3 Statements on Proposed Alternatives to Fluoridation of Water Supplies

Tablets

"An extensive program has been instituted in Switzerland (*1*) in an attempt to control dental caries through the administration of fluoride tablets to school children. Held and Piquet (*2*) in a preliminary report of a study of 6-year-old school children, which continued 3 years, reported that compressed sodium fluoride tablets were effective in reducing the incidence of dental caries. With the report of positive results, the practice has spread rapidly, and approximately 500 Swiss communities are using this method of caries prevention (*1*). Apparently the tablets are distributed in the primary schools; the method of administration, if any, of the fluorine prophylaxis to preschool children and infants is not known. A recent communication from H. J. Schmidt indicates that prophylaxis by means of fluoride tablets is also being administered in the state of Hessen, Germany.

"Use of fluoride tablets has been limited in the United States. Dietz (*3*) has reported a study involving a small number of children. Positive results were reported. Bibby, Wilkins, and Witol (*4*) state that the use of fluoride lozenges may contribute to the control of dental caries, and that the effects are probably the result of fluorine acting on external surfaces of the teeth. The number of persons observed was relatively small and the duration of the study only 12 to 14 months.

"In discussing the question of using fluoride tablets beginning at 5 or 6 years of age (first school year), certain presumptive evidence from fluoridation studies might be kept in mind. From the behavior of the results that A. L. Russell (personal communication, 1955) is obtaining in his studies in Montgomery and Prince Georges Counties, Md., the ingestion of fluorides after the period of tooth formation may not give the same protective effect as ingestion during the period of calcification. Effects observed in the earlier fluoridation studies support this inference; for example, the present dental caries prevalence rates in the Grand Rapids children who were 6 years old when fluoridation started (now 16 years old) as compared to those of the 16-year-old, Aurora, Ill., children who have used fluoride water all during their lifetime. It would seem logical, in the light of present evidence, to assume that an appreciable measure of protection would be lost if fluoride tablets were used by children only after starting to school, even if fluoride tablets are theoretically as effective as fluoride-bearing water.

"Another point to be borne in mind is that from the standpoint of effective public health application, the individual administration of fluoride tablets presents more difficulties than a broad community action, such as fluoridation. As a large portion of a child's permanent teeth are calcified prior to 6 years of age (normal time to enter primary school), a high degree of intelligent participation on the part of each mother, an alertness against waning interest, and a daily constancy of purpose measurable in years, is essential. The health education question posed by the tablet method of application becomes highly important if any degree of success is to be attained.

"In the light of present available evidence, prophylaxis by means of fluoride tablets cannot be evaluated properly until carefully controlled studies, including adequate numbers of children and observed over the necessary number of years, are available. At the present time, such studies are not available. From the standpoint of theoretical physiology, there would seem no reason why fluoride tablets should not be effective, providing some method can be found to ensure their conscientious daily consumption, at least over the period of tooth calcification. Because of the health education essential for their success it might be well, for the present, to limit the use of fluoride tablets in the control of dental caries to prescription by the dentist.

When all considerations are weighed, it would seem that in a community having a public water supply, the most economical and efficient manner of applying the fluorine prophylaxis to the greatest number of people is through fluoridation of the domestic water."

—H. Trendley Dean. Fluorine in the control of dental caries. Journal of the American Dental Association, vol. 52, January 1956, pp. 7–8.

"The preparation of fluoridated water at home by adding fluoride tablets to tapwater would be less expensive than the purchase of bottled water, but much more costly than communally fluoridated water. However, the proper preparation of such water in the home presents a very difficult problem of regulation. The problem is not merely one of assuring the addition of the proper amount of fluoride but also of proper mixing of the solution. An additional disadvantage of both alternative water procedures is that of inconvenience. It would be difficult to induce a high proportion of housewives and certainly of children to get their drinking and cooking water from a bottle rather than from the convenient sink tap.

"The daily consumption of tablets likewise raises questions of effectiveness and practicality. In the hands of trained personnel at the water treatment plant fluoride levels can be precisely controlled. But experience with other home remedies—even the aspirin tablet—prompts caution. The philosophy that 'if one tablet is good, two are better' may produce harm. A child's accidental ingestion of a large number of tablets is a great hazard from the viewpoint of those familiar with accidents in the home."

—From Report to the Mayor on Fluoridation for New York City, by the Board of Health, City of New York, October 24, 1955, pp. 33–34.

Bottled Water

"The process of preparing fluoridated water to be distributed in the same manner as bottled water involves the installation of equipment in one or more bottling plants and distribution to those who are willing to buy it. It is unlikely that a bottling plant would install the same kind of equipment that would be used in water treatment. One method that might be used is that of dissolving tablets containing fluoride ion in the water. A number of technical problems are introduced. The water would have to be tested for fluoride ion by the health department and bottled water companies would have to employ technical staff to supervise treatment procedures.

"Persons using the water must pay for the water as well as the fluoride ion. It is estimated that bottled fluoride water would cost 5 cents per day per person using it, or about $18.25 per year per person.

"Minimum health department supervision of bottled water fluoridation is estimated at $20,000 per year. The minimum estimate of the cost of bottled fluoride water at present prices would be not less than $18.25 per person per year. Such a price is of course prohibitive, and it is doubtful if many adults or children would have the benefit of fluoride water if such a fluoridation program were instituted."

—From Report to the Mayor on Fluoridation for New York City, by the Board of Health, New York City, October 24, 1955, p. 37.

Milk

"The Public Health Service does not favor the addition of fluorides to milk for the purpose of prevention of dental caries. The reasons for this position are as follows:

1. It is not known whether the addition of fluorides to milk is effective in preventing tooth decay, although it is known that such addition is effective in water. Further studies of this matter are indicated.

2. The individual consumption of milk by children varies considerably more than their water intake. For economic and other reasons, a considerable number of children in some age groups consume little or no milk. Furthermore, the use of fluorides in milk has not been investigated. On the other hand, we do know, on the basis of examination of many thousands of children who have consumed water varying in fluoride concentration, the amount of fluorides which must be added to water to be effective.

3. The possibility that fluoridation of milk may be harmful in an area where the water

supply is fluoridated or already contains sufficient fluorides.

4. The practical difficulties and hazards that would exist, both in controlling the rate of application and in testing the amount of fluorides added to relatively small volumes of milk by the large number of individual milk plants that might adopt this practice. From an administrative standpoint, the fluoridation of milk would spread the responsibility for control, and would necessitate the introduction of a complicated system of supervision.

5. The likelihood that only a portion of the milk supply would be fluoridated in a given market, resulting in a lack of uniform distribution. This would reduce the benefits to be obtained by the community as a whole. From this point of view, it would appear that water is a much better vehicle."

—U.S. Public Health Service. The fluoridation of milk—a statement of policy.

"Technical problems are such that representatives of the milk industry have resisted the idea of fluoridating milk in the past. It has been estimated that fluoridation will add 1 cent per quart to the milk price. Health department supervision of milk fluoridation would be costly. To provide adequate checking, 25,000 samples per year would need to be tested in the laboratory. The health department would have to construct adequate facilities for the testing program and enlarge the staff to perform the work. It is estimated that the annual cost exclusive of facilities would be $294,800 for performance of tests by official methods of analysis. The cost of fluoridated milk for school children only in New York City is estimated at $2,140,000, or $2.14 per person."

—From Report to the Mayor on Fluoridation for New York City, by the Board of Health, City of New York, October 24, 1955, p. 38.

"In regard to the distribution [of fluoridated milk], the committee feels that there would be a lack of uniformity of intake in various parts of the country and that small farms and dairies in rural districts would have problems in controlling the addition of fluoride to small quantities of milk. Furthermore, the intake of milk during the first year of life would depend on the extent to which the babies were breast fed. Human milk contains only traces of fluoride, the highest concentration found in our study (Hodge and associates, unpublished data) being 0.09 ppm."

—The problem of providing optimum fluoride intake for prevention of dental caries. National Academy of Sciences-National Research Council, Publication 294, November 1953, p. 12.

