America's lead problem: an unexpected culprit surfaces

Millions of American children have lead levels high enough to put them at risk for learning disabilities, attention and behavior problems, and criminality (see related stories on pages 1 and 2. (see related articles, *Crime Times*, 1998, Vol. *4*, No. 4, Page 1&2 and *Crime Times*, 1998, Vol. *4*, No. 4, Page 2&7). New research by Roger D. Masters and Myron Coplan suggests a surprising contributor to America's lead problem: the chemicals used to fluoridate public water supplies. According to Masters, "Wherever there is lead pollution in the environment, the use of silicofluorides in water treatment increases lead uptake in the body and brain."

Masters and Coplan analyzed data from more than 200 communities in Massachusetts, investigating the blood lead levels of children, the lead content of public water supplies, and the water fluoridation methods in each community. The study controlled for socioeconomic and demographic factors including population density, income, housing age, and race.

The researchers found that the average uptake of lead by children is only weakly associated with lead levels in a community's water supply. However, they say, "the fluoridation agents used in water treatment have a major effect on lead levels in children's blood." Children's average lead levels were higher in communities using fluosilicic acid or sodium silicofluoride than in communities that used sodium fluoride or did not fluoridate their water. Moreover, the percentage of children with dangerously high lead levels was significantly higher in communities using silicofluoride compounds than in the other communities.

Masters and Coplan note that communities where children have high blood lead levels generally have higher crime rates than other areas. Interested in the possible role of fluoridation, the researchers studied data from all communities in Massachusetts, and are now extending their work to Georgia, Wisconsin, and other U.S. cities and states. The data analyzed so far reveal, they say, that "rates of violent crime are higher where silicofluorides are used than where other fluoridation methods or non-fluoridation is practiced."

Why would certain types of water fluoridation increase children's lead levels? Masters and Coplan note that water was originally fluoridated with sodium fluoride, on which safety data were based. Many communities, however, later switched to silicofluorides--a switch that the researchers say "occurred without adequate human or animal studies assessing their effects under realistic conditions."

Masters and Coplan say that the breakdown of silicofluorides into harmless substances "is almost certainly not complete under the conditions of normal water treatment." Incomplete breakdown can make water more acidic, and thus more likely to leach lead from pipes. "In addition," the researchers speculate, "traces of undissociated fluorinated silica residues may complex dissolved lead and facilitate its transport from the gastrointestinal tract to the blood stream."

To study the possibility that silicofluoride-treated water exacerbates children's uptake of lead from other sources, the researchers analyzed towns with high water lead levels and older housing. "In towns with both more old housing and high levels of lead in water," they report, "average blood lead is 3.59 æg/dl in 20 towns where silicofluorides are used, and only 2.50 æg/dl in the 26 towns not using these agents." This suggests, they say, that silicofluorides enhance lead uptake by the body.

"Water treatment with silicofluorides and lead toxicity," Roger D. Masters and Myron Coplan, *International Journal of Environmental Studies,* in press. Also: *Fact Sheet: Silicofluorides, Lead Toxicity, and Behavior,* Roger D. Masters and Myron Coplan. Address: Roger D. Masters, Gruter Institute for Law and Behavioral Research, Bldg. 50-Hinman Box 6222, Dartmouth College, Hanover, NH 03755. Email: ruter.institute@Dartmouth.edu.

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