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Robert H. Burnett
Executive Director

July 1, 1992

TO: Vinyl Institute Board Members
Committee Chairmen
Communications Committee

FR: Bob Burnett

RE: Chlorine Health Study

I wanted to alert you to the attached news development, which broke late yesterday.

We are in contact with the Chlorine Institute on this, and expect that group to take the lead in responding to the media on it. As other developments occur, or we learn more from the CI, I will let you know.

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Tiny Cancer Risk in Chlorinated Water

By LAWRENCE K. ALTMAN

Chlorinated drinking water has been linked to small increases in the rates of rectal and bladder cancer in a new analysis by researchers at Harvard University and the Medical College of Wisconsin.

The findings, reported today in the *American Journal of Public Health*, are drawn from a combination of 10 previous studies. Using statistical methods, the researchers found that the slightly higher rates of the two cancers seemed to correlate with the amount of byproducts produced by chlorinated water. Previous studies had offered contradictory findings, but many of them, taken by themselves, were not statistically significant.

About three-fourths of the water supply in the United States is chlorinated. The degree of chlorination varies widely, depending largely on the source of the water and the contaminants present in it. Also, the studies the researchers analyzed were done in the 1970's, when allowable levels of chlorination were substantially higher than they are now.

One Peril Is Greater

The authors and other experts stressed that the new study should not lead to stopping chlorination. "The potential health risks of microbial contamination of drinking water greatly exceed the risks" of cancer, the authors said.

But the new study is likely to push government and industry harder to find more effective alternatives for chlorination to disinfect water supplies, epidemiologists and experts in water safety said in interviews.

Scientists are handicapped in evaluating the benefits and hazards of chlorination because they do not know how many cases of serious infection would occur if disinfection of water supplies was stopped.

Although the study found the risk of cancer from chlorinated water to be small, the authors calculated that it accounted for 6,500 cases of rectal cancer and 4,200 cases of bladder cancer in the United States each year. Each year, 47,000 cases of bladder cancer and 44,000 cases of rectal cancer are diagnosed in the United States.

Federal Standards Change

The study team was headed by Dr. Robert D. Morris of the Medical College of Wisconsin in Milwaukee. It comes at a time when previously-reported studies have suggested that existing American chlorination levels are too low to prevent many cases of gastrointestinal illness.

The 10 studies that Dr. Morris evaluated were carried out in the 1970's. Because Federal standards for the amounts of chlorinated byproducts allowed in water were tightened in 1973, the risk of the two cancers may now be lower than indicated in the figures found by Dr. Morris.

Experts have warned that if chlorination standards are relaxed in the United States, areas of the country could experience upsurges of cholera and other diseases. Such epidemics have occurred recently in areas of South America where chlorination was stopped or standards lowered, the experts said.

"This is a real important drinking water issue that has to do with the health of every American," said Ronnie Levin, an official of the Environmental Protection Agency.

Question of Balance

Ms. Levin, who is a policy officer in the research and development section at the E.P.A., said the issue involved balancing chlorination's benefits in preventing large numbers of infections against a small risk of cancer.

Dr. Morris's study will make it easier to evaluate the risks and the benefits of chlorination, Ms. Levin said, and it is likely to push research about alternative disinfectants.

Chlorination was first used to protect public drinking water at the end of the last century, and it has been credited with preventing typhoid and many other water-borne diseases.

In 1893, chlorination was used to treat sewage effluent at Brewster, N.Y., to protect New York City water. In 1908, chlorination was used successfully to stop the spread of typhoid in Chicago by treating contaminated drinking water at the stockyards. That was five years after the first continual use of chlorine in water treatment, in the small Belgium town of Middelkerke.

Alarm Stems From 1974

Thereafter, chlorination of water supplies spread rapidly. Today virtually all surface water is disinfected, and chlorination is the overwhelming choice for treating public water supplies. Ground water is chlorinated less often. Private wells and bottled water are generally not chlorinated.

Concern about cancer from chlorinated drinking water stems from the discovery in 1974 that the chlorination

of water creates environmental health hazards. To help clarify the issue of chlorinated drinking water and cancer, he turned to a new statistical method, called a meta-analysis, while working at the Harvard University School of Public Health in Boston.

Meta-analysis aims at gleaned more information from existing data by pooling the results of many smaller studies and applying one or more statistical techniques. The larger numbers obtained by combining studies can provide a greater statistical power than any of the individual, smaller studies. The method can produce a unified result from diverse apparently contradictory studies.

Taking a Second Look

In the chlorinated water and cancer controversy, Dr. Morris reasoned that a standard review of literature might erroneously conclude that no statistically significant risk exists when a meta-analysis might show one.

By pooling data from 10 published studies that met the criteria for the meta-analysis, Dr. Morris's team found that the relative risk for bladder cancer was 1.21. For rectal cancer it was 1.38. In other words, people drinking chlorinated water had a 21 percent greater risk of getting bladder cancer and a 38 percent greater risk of getting rectal cancer than those who drank non-chlorinated water.

Dr. Morris said a new study conducted in Colorado and reported at a recent meeting of the Society for Epidemiologic Research found a relative risk of 1.2 for chlorination and bladder cancer. The study was reported by Mike McGeehin of the Federal Agency for Toxic Substances and Disease Registry in Atlanta, who did not return calls to his office.

There is a wide variation in the amount of chlorinated byproducts found in water. "If you take water out of the Potomac and add chlorine to it, you are going to get more byproducts than if you take water out of Lake Superior and add chlorine to it," Dr. Morris said.

Hunting the Culprit

Scientists do not know what byproduct is the most important carcinogen in chlorinated water. One suspect is chlorinated hydroxy-furanone.

Experts said the second-most-common form of disinfection was chloramination, which adds both chlorine and ammonia to filtered drinking water to form chloramines. It tends to reduce the amount of byproducts.

An even less frequent form is ozone, although chlorine often is added in this process. Ozone byproducts have not been fully evaluated for safety.

As scientists explore newer methods and ask whether they are safer, they must determine whether the question relates to disinfection or the hazards of byproducts.

Dr. Thomas C. Chalmers, a co-author, said it took more than a year and

Accepting one
small risk to
ward off a much
larger one.

of chlorine and organic compounds in drinking water could produce chloroform and other potentially dangerous byproducts.

The discovery led to a number of studies. But they came up with inconsistent and conflicting results.

Dr. Morris has degrees in engineering and medicine, and his main interest

rejection by three journals before the team got its analysis published.

Science, the Journal of the American Medical Association, and the American Journal of Public Health all rejected the paper, Dr. Chalmers said.

Generally, scientific journals only tell the authors why they turn down a paper. But Dr. Chalmers said the experts who reviewed the paper "were uneasy about informing people about this problem until some alternative was available" for fear that people would demand an end to chlorinating water.

"But we felt people ought to have the data, not suppress it," Dr. Chalmers said. So when The American Journal of Public Health appointed a new editor, the authors sent their paper in again, and it was accepted.

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