Statistics and the fluoride debate

Acting on evidence that fluoride reduces tooth decay, health officials in the early 1950s began adding commercial inorganic fluorides to the water reservoirs of selected cities across the country. While some hailed the action as an unprecedented step in preventive health care, others argued that fluoride's cavity-retarding powers were more than offset by its potential evils. Conservative groups charged that such "tampering" with the "people's life source" was the insidious act of communists within the government who would soon supplant fluoride with soluble poisons. Some physicians felt the enforced drinking of fluoridated water would cause such side effects as chronic fatigue, migraine headaches, dermatitis and kidney ailments in certain persons. Various scientists—working under the tenet that chronic exposure to any unaccustomed chemical will trigger malignancy—warned that fluorides would eventually induce cancer.

That eventuality has come to pass, according to John Yiamouyiannis, science director of the privately-funded National Health Federation (NHF). The debate over fluoride continued last week as Yiamouyiannis went before the House Intergovernmental Relations and Human Resources Subcommittee to defend evidence he says shows an irrefutable link between fluoride and cancer. Also on hand were top officials of NHF's traditional opponent, the National Cancer Institute (NCI), who denounced the NHF studies as invalid and misleading.

NHF's "Exhibit A" was an epidemiological study undertaken by Yiamouyiannis and Dean Burk, former head of the NCI's cytochemistry section. Their study compares the cancer mortality rates of the 10 largest cities fluoridated in the early 1950s with the 10 largest cities left unfluoridated. Yiamouyiannis testified at the Oct. 12 hearing that the study reveals cancer mortality has increased significantly faster during the last 20 years for the "45 and above" age bracket in the fluoridated cities.

NCI deputy director Guy R. Newell does not contest that statistic. He does maintain, however, that the fluoridated cities also had disproportionate influxes of nonwhite and elderly populations, groups that have higher cancer rates than the national average. It is this greater proportion of both nonwhite and elderly, he says, that caused the greater cancer rates.

While Yiamouyiannis concedes fluoridated cities do show "a slightly more rapid increase in the age of the population," he maintains his statistical analysis proves neither factor had anything to do with the cancer increase. Newell counters that what the NHF study shows is merely an artifact of the statistical techniques Yiamouyiannis used.

The point of contention, then, is how to interpret the data. NHF charges that the "Standard Mortality Ratio" NCI uses in epidemiological studies—which compares average expected cancer mortalities with observed mortalities—often obscures what is really happening in a population. NCI argues that the NHF experimental design fails to isolate possible fluoride effects from other cancer-contributing factors in the inner city—location, population density, level of manufacturing and socioeconomic status, as well as age and race.

It was clear at the recent hearing that the honest disagreement on the data had reached an impasse. An anti-fluoride observer muttered afterwards: "They [NCI] keep playing scientific pick-up sticks with us. Every time we throw all the evidence out on the table and try to pull out the cancer-fluoride link, they yell that all the other sticks are moving, that we've touched on known contributing factors." NCI's frustration was evident when Herman F. Kraybill of NCI's Division of Cancer Cause and Prevention suddenly halted his testimony to rhetorically demand whether or not Congressman Clarence J. Brown (R-Ohio) could prove that grapefruit did not cause cancer. "Of course you can't," Kraybill continued, "and we can't prove it absolutely either. But our studies do show there is no obvious link between fluoridated water and cancer."

The studies Kraybill referred to are comparisons of cancer mortalities in a number of Texas counties. Some had low, some moderate and other counties had extra high levels of natural fluoride in their drinking water; still other counties had various levels of artificially-fluoridated water. When compared with cancer mortality and cancer incidence in non-fluoridated counties, no link with cancer was shown, NCI officials testified. Four independent scientific groups, including Oxford University and the Royal College of Physicians of England, reviewed and confirmed NCI's Texas studies.

In spite of what NCI and other public health agencies call an overwhelming body of evidence showing no link between fluoride and human cancer, the dispute will probably continue. Yiamouyiannis and his colleagues know it took epidemiologists years to prove cigarette smoking is carcinogenic; they say they are willing to play the devil's advocate on the fluoride question just as long.

Under renewed pressure to establish, in committee Chairman L.H. Fountain's (D-N.C.) words, that the agency is "doing something with the $850 million they've been given" (their approximate annual budget), NCI will soon begin a series of comprehensive bioassay tests on laboratory animals fed high doses of fluoride. □

Lead, cadmium linked to learning problems

An apparent link between learning disability and abnormally high lead and cadmium levels in children has been established by Canadian psychologists. R. O. Pihl of McGill University headed a research team that reports almost uniformly elevated lead and cadmium levels among 31 learning disabled children with developmental problems in areas such as comprehension, language, motor skills and orientation.

The group was compared with 22 non-disabled youngsters from the same school system. The two groups of children, all third- and fourth-graders, were matched by socioeconomic status, occupation of the parents, age, sex and language (fewer than 10 percent in each group were non-English speaking). Samples of head hair were taken from each youngster and analyzed for 14 trace elements.

Although none of the metal concentrations approached toxic levels, both lead and cadmium were substantially elevated in the learning disabled children, compared with normal readings in the other youngsters. While lead has been linked to hyperactivity and more indirectly to retardation and intelligence measures, this may be the first study to implicate lead in learning disability, Pihl told SCIENCE NEWS. Likewise, cadmium has been present in certain neurological problems, but until now has not been linked to learning disability.

Because the children's backgrounds and environments were so closely matched, it is unlikely that the 31 disabled children were exposed to higher levels of air-and water-borne lead or cadmium, Pihl says. "It may be a function of their [the disabled youngsters'] metabolism—they may not be getting rid of it as well," he suggests. Lead may be ingested through breathing, eating or drinking, while cadmium is dust-borne and is a product of, among other things, the smoke of a burning cigarette.

In most big cities, the trace elements float to the ground. "They're finding that small dogs are having seizures" from ingesting the metals in such cities, Pihl says.

The results, he concludes, definitely point to high levels of cadmium and lead being a possible causative factor in the development of learning disabilities in children. "Sure, we think that," he says, but only a predictive study, before the fact, would provide definitive proof.

Pihl and his colleagues are planning to replicate the study, which was reported in the Oct. 14 SCIENCE. If the followup results are consistent with the first study, Pihl plans a nutritional treatment program to attempt to counteract or prevent the lead and cadmium buildup. □