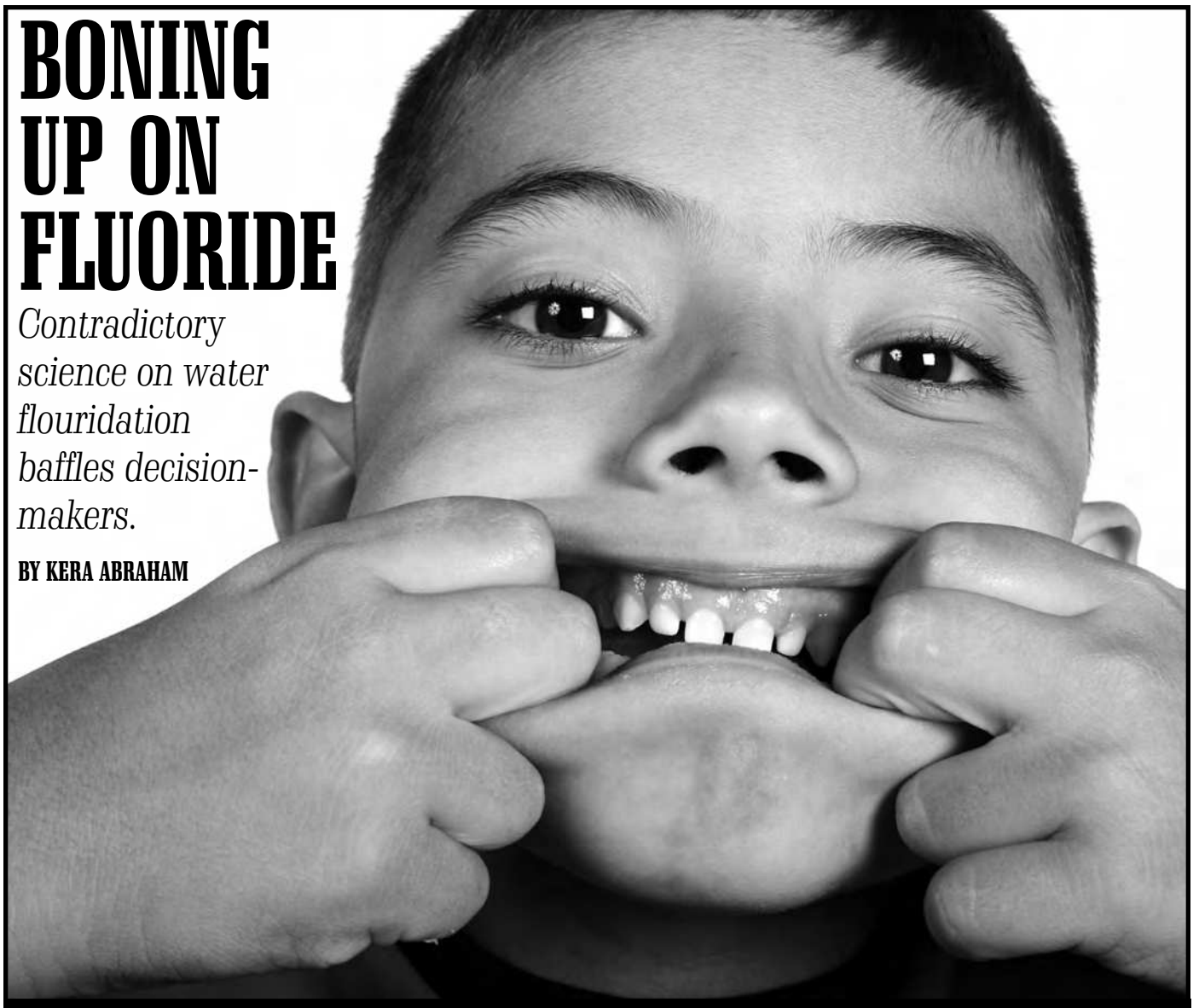
BONING UP ON FLUORIDE

Contradictory science on water flouridation baffles decision-makers.

BY KERA ABRAHAM



In Stanley Kubrick's classic 1964 movie, *Dr. Strangelove*, the deranged General Jack D. Ripper thinks he knows a secret communist plot to destroy Americans from within. "A foreign substance is introduced into our precious bodily fluids without the knowledge of the individual. Certainly without any choice," he says ominously. He's referring to water fluoridation, "the most monstrously conceived and dangerous communist plot we have ever had to face." Kubrick seems to be mocking the anti-fluoridation activists of his day.

Forty years later, some Americans still view fluoride as a threat — though not a Soviet one, and probably not dangerous to our precious bodily fluids so much as to our solid parts. Fluoridation's opponents are fighting against momentum; three in five Americans now drink fluoridated water, and that number is growing as more cities fluoridate their water supplies. But the movement against fluoridation, buoyed by new studies and the Internet, is amassing credible ammunition in its favor.

