) analytical chemist Ben Blount was surprised to measure perchlorate in the urine of 61 CDC co-workers. Most samples had ~3 ppb perchlorate, more than an order of magnitude greater than the level that someone might ingest from drinking water in CDC’s home region of Atlanta. Blount is now analyzing for perchlorate in the urine of ~2800 Americans as part of the 2001–2002 National Health and Nutrition Examination Study (NHANES); results should be published this year.

“If perchlorate is ubiquitous—not just in water or in milk or in vitamins—then the possibility of getting enough to have an effect, even if only transient, would indeed increase,” says Harvard thyroidologist Robert Utiger, a member of the National Academies’ perchlorate committee, which advised EPA on setting a safe level. Those NHANES data should be interesting. —REBECCA RENNER