THE INS AND OUTS OF FLUORIDE IN HUMAN NUTRITION

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July 2000 FN-504

WHAT IS FLUORIDE?

Fluoride is a natural mineral that is found in various concentrations in all drinking water and soil. While it is not considered an essential factor for human growth and development, fluoride is a beneficial nutrient. Fluoride is the only nutrient that reduces the occurrence and prevalence of dental caries (cavities) in both children and adults. The use of fluorides and fluoridation is endorsed by many professional health organizations as the most effective dental public health measure in existence.

HOW DOES FLUORIDE PROTECT TEETH?

- Promotes remineralization of teeth
- Increases resistance to acid decay
- Prevents and inhibits formation of plaque
- Helps permanent teeth in children mature faster
- Improves tooth structure

HOW DID WE LEARN ABOUT FLUORIDE?

The role of fluoride in dental health gained recognition in the early 1900's. Several dentists, particularly in the Southwest region of the United States, had observed unusual stains or "mottled enamel" on the teeth of many of their patients. These stains, while visually displeasing, were highly resistant to tooth decay. Extensive research discovered that the occurrence and severity of the stained teeth (called dental fluorosis) was associated with high levels of fluoride found naturally in the water supply.

Scientists believed that dental decay could be prevented by increasing fluoride amounts in the water supply. Starting in 1945, four community-based trial studies were conducted in areas with low fluoride amounts in their water supplies. Two communities, usually neighboring locations, were paired together. One received increased fluoride in their water, the other had no

change. These communities were followed for 13-15 years. The results showed the dramatic benefits of water fluoridation resulting in a 50-70 percent reduction in tooth decay. In 1962 recommendations were made in the United States for the optimum range of fluoride concentrations to protect dental health and prevent dental fluorosis. In the United States, the optimal concentration of fluoride recommended for caries prevention is between 0.7 and 1.2 ppm (parts per million) depending upon the annual average maximum daily air temperature of the community. The lower range was recommended for warmer climates where water consumption was higher and the higher concentrations for colder climates.

WHAT AREAS OF THE WORLD NOW RECEIVE FLUORIDATED WATER?

In 1984 the World Health Organization (WHO) set a standard maximum concentration of 1.5 ppm fluoride in drinking water to avoid dental fluorisis. Recognizing the benefits of water fluoridation on dental health, many nations responded using the recommended WHOW standards as a guide. Hong Kong and Singapore fluoridate all their water supplies. Countries that currently provide fluoridated water to more than half their residents include Australia, Ireland, New Zealand and the United States. Other countries with large water fluoridation programs include Brazil, Canada, Chile and Malaysia.

Although the rate of water fluoridation increased fairly quickly from 1945 to the 1970's, the increase has been much slower in recent years. In the U.S., approximately 70% of all cities with populations above 100,000 use fluoridated water. Overall, an estimated 62% of the U.S. population had access to fluoridated water in 1992. The nation's goal, issued by the US DHHS Healthy People 2000 guidelines, was set at 75%.

Only two percent of the Utah population has access to fluoridated water, Brigham City, Helper and Hill Air Force Base have water systems with added fluoride while Delta, Snowville and Milford have naturally high fluoride levels in their water supplies. In Utah state legislation requires the consent of local voters before any community may initiate fluoridation.

WHY HAS THE EXPANSION OF FLUORIDATION SLOWED IN THE U.S.?

- The false perception among the public and policymakers that dental health is no longer a major problem or that fluoridation is no longer necessary or effective,.
- Political processes make adoption of new programs lengthy and difficult
- Many of the public water systems that are not fluoridated tend to serve small populations. Thus the cost per capita is higher
- Opponents of water fluoridation make unsubstantiated claims about adverse side effects in an attempt to influence public opinion.

IS WATER FLUORIDATION SAFE?

Fluoridation is one of the most thoroughly studied community health issues. The American Dental Association has gathered extensive research on the safety of fluoridation. The results showed no increased rate of any chronic disease due to fluoridation including cancer, heart disease, Downs Syndrome, Alzheimer's disease, AIDS, allergic reactions and cirrhosis. In 1988 the US Surgeon General issued a report stating that fluoride levels in drinking water are safe. The National Research Council of the National Academy of Sciences, in 1989 released a report stressing the safety of water fluoridation. Overall, the safety and effectiveness of water

fluoridation has been reevaluated frequently with little credible evidence to support an association between fluoridation and any disease conditions.

The possibility that fluoridated water may increase the risk for hip fractures in the elderly has been suggested by some recent studies. One Utah study by Danielson, et al reported in the Journal of the American Medical Association in 1992, concluded that they "found a small but significant increase in the risk of hip fracture in both men and women exposed to artificial fluoridation at 1 ppm suggesting that low levels of fluoride may increase the risk of hip fractures in the elderly." A 1996 study by Hiller et. Al concluded that "the burden of evidence suggests that fluoridation might be a risk factor for hip fracture but is weak and not sufficient to retard the progress of the water fluoridation program." Several additional studies show no correlation between fluoride intake and hip fractures.

ARE THERE ANY OTHER SOURCES OF FLUORIDE FOR THOSE WHO DO NOT HAVE FLUORIDATED WATER?

While fluoridated water is the most reliable and most effective source of fluoride, supplements, dental products, and even some foods can provide the needed amounts of fluoride to protect dental health.

Supplements

The prescription of fluoride supplement pills for children has long been recognized as an effective (but less reliable) alternative to water fluoridation. The American Dietetic Association and the American Dental Association both recommend fluoride supplements for children who live in areas where fluoride is not available in the water supply. Parents should learn what the range of fluoride is in their water supplies, and then work with their child's dentist and pediatrician for the recommended dosage.

The use of supplements is not encouraged in areas that receive fluoridated water since too much fluoride can cause irreversible stained teeth.

Topical Application Sources

Fluoride mouth rinses, toothpastes, and gels are also important sources of fluoride. In the United States, about 95% of toothpaste contains fluoride. People of all ages benefit from the topical effects of fluoride, whether or not they consumed fluoridated water or fluoride supplements as children. Topical fluoride may be particularly important in the prevention of tooth decay in adults and the elderly.

The concentration of fluoride in all of these products is very high, as they are meant to be used topically only. Danger of excess fluoride is possible if the products are ingested. Parents should use caution as young children learn to brush their teeth to teach them not to swallow the toothpaste. The average 2-3 year old will swallow 28-65% of their toothpaste. This is a problem for children in fluoridated communities, since they already receive sufficient fluoride. In non-fluoridated communities, if supplements are being used, a smaller dose may be necessary for this time period.

Food Sources

Although most foods contain minimal amounts of fluoride, the primary dietary source is water. Beverages and commercial food products prepared in areas with fluoridated water are also high in fluoride. However, the exact amounts vary extensively and are difficult to estimate. Fish, shellfish, chicken, and tea have the highest fluoride levels among all other foods. But the

amounts are significantly lower than that found in fluoridated water. Some countries (Great Britain) provide fluoride in their table salt (sodium fluoride). This is not readily available in the U.S.

WHAT HAPPENS IF YOU GET TOO MUCH FLUORIDE?

Excessive fluoride can cause dental fluorosis. Fluorosis is the mottling (discoloration) of tooth enamel that occurs in children as the permanent teeth develop, before they appear. This can be prevented by proper use of fluoride sources. However, once apparent, the results are irreversible. In mild cases, the teeth are highly resistant to tooth decay, but may have chalky white patches. This mild form is usually only detectable during dental exams and as such are not a cosmetic concern. Sever fluorosis causes dark brown stains and can interfere with the proper tooth mineralization.

Water fluoridation levels are well below the amount that could cause fluorosis. The main causes of fluorosis are as follows:

- Excessive use of dietary supplements (incorrect dosage, use in fluoridated areas)
- Ingestion of topical fluoride sources (toothpaste, rinses, gels)

CONCLUSION

When fluoride is provided in optimal amounts, is provides major dental health benefits to all age groups. Fluoridation of public water supplies has been endorsed by several professional health organizations including the American Dental Association, the American Dietetic Association, the American Medical Association, and the World Health Organization. Water fluoridation remains the most equitable and cost-effective method of delivering fluoride to all members of most communities, regardless of age, educational attainment, or income level. In areas that do not have fluoride in their water supply, children should receive fluoride supplements under the direction of their dentist and pediatrician.

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert L. Gilliland, Vice-President and Director, Cooperative Extension Service, Utah State University, Logan, Utah. (EP/07/2000/DF)