THE SCIENCE

Fluoride is a natural substance that exists in all water at some level. The gaseous element fluorine combines with other elements to form fluoride compounds in rocks and soil, which dissolve into flowing water. Most groundwater contains trace levels of fluoride, and ocean water contains about 1.3 parts per million (ppm) flouride.

Public water fluoridation actually means "adjusting to the optimum" — adding or removing fluoride to achieve a level of about 1 ppm, which the Center for Disease Control (CDC) has determined as the optimum concentration for strengthening teeth without causing serious dental fluorosis (or tooth mottling, a funky cosmetic effect). In places with high levels of naturally occurring fluoride, adjusting to the optimum means removing fluoride from the water supply. In most places, though, it means adding fluoride.

Governments fluoridate water as a means to prevent tooth decay. When we eat sugar or other refined carbohydrates, oral bacteria produce acid that erodes minerals on the surface of teeth. Our saliva attempts to reverse this process by re-building the tooth's mineral shield with a bath of calcium and phosphate. But a high-sugar diet produces acidic bacteria faster than mineral-rich saliva can repair the damage, causing cavities over time.

When we ingest fluoride in water, it replaces calcium and phosphate on the tooth's surface, resulting in enamel that is about 10 times more acid-resistant than teeth that have not been exposed to fluoride. That helps to prevent cavities, but it also makes teeth more brittle. Teeth that have been exposed to fluoride tend to break more easily than those that have not.

What happens to teeth often happens to bone. According to fluoride critic Dr. Hardy Limeback, head of preventative dentistry at the University of Toronto, 95 percent of ingested fluoride ends up in bones, not teeth. And what happens there worries some scientists and doctors.

BONES ABOUT FLUORIDE

In the past five years, scientists have produced an influx of peer-reviewed research linking fluoride consumption with bone damage. In a recent study, 96 percent of Tibetan children with dental fluorosis (caused by high fluoride intake from brick tea) exhibited developmental skeletal abnormalities in wrist x-rays. A May 2003 study in the journal *Fluoride* links increased fluoride consumption with lower IQs in Chinese children. A study in *Rheumatology Journal* reports that moderate levels of fluoride intake (1.9-3.6 ppm) correlates to knee osteoarthritis. And a 2001 Harvard doctoral thesis links fluoridated water to an increase in young boys' risk of developing osteosarcoma, a rare form of childhood bone cancer.

Proponents are quick to point out that high doses of fluoride may be toxic, but water supplies are fluoridated to a relatively low dose. The Environmental Protection Agency (EPA), however, reports that even at 1 ppm, fluoride can cause moderate dental fluorosis in a small percentage of people. The EPA sets a "maximum contaminant level" of fluoride at 4 ppm, warning that children exposed to this amount are at increased risk of bone disease and severe dental fluorosis. Canada has set its optimum fluoride level for water at 0.6 ppm, and most Western European countries — including those with government-subsidized dentistry — have rejected fluoridation outright. (See sidebar for more dosage info.)

The FDA regulates fluoride as a drug when it is administered topically to prevent tooth decay (as in fluoridated toothpaste). But fluoride in the water supply is officially classified as a contaminant rather than a drug, and the EPA regulates it. Agency managers have remained largely mum on the subject, but unionized EPA scientists voted against fluoridation in 1997. "We hold that fluoridation is an unreasonable risk," union senior Vice President Dr. J. William Hirzy testified. "The toxicity of fluoride is so great and the purported benefits associated with it are so small — if there are any at all — that requiring every man, woman and child in America to ingest it borders on criminal behavior on the part of the local governments."

FLUORIDE'S FRIENDS

Despite the concerns about fluoride, the CDC calls fluoridation one of the 10 greatest public health achievements of the 21st century, and the American Dental Hygienists' Association credits it with a 50-60 percent reduction in tooth decay since World War II. The American Dental Association, the American Medical Association, the U.S. Public Health Service and the American Water Works Association all endorse it.

Jane Myers, director of the Oregon Dental Association's public affairs department, believes that the mainstream majority supports fluoridation. She says that if local jurisdictions won't fluoridate their water supplies, the state should mandate it. "The world abounds in junk science," she says. "We require seat belts and motorcycle helmets and inoculations and a number of things, and they're frequently met with resistance by vocal minorities."

In addition to improving the state's teeth, Myers says, water fluoridation is good for the economy. She claims that every $1 spent on fluoridation yields about $38 in saved dental costs, which could make a big dent in the state's annual $70 million Medicaid dental bill.

Myers, admitting that she's not an MD, has nothing to say about fluoride's potential threats to the body — but she suspects that they're overblown. "They've been doing this for 60 years in the United States," she says. "It comes down to who you're gonna believe. Are you gonna believe the Department of Health, which has our well being at stake, or the opponents? Who are they, and what are their credentials?"

FLUORIDE'S FOES

Lynne Campbell, director of the anti-fluoridation group Oregon Citizens for Safe Drinking Water, suspects that something fishy is going on with fluoridation, though she doesn't know the details. She notes that the Public Health Service, the agency in charge of fluoridation research, is also fluoridation's primary endorser. In her view, that conflict of interest has created skewed poli-