Dental Plaque Fluoride Is Lower after Discontinuation of Water Fluoridation (Short Communication)

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Key Words

Dental plaque
Fluoridated water
Fluoride

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The beneficial effect of water fluoridation in reducing dental caries is well established [Murray and Rugg-Gunn, 1982]. Nevertheless, an increase in the caries prevalence is observed either after discontinuation of the addition of fluoride to the public water supply or when people move to a non-fluoridated area [Russell, 1949 Lemke et al., 1970; Kunzel, 1980]. Thus, the fluoride incorporated during enamel formation seems not to be the only mechanism involved in the cariostatic efficacy of fluoridated drinking water. Furthermore, considering that the primary action of fluoride is at the site of the lesion formation [Weather-ell et al., 1984], there is a need for continuous exposure to fluoridated water to obtain a maximum effect by maintaining an adequate concentration of fluoride in the oral fluids and so in dental plaque. The purpose of this study is to report the change of plaque fluoride concentration after discontinuation of water fluoridation in Piracicaba, SP, Brazil, a city of 300,000 inhabitants. The drinking water was fluoridated in 1971. Fluoridation was ceased in January 1987 due to a lack of sodium fluorosilicate availability. Dental plaque of unknown age was collected from 91 children of both sexes, aged 6–8 years, during the last 6 months of water fluoridation (0.8 ppm F) and from 41 subjects after its cessation (0.06 ppm F). The oral hygiene habits of these children were poor. Samples were carefully removed from all accessible tooth surfaces, transferred to individual 1.5-ml polypropylene microcentrifuge tubes, and dried for 16 h in vacuo at 40 °C over P205 [Pearce, 1984]. The mean dry weight from both plaque groupings was 3.3 ± 1.5 mg. The fluoride was extracted in 0.5 ml of 0.5 M HC104 by agitation for 3 h at room temperature. Acid neutralization was achieved by means of TISAB (20.0 g NaOH/l), and the extract was centrifuged at 16,000 g for 1 min. The fluoride content in the supernatant was then determined with a fluoride ion electrode (Orion 94–09) coupled to an Orion pH/mV meter (model 701). The fluoride concentration was expressed as nanograms fluoride per milligram dry weight of plaque, and electrode calibration employed standards containing 20.0–100.0 ng of fluoride per milliliter in TISAB-HC104 solution. As the fluoride concentrations in plaque were very low after water fluoridation was ceased, it was necessary to make ten pools of the 41 individual plaque samples, since at least 12.0 mg of plaque was required for an accurate fluoride determination. The results are presented in table I and show that the fluoride concentration in plaque 2 months after

interruption of water fluoridation was significantly lower than the concentration during fluoridation. Moreover, the fluoride level was similar to that found by Grobler et al.

Table I. Mean fluoride in dry plaque from schoolchildren of Piracicaba, SP, Brazil, before and after discontinuation of water fluoridation

Before After t test

Number of samples 91 10a

Mean fluoride concentration, ng/mg 21.7 1.7 $p < 0.01$

Standard deviation 12.5 0.6

This work was supported in part by Finep (4/3/85/0521/00).

Pooled from 41 individual samples.

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[1982] for a nonfluoridated area. Thus, the suspension of water fluoridation produced a marked decrease in plaque fluoride which may contribute to the reduction of the cariostatic effect when fluoride ingestion from water is interrupted.

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