Bread

"Common foods suitable as carriers for fluoride, must above all meet the requirements of food technology for easy handling and mixing. Flour, as an example, may be considered a feasible vehicle from the standpoint of stability and the technology of distribution of the fluoride uniformly throughout the food. According to the study of Widdowson, the consumption of cereal increased from approximately 2 ounces per individual per day in the 1-year-old group to an average of 6 ounces in the 12-year-old. The consumption of bread showed roughly the same quantitative increase with age. Consequently, the average intake of fluoride, if added to flour, bread, or cereal, would come near to the desired increase with age from infancy to adolescence. The average daily consumption of flour in this country is estimated to be similar, or about 6½ ounces per individual per day in the adult. Considering the desirable intake of fluoride in older children as 1 mg. per day, the approximate amount of fluoride to be incorporated in the flour could be calculated. However, we have already referred to English observations suggesting that there are marked individual variations within single age groups in the consumption of bread. In addition, it is believed, for lack of exact data, that in the United States bread would not be used to a great extent in infancy during the early stage of tooth development."

—The problem of providing optimum fluoride intake for prevention of dental caries. National Academy of Sciences-National Research Council, Publication 294, November 1953, p. 11.

Salt

"No exact information has been obtained with regard to the consumption of salt in various age

groups. It is not even certain that this vehicle would be practical from a technical standpoint; it would have to be determined, for instance, whether the addition of sodium fluoride would be uniform throughout and whether it would affect unfavorably the antihygroscopic property of the product. While the daily consumption would have to be determined more exactly, there are doubts as to whether this vehicle would serve the purpose for infants and young children."

—*The problem of providing optimum fluoride intake for prevention of dental caries. National Academy of Sciences-National Research Council, Publication 294, November 1953, p. 12.*

Summarization

"Various vehicles have been proposed for the systemic administration of fluoride in regions where water fluoridation cannot be applied. The most important of these vehicles seem to be milk, table salt, and fluoride tablets which are now all being tested. Milk might be a possible alternative vehicle in countries with a universal milk consumption by the children, while salt might be possible for regions with a low or irregular milk consumption.

"At present, the value of milk and salt for fluoride administration cannot be compared with that of drinking water, since the evidence in favor of the first two vehicles is incomplete; in particular, there is a total lack of clinical evidence of their effectiveness. On the other hand, tablets have been shown to have some positive effect, although the experiments with tablets have been performed for a much shorter time and on a much smaller scale than drinking water fluoridation.

"Continued research on these fluoridation methods should be encouraged. If their effectiveness, practicability, and safety of application can be satisfactorily demonstrated, they may become very valuable in regions where water fluoridation is impossible."

—*Expert Committee on Water Fluoridation, First Report. World Health Organization Technical Report Series No. 146, Geneva 1958, p. 19.*

REFERENCES

(*1*) Le probleme du fluor et l'attitude des autorites sanitaires et medico-scolaires dans les cantons helvetiques. Second meeting of the European Organization for Research on Fluorine and Dental Caries Prophylaxis, Geneva, May 18–19, 1955. Program booklet, pp. 21–23.

(*2*) Held, A. J., and Piquet, F.: Prophylaxie de la carie dentaire par les comprimés fluorés: Premiers résultats. Bull. l'Acad. Suisse des Sciences Medicales, Basel 10: 249–259, October 1954.

(*3*) Dietz, V. H.: Sodium fluoride tablets in the precision control of dental caries. J. Missouri Dent. A. 33: 7–9, December 1953.

(*4*) Bibby, B. G., Wilkins, E., and Witol, E.: A preliminary study of the effects of fluoride lozenges and pills on dental caries. Oral Surg. 8: 213–216, February 1955.

Drinking Water Standards To Be Revised

An advisory committee of physicians, scientists, engineers, and administrators has been appointed to consider revision of the Public Health Service Drinking Water Standards. At its first meeting, March 24–25, 1959, special attention was given to limits for nonliving contaminants such as radionuclides and synthetic organics.

The Drinking Water Standards, first formulated 45 years ago and last revised in 1946, were originally applicable only to water used on interstate carriers. This is still their only legal basis. However, State health departments, the American Water Works Association, and the Armed Forces have accepted them as standards for public water supplies.