

range in scores among subjects using the dentifrice containing 0.4 percent stannous fluoride plus stannous pyrophosphate.

In a second study in the same report (Ref. 94), Svaton examined the influence of polishing teeth with a stannous fluoride or sodium monofluorophosphate dentifrice on 24-hour plaque regrowth in 8 mentally retarded home care subjects. Oral hygiene was suspended for 24 hours. There was less plaque regrowth following the stannous fluoