

Second Thoughts about Fluoride

by Dan Fagin.

Scientific American, January 2008, pages 74–81

Full article available is available at the Scientific American website page

KEY CONCEPTS

- Researchers are intensifying their scrutiny of fluoride, which is added to most public water systems in the U.S.

Some recent studies suggest that overconsumption of fluoride can raise the risks of disorders affecting teeth, bones, the brain and the thyroid gland.

- A 2006 report by a committee of the National Research Council recommended that the federal government lower its current limit for fluoride in drinking water because of health risks to both children and adults

Page 75: Most fluoridated water contains much less fluoride than the EPA limit, but the situation is worrisome because there is so much uncertainty over how much additional fluoride we ingest from food, beverages and dental products. What is more, the NRC panel noted that fluoride may also trigger more serious health problems, including bone cancer and damage to the brain and thyroid gland. Although these effects are still unproved, the panel argued that they deserve further study.

*Page 75: **TOO MUCH OF A GOOD THING:*** Fluoride is in many foods, beverages and dental products. The ubiquity of the cavity-fighting chemical can result in overconsumption, particularly among young children.

*Page 78: **Scientific attitudes toward fluoridation may be starting to shift in the country where the practice began.***

Page 79: But enamel fluorosis, except in the severest cases, has no health impact beyond lowered self-esteem: the tooth marks are unattractive and do not go away (although there are masking treatments). The much more important question is whether fluoride's effects extend beyond altering the biochemistry of tooth enamel formation. Says longtime fluoride researcher Pamela DenBesten of the University of California, San Francisco, School of Dentistry: "We certainly can see that fluoride impacts the way proteins interact with mineralized tissue, so what effect is it having elsewhere at the cellular level? Fluoride is very powerful, and it needs to be treated respectfully."

Page 80: Clashes over the possible neurological effects of fluoride have been just as intense. Phyllis Mullenix, then at the Forsyth Institute in Boston, set off a firestorm in the early 1990s when she reported that experiments on lab rats showed that sodium fluoride can accumulate in brain tissue and affect animal behavior. Prenatal exposures, she reported, correlated with hyperactivity in young rats, especially males, whereas exposures after birth had the opposite effect, turning female rats into what Mullenix later described as "couch potatoes." Although her research was eventually published in *Neurotoxicology and Teratology*, it was attacked by other scientists who said that her methodology was flawed and that she had used unrealistically high dosages. Since then, however, a series of

epidemiological studies in China have associated high fluoride exposures with lower IQ, and research has also suggested a possible mechanism: the formation of aluminum fluoride complexes—small inorganic molecules that mimic the structure of phosphates and thus influence enzyme activity in the brain. There is also some evidence that the silicofluorides used in water fluoridation may enhance the uptake of lead into the brain.

Page 80: The NRC committee concluded that fluoride can subtly alter endocrine function, especially in the thyroid—the gland that produces hormones regulating growth and metabolism. Although researchers do not know how fluoride consumption can influence the thyroid, the effects appear to be strongly influenced by diet and genetics. Says John Doull, professor emeritus of pharmacology and toxicology at the University of Kansas Medical Center, who chaired the NRC committee: “The thyroid changes do worry me. There are some things there that need to be explored.”

Page 80-81: “What the committee found is that we’ve gone with the status quo regarding fluoride for many years—for too long, really—and now we need to take a fresh look,” Doull says. “In the scientific community, people tend to think this is settled. I mean, when the U.S. surgeon general comes out and says this is one of the 10 greatest achievements of the 20th century, that’s a hard hurdle to get over. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this [fluoridation] has been going on. I think that’s why fluoridation is still being challenged so many years after it began. In the face of ignorance, controversy is rampant.”

Page 81: Opponents of fluoridation, meanwhile, have been emboldened by the NRC report. “What the committee did was very, very important, because it’s the first time a truly balanced panel has looked at this and raised important questions,” says Paul Connett, a chemistry professor at St. Lawrence University and the executive director of the Fluoride Action Network, one of the most active antifluoridation groups world-wide. “I absolutely believe it’s a scientific turning point because now everything’s on the table. Fluoride is the most consumed drug in the U.S. , and it’s time we talked about it.”

Page 80: **A FLUORIDE DIET**

The optimal range for daily intake of fluoride—the level that maximizes protection against tooth decay but minimizes other risks—is generally considered to be 0.05 to 0.07 milligram for each kilogram of body weight. Consuming foods and beverages with large amounts of fluoride can put a diet above this range. [The article includes a list of foods and beverages with their fluoride content in parts per million, which is specific to the USA and may differ from Australian dietary fluoride levels]