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## THE JOURNAL of the AMERICAN DENTAL ASSOCIATION

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*Editorial Department*

1944

### THE EFFECT OF FLUORINE ON DENTAL CARIES

THE discovery of the relation of a low-carries rate to the fluorine content of drinking water opened up a field of tremendous importance to those in dentistry and in public health work who are endeavoring to solve the problem of dental caries.

In our long and as yet profitless search for a mass preventive for dental caries, we have followed many promising leads, only to find them intriguing mirages. The latest lead in this direction is the caries-fluorine hypothesis, which is based upon the theory that, inasmuch as it has been found that the presence of fluorine in the drinking water has a retarding influence upon dental caries, fluorides may be employed therapeutically as a mass preventive of dental caries.

As far back as 1916, when that grand old pioneer of advancement in dentistry, G. V. Black, in association with F. S. McKay, presented his epoch-making studies on the rôle of fluorine in producing mottled enamel, the subject has been one that has invited investigation by the dental researcher. The studies on the subject conducted by H. Trendley Dean, of the United States Public Health Service, led to a nation-wide

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effort to eliminate the principal source of mottled enamel; namely, excessive amounts of fluorine in the drinking water, and the efforts of the United States Public Health Service in this field have been notable for their widespread beneficence.

Dr. Dean presented the results of his studies on the effect of the fluoride concentration in community water supplies on the incidence of dental caries in 1939, and his work immediately attracted the attention of numerous research workers, particularly those who were endeavoring to solve the problem of the etiology of dental caries.

In the study of the rôle of fluorides in producing mottled enamel, it was found that teeth so mottled were less susceptible to caries than the teeth of persons living in areas where the drinking water was free of fluorine. This discovery led to an intensive study of the relation of fluorine to dental caries, and the findings have led to wholesale and indiscriminate use of fluorides as a corrective of the carious process in the teeth, without regard to its possible baneful effects upon the teeth and other tissues of the body.

Research from the point of view of the relation of fluorine to caries has definitely determined that the use of drinking water containing certain amounts of fluorine will cause a disfiguring mottling of the enamel; that elimination of fluorides from the drinking water will stop the occurrence of this mottling effect; that this mottling is permanent when once it occurs and, too, that drinking water containing not more than 1.0 parts per million of fluorine will not have any mottling effects on the enamel of the teeth. It has also been determined that the carious process in teeth so mottled is definitely and quite perceptibly retarded and, in some instances, checked entirely.

The latter discovery has attracted the widespread attention of health workers and dentists, and efforts are now being made to apply fluorides topically to the teeth as a curative agent against dental caries, reportedly, in some instances, with success.

Comparison made by Arnold (J. A. D. A., April 1943) of the dental caries picture in children living in communities where the water contains not more than 1.0 parts per million and that of children living in communities using fluoride-free waters show that: (1) about six times as many children show no dental caries experience; (2) about a 60 per cent lower dental caries experience rate exists, and (3) there is almost a 75 per cent decrease in first permanent molar loss.

While these data are certainly speculatively attractive as leading to

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possible mass treatment of caries, our knowledge of the subject certainly does not warrant the introduction of fluorine in community water supplies generally.

Sodium fluoride is a highly toxic substance, and while its application in safe concentrations, and under strict control by competent personnel, may prove to be useful therapeutically, under other circumstances it may be definitely harmful.

To be effective, fluorine must be ingested into the system during the years of tooth development, and we do not yet know enough about the chemistry involved to anticipate what other conditions may be produced in the structure of the bone and other tissues of the body generally.

We do know that the use of drinking water containing as little as 1.2 to 3.0 parts per million of fluorine will cause such developmental disturbances in bones as osteosclerosis, spondylosis and osteopetrosis, as well as goiter, and we cannot afford to run the risk of producing such serious systemic disturbances in applying what is at present a doubtful procedure intended to prevent development of dental disfigurements among children.

With regard to the safety margin in the fluorine content of drinking water, the reported amount of fluorine in the water cannot be taken as the criterion for the amount taken in the system, as in an intensely hot climate much larger quantities of water would be imbibed and hence a much larger quantity of fluorine would be taken into the body. Another feature of the complex problem that demands consideration, in attempting to take advantage of the therapeutic value of fluorine, is the quantity absorbed by the system at various age periods of life.

M. C. Smith and H. V. Smith, in their studies at St. David, Ariz., found that, of the people using drinking water containing 1.6 to 4.0 parts per million of fluorine at the ages 12 to 14, 33 per cent had caries; at ages 21 to 41, nearly 100 per cent had caries; from 24 to 41, 50 per cent had all teeth extracted and replaced by dentures. The authors concluded from these data that the teeth of the individuals of a community in which comparatively large amounts of fluorine are found, in this case say 1.6 to 4.0 parts per million, are structurally weak; in some cases, the tooth structure being so impaired as to crumble on attempts to place fillings. (*Am. J. Pub. Health*, 30:1050, September 1940.)

Because of our anxiety to find some therapeutic procedure that will promote mass prevention of caries, the seeming potentialities of fluorine appear speculatively attractive, but, in the light of our present knowledge

or lack of knowledge, the harm far outweighs the benefit.

## DENTAL

TIME calls for a new approach to the problem. We repeat. Through proper application of dentistry, we can have benefited by the adjunct has profited.

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## DENTAL PROSTHETIC SERVICE PROGRAM

TIME calls for serious consideration of the dental prosthetic service problem. We represent the second largest health profession in America. Through proper application of the biologic and technical knowledge of dentistry, we coordinate these sciences to meet the exacting requirements of present-day oral health needs. The profession and the public have benefited by our efforts and achievements. The dental laboratory adjunct has profited by our progress.

From time to time, it becomes necessary to take inventory of our status as a profession and consider the philosophic, ethical and professional phases of our calling. Delinquency, if not checked, results in retrogression. Subversive activities in prosthetic service have been called to our attention repeatedly.

Many and varied solutions to the prosthetic service problem have been projected by men within and without the profession. Only a few within our profession are in practices and positions in which the rendering of an adequate prosthetic service has become distasteful. Currently, a few plans have been proposed that are incompatible with the wisdom that has directed our profession along a safe and sound course. They serve a purpose; however, in crystallizing the profession as to what is good and what is bad for it and the public. The bulk of dental work is still done by the rank and file of every-day practitioners, who give final disapproval of these projected theories.

The dental technician is a valuable adjunct to the profession and is another assistant to us in our practice. The commercial laboratory is the agency which hires and trains the technician, sees that he is surrounded by sanitary working conditions, sees that the technician is adequately paid and receives and processes our prescriptions. They, too, are assistants and serve the profession.

With the complexities of democratic societies, problems always arise. Each in its turn must be solved. Illegal practices have crept in with the processing phases of prosthetic service. Many times, these practices have been entered into through mere thoughtlessness on the part of some