

RETREAT OF THE FLUORIDE-FLUORIDATION PARADIGM

Although its effectiveness to prevent dental caries was questioned almost from the start some sixty years ago, water fluoridation continues to enjoy widespread and unwavering support among most dental public health officials. In many quarters, despite a large and growing body of unfavorable evidence, belief in the value of fluoridation remains adamant. Yet in a detailed examination of “the fluoridation paradigm” in his 1987 PhD thesis *Education and Fluoridation in New Zealand: an historical study*,¹ our late editor, Dr John Colquhoun, who formerly had been an ardent proponent of fluoridation,² presented a strong case to challenge this belief. His research led him to conclude that, at least since the 1950s, improved nutritional education and better dental care in New Zealand and in other countries were far more responsible for increased dental health than fluoridation and fluoride use. He also examined and showed how “education for fluoridation” created a strong pro-fluoride mindset among dentists and dental health officials.

As abstracted in this issue of *Fluoride* (pages 315-6), a recent related review by Denmark’s Royal Dental College Professor Ole Fejerskov, titled “Changing paradigms in concepts of dental caries: consequences for oral health care,”³ draws attention to a major shift in understanding among cariologists about dental effects of fluoride that has not yet extended appreciably to textbooks and teaching, especially for public health dentistry. Contrary to previous and still-prevalent thinking among many dental health officials, pre-eruptive incorporation of fluoride into teeth and dental enamel during their formation and development is *not* how fluoride helps to reduce tooth decay.⁴ Permanent teeth with more fluoride in their enamel from such exposure develop caries about as easily as teeth with less fluoride in their enamel. Consequently, ingestion (swallowing) of fluoride is not needed to help prevent tooth decay, at least for permanent teeth. However, when ingested in excess during childhood (birth to age eight), fluoride causes varying degrees of dental fluorosis,^{5,6} yet its presence in the enamel prior to tooth eruption has not been shown to make teeth more resistant to decay. Unfortunately, this cardinal fact about fluoride in dentistry—that there is no systemic need for fluoride to deter dental caries—has been and continues to be widely overlooked.

Even so, just as in the second edition of his book, *Fluoride in Dentistry*,⁷ co-edited with Professors Jan Ekstrand and Brian Burt, Prof Fejerskov mistakenly continues to claim that water fluoridation is an effective and safe way to prevent tooth decay, except for attendant dental fluorosis. He cites reports of 50–60 years ago by H Trendley Dean and others in the US Public Health Service that 1 ppm fluoride in drinking water reduced dental caries in children by 50%, but he fails to note how these studies were flawed and that recent large-scale studies show virtually no difference in tooth decay between fluoridated and nonfluoridated communities.^{8,9} He also does not cite any of the studies showing that caries rates after cessation of water fluoridation have not increased but have continued to decline.¹⁰

Fluoride ingestion can also result in delayed tooth eruption.^{11,12} This fact is overlooked in almost all fluoridation studies and is one of the greatest flaws that still needs to be addressed in a re-examination of the fluoridation data. Teeth that have not erupted into the oral cavity are not exposed to the same number of demineralization-remineralization cycles as teeth that have erupted earlier; therefore, they cannot be compared with teeth already exposed. Yet that is exactly what happens when cohorts of children of the same birth age are compared. The comparison should be made between matched teeth that have been in the oral cavity for exactly the same periods of time. The early data show that fluoridation simply delays the onset of caries.¹³ Since fluoride ingestion has increased in modern times and now occurs from several other sources, the delay is no longer so pronounced as it once was.¹⁴

For many dental researchers, it is the widespread exposure to other sources of fluoride, primarily fluoridated toothpaste, that explains why it is no longer possible to show significant benefits of fluoridation in modern times.¹⁵ However, there are many other factors that need to be taken into account such as improved oral hygiene, improved education in relation to diets, and the introduction of antibiotics.¹⁶⁻¹⁸

Additionally, while supporting an altered fluoride paradigm that largely discounts any need for incorporation of fluoride into the enamel during the formation and development of permanent teeth for protection against dental caries, Prof Fejerskov fails to recognize that *the main component* of the fluoridation paradigm—a significant post-eruptive need for fluoride to prevent tooth decay—also needs to be questioned. He insists that oral topical effects of water-borne fluoride, even at levels as low as 1-ppm fluoride in drinking water, are real and lie primarily in a topical intra-oral anti-caries mechanism of promoting enamel apatite formation to arrest and/or prevent dental caries. But for this to occur he also—and correctly—recognizes the need for adequate amounts of calcium and phosphate to be present in the saliva. The overriding importance of calcium and not fluoride is readily seen in studies showing cleaner and superior teeth in dogs given purified bone meal or defluorinated phosphate supplements but very poor and unclean teeth with sodium fluoride supplements.¹⁹

Prof Fejerskov likewise fails to cite unrefuted research showing that correcting dietary calcium deficiency is a much more critical need than fluoride to prevent tooth decay.²⁰⁻²² Nutritionally deficient, refined sugar-rich diets—not lack of fluoride—are increasingly recognized as the principal cause of continued and even increasing high rates of tooth decay, especially in early childhood, occurring in fluoridated as well as nonfluoridated communities. Moreover, contrary to his claim that partial control but not real prevention of dental caries is possible, he ignores unrefuted evidence for caries-resistant teeth being formed by optimal, complete dental nutrition.^{21,22} Thus years ago, Reidar F Sognaes pointed out that teeth of monkeys, and also hamsters and rats, raised on a natural diet “do not develop appreciable caries later on very high sugar diets but do develop caries with an early high sugar diet during tooth development.”²³ Domestic animals,

including young and adult cats and dogs kept as pets, when fed nutritionally balanced diets rich in calcium and phosphorus, do not develop dental caries.

Fluoride exposure after tooth eruption may be beneficial to patients who are at high risk for caries, but nowadays the clinical evidence for even this benefit is statistically weak, and the gains may no longer be clinically significant.²⁴ Is it not time, therefore, to re-evaluate the overall role of fluoride in preventing dental caries in healthy individuals whose teeth develop with the benefit of a nutritious, well balanced diet, and whose dentition is well cared for throughout life?

In their major review of water fluoridation,⁶ the York reviewers conceded that the research literature in support of fluoridation is methodologically deficient and that no study had yet properly examined the alleged benefits of fluoride in relation to the impact of cariogenic diets. Thus the fluoridation paradigm shift has not made a complete retreat.

Unfortunately, the obsession with fluoride as a “magic bullet” continues to take many dental researchers down a misleading path of trying to find “new and improved” therapeutic fluoride products for the prevention of dental decay. Their efforts, however, would be more productive by finding ways to improve dental nutrition and produce caries-resistant teeth by nutritionally sound dietary fortification with factors that clearly and safely promote and support proper tooth development and growth and then help maintain teeth caries free for life.

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