

Year Book OF Dentistry

1972



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THE YEAR BOOK *of* DENTISTRY

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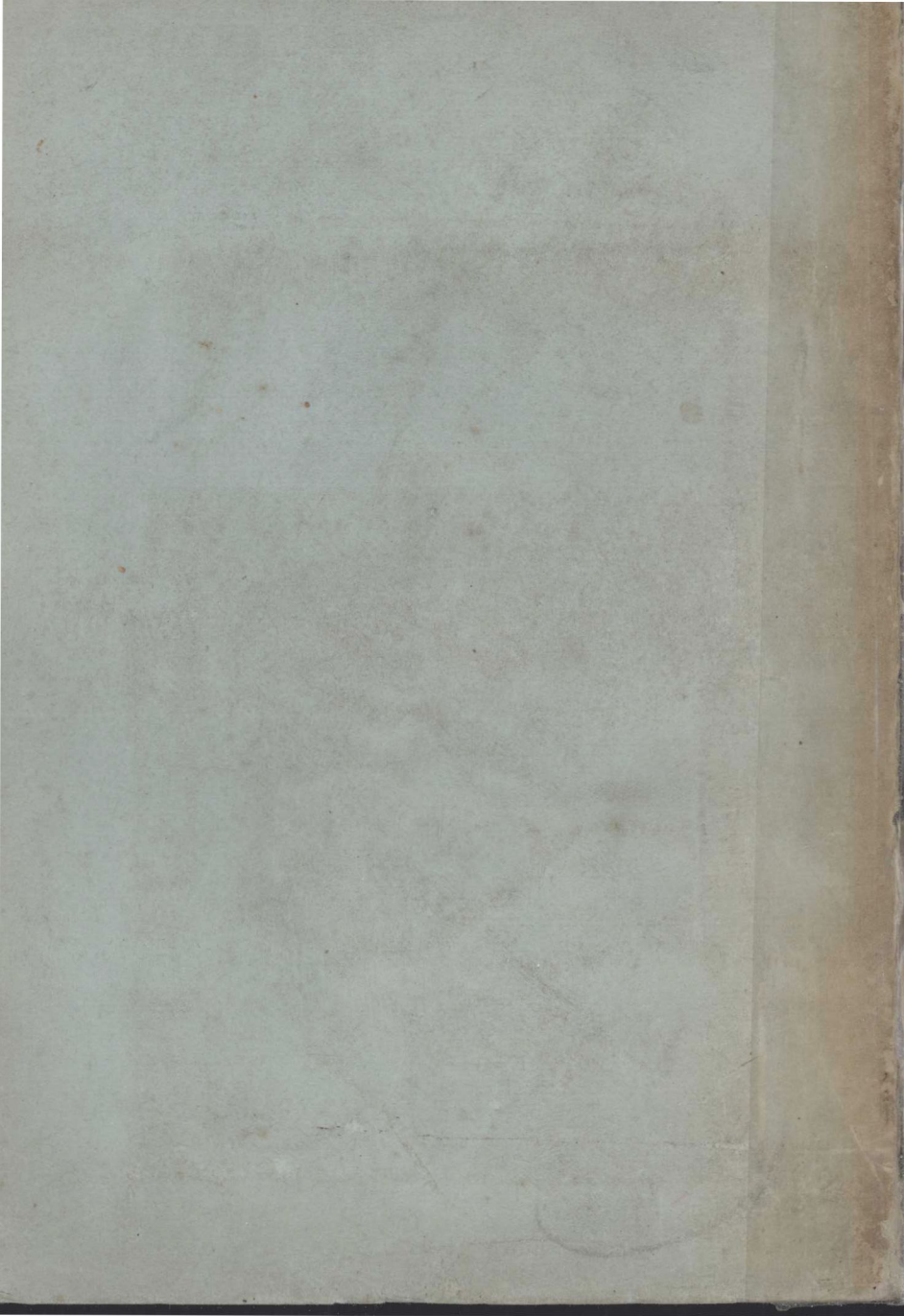
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EVALUATIONS BY 3 EXAMINERS OF PHOTOGRAPHS OF PLAQUE
DEPOSITS GROWN ON STREPTOCOCCUS COLONIES (SL TYPES)
IN SAMPLES OF PLAQUE REMOVED AFTER THE ASSAY

DENTAL CARIES

Dispersion of Dextranous Bacterial Plaques on Human Teeth with Dextranase. The clinical studies described in this report by Paul H. Keyes, Morris A. Hicks, Barry M. Goldman, Robert M. McCabe (Nat'l Inst. of Dental Res.) and Robert J. Fitzgerald¹ (VA Hosp., Miami, Fla.) were undertaken to obtain provisional answers to these questions: Can dextranase or dextranases derived from *Penicillium funiculosum* contribute to the dispersion of human dental plaques? Can a mouth rinse containing this product reduce the rate at which dextranous matts form on surfaces of the teeth? Samples of dentobacterial plaque were removed from the teeth of 77 young to middle-aged human adults and plated on Mitis salivarius agar. Only 10 people, aged 18-44, harbored the pathogens in sufficiently high numbers to be considered satisfactory for the study.

All samples of plaque removed after the first 48 hours of the preassay period revealed typical colonies of dextranogenic streptococci. This finding supported the assumption that at least some of the deposits under observation contained dextrans.

The interpretations of the photographs have been presented in the table. Study of this table shows that agreement between the observers was good. With assay no. 1 the examiners were not able to detect any consistent reduction in stainable plaque material on the basis of findings in photographs taken before the placebo rinse and those taken 1 hour afterward. All of the examiners agreed that the photographs of the teeth of the subject who repeated the entire program with a placebo rinse showed no evidence of plaque dispersion. With assay no. 2 all of the examiners agreed that the photographs of teeth taken after the period during which dextranase was assessed as a "plaque-preventive" agent showed less accumulation than those taken after use of the placebo rinse. As in assay no. 1, the enzyme appeared to be more effective on some surfaces than on others. None of the volunteers reported experiencing any unpleasant tastes or sensations while using the dex-

(1) J.A.D.A. 82:136-141, January, 1971.

EVALUATIONS BY 3 EXAMINERS OF PHOTOGRAPHS* OF PLAQUE
DEPOSITS. COUNTS OF STREPTOCOCCIC COLONIES (SL TYPES)
IN SAMPLES OF PLAQUE REMOVED BEFORE AND AFTER THE ASSAYS

Subject	Examiner	Evaluation	Dextranogenic streptococci	
			Before	After
L.F.	1	1 = 2 > 4 = 3 > 5	18%	10% and 0%
	2	1 = 2 > 5 > 4 > 3		
	3	1 > 2 > 5 = 4 > 3		
S.L.	1	2 = 1 > 3 > 4 > 5	21%	70% and 6%
	2	2 = 1 > 3 = 4 > 5		
	3	2 = 1 > 3 > 5 = 4		
M.M.	1	1 = 2 > 3 = 4 > 5	4%	4%
	2	1 = 2 > 3 = 4 > 5		
	3	1 = 2 > 3 = 4 > 5		
P.P.	1	1 = 2 > 3 > 5	43%	not taken
	2	2 = 1 > 3 > 5		
	3	2 > 1 > 3 > 5		
D.W.	1	2 = 1 > 4 = 3 > 5	5%	4% and 0%
	2	2 = 1 > 3 > 4 > 5		
	3	2 > 1 > 4 = 3 > 5		
M.W.	1	2 = 1 > 3 > 4 > 5	21%	10% and 0%
	2	2 = 1 > 3 = 4 > 5		
	3	1 > 2 > 3 > 5 = 4		

*1, Before rinse program; 2, 1 hour after placebo rinse; 3, 1 hour after dextranase rinse; 4, after five rinses with dextranase; and 5, next morning after eight rinses with dextranase.

tranasase rinses, and all reported that the surfaces of their teeth felt smoother to the tongue after use of the enzyme. No changes in the appearance of the enamel or soft tissues (tongue, gingiva or buccal mucosa) were observed.

If present theories of plaque diseases are correct, it would be beneficial not only to disperse the matt-forming microorganisms but also to eliminate as many as possible from the oral environment. In other words, the principal objective of antiplaque therapy would be both dispersion and suppression of plaque-forming odontopaths.

► [The effectiveness of dextranase mouth rinses to prevent the formation of plaque or to remove previously formed plaque from the teeth is a moot question (Caldwell, R. C., *et al.*, J.A.D.A. 82:124, 1971; Lobene, R. R., *ibid.*, p. 123). Perhaps different dextranases vary in their ability to break down differing dextrans, thus accounting for the discrepancies in results by different investigators. Long-term human clinical trials could resolve this question and also could determine the effect of the enzyme on dental caries and periodontal disease.—S.B.F.]

Plaque-Inhibiting Effect of Chlorhexidine-Containing Dentifrices. Several reports have noted the plaque-inhibiting effect of chlorhexidine, but the use of mouthwashes has led to soreness, mucosal desquamation and staining of teeth. Short-term studies have shown preservation of the plaque-

TABLE 1.—MEAN PLAQUE INDEX AFTER BRUSHING WITH DENTIFRICES CONTAINING CHLORHEXIDINE AND PLACEBO

Surfaces	4 weeks			6 weeks			8 weeks		
	"TK" (n = 18) \bar{x} s. d.	"RM" (n = 19) \bar{x} s. d.	"F304" (n = 13) \bar{x} s. d.	"TK" (n = 19) \bar{x} s. d.	"RM" (n = 17) \bar{x} s. d.	"F304" (n = 12) \bar{x} s. d.	"TK" (n = 18) \bar{x} s. d.	"RM" (n = 21) \bar{x} s. d.	"F304" (n = 13) \bar{x} s. d.
Total	0.57** 0.33	0.89 0.33	0.75 0.22	0.48** 0.27	0.88 0.32	0.68 0.24	0.39** 0.27	0.76 0.36	0.52* 0.19
Vestibular	0.26* 0.40	0.58 0.42	0.37 0.29	0.17** 0.17	0.56 0.49	0.32 0.25	0.13** 0.19	0.46 0.38	0.14** 0.06
Interproximal	0.79** 0.36	1.11 0.29	0.95 0.22	0.70** 0.34	1.13 0.28	0.86** 0.25	0.59** 0.33	0.98 0.36	0.76* 0.25
Lingual	0.43* 0.38	0.75 0.42	0.70 0.37	0.38** 0.37	0.73 0.37	0.66 0.34	0.26** 0.34	0.61 0.47	0.44 0.33

*P<0.5.

**P<0.1.

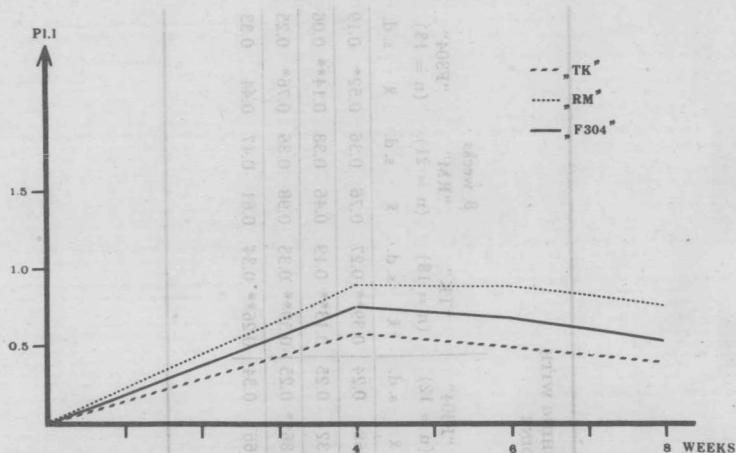


Fig. 1.—Mean plaque index (P.I.) after brushing with dentifrices containing chlorhexidine and placebo. (Courtesy of Gjermo, P., and Rølla, G.: *Scandinav. J. D. Res.* 79:126-132, 1971.)

inhibiting capacity when chlorhexidine is incorporated in tooth pastes. Per Gjermo and Gunnar Rølla² (Univ. of Oslo) evaluated the effects of two chlorhexidine-containing dentifrices on plaque formation in a group of students over 2 months. Pastes with inorganic or polymer abrasives containing 0.8 (coded TK) and 0.6% chlorhexidine digluconate (F304), respectively, were compared with a placebo paste not containing chlorhexidine (RM). Agents that interfere with chlorhexidine such as sulfates and phosphates were not present in the dentifrices. The materials were used twice daily for 2 minutes by 53 dental students with a mean age of 23 years. About 1 Gm. dentifrice was used in each instance.

TABLE 2.—DISCOLORATIONS OF SILICATE FILLINGS AND TOOTH SURFACES AFTER 8 WEEKS OF BRUSHING WITH DENTIFRICES CONTAINING CHLORHEXIDINE AND PLACEBO

Dentifrices	Fillings		Vestibular surfaces		Interproximal surfaces	
	Total	Discolored	Total	Discolored	Total	Discolored
"TK" (0.8 % chlorhexidine)	43	41	178	25	298	115
"RM" (Placebo)	93	14	203	14	331	34
"F304" (0.6 % chlorhexidine)	16	9	144	22	240	83

(2) *Scandinav. J. D. Res.* 79:126-132, 1971.

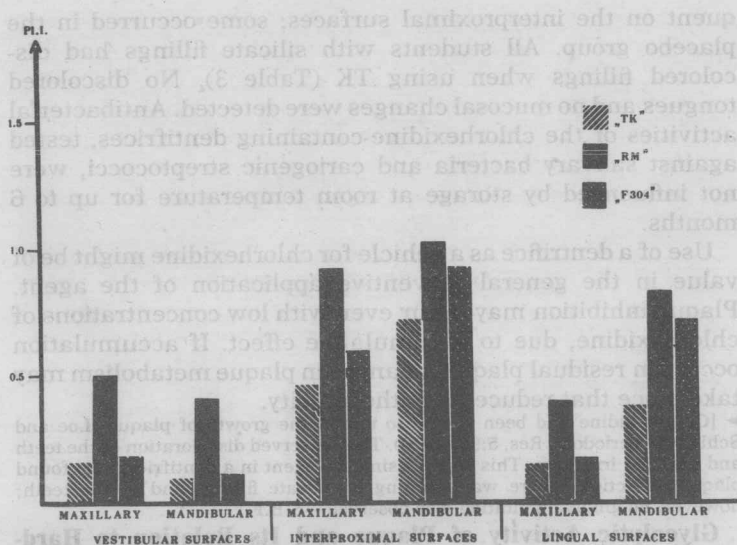


Fig. 2.—Mean plaque index (P.I.) of various tooth surfaces in maxilla and mandible after 8 weeks of brushing with dentifrices containing chlorhexidine and placebo. (Courtesy of Gjermo, P., and Rølla, G.: *Scandinav. J. D. Res.* 79:126-132, 1971.)

The study was begun after the teeth were scaled and polished.

The plaque index was significantly lower with TK than with RM after 4 weeks of use, and the difference increased in the next month (Table 1). Intermediate values were found with the F304 dentifrice, the difference from RM being significant after 8 weeks (Fig. 1). Similar differences were found when the different tooth surfaces were considered separately (Fig. 2). Nearly all silicate fillings were stained brown by TK and about half by F304 (Table 2). Discolorations were most fre-

TABLE 3.—NUMBER OF TEST PERSONS WITH DISCOLORED SILICATE FILLINGS AND TEETH AFTER 8 WEEKS OF BRUSHING WITH DENTIFRICES CONTAINING CHLORHEXIDINE AND PLACEBO

Dentifrices	Test persons w/fillings	Test persons w/discolored fillings	Test persons w/discolored teeth	Total no.* of test persons
"TK"	13	13	12	16
"RM"	13	4	7	20
"F304"	8	4	7	12

*Five photographs could not be evaluated.

quent on the interproximal surfaces; some occurred in the placebo group. All students with silicate fillings had discolored fillings when using TK (Table 3). No discolored tongues and no mucosal changes were detected. Antibacterial activities of the chlorhexidine-containing dentifrices, tested against salivary bacteria and cariogenic streptococci, were not influenced by storage at room temperature for up to 6 months.

Use of a dentifrice as a vehicle for chlorhexidine might be of value in the general preventive application of the agent. Plaque inhibition may occur even with low concentrations of chlorhexidine, due to a cumulative effect. If accumulation occurs in residual plaque, changes in plaque metabolism may take place that reduce its pathogenicity.

► [Chlorhexidine had been shown to inhibit the growth of plaque (Loe and Schiott, J. Periodont. Res. 5:90, 1970). They observed discoloration of the teeth and gingival irritation. This study, using the agent in a dentifrice, also found plaque reduction. There was staining of silicate fillings and of the teeth; however, no gingival irritation was observed.—S.B.F.]

Glycolytic Activity of Plaque and Its Relation to Hard-Tissue Pathology: Recent Findings from Intraoral pH Telemetry Research. The pH telemetry method has been applied since 1963 in over 400 recording sessions of 5 subjects. A selection of findings that have practical significance in dietary measures for caries prevention and some results concerned with inhibition of glycolysis or prevention of the pH drop are presented by H. Graf³ (Univ. of Zurich). The results of pH measurements in 4-day-old plaque were the same in all subjects. Fasting plaque values lay between pH 6 and 7. Two subsequent full-day recordings (Fig. 3) revealed that sweet snacks between main meals are responsible for maintenance of a low pH throughout the day. Three main meals only produced pH drops that reached critical values (Jenkins, 1966) for a total of 3 hours, whereas sweet snacks kept the value below pH 5.5 for 8 hours. These findings may explain the mechanism that led to the results of the Vipeholm study (Gustafsson *et al.*, 1954). Recordings of the pH of the interdental plaque during the night showed that eating half an apple instead of brushing teeth lowered the plaque pH to critical levels for 3 hours.

(3) Internat. D. J. 20:426-435, September, 1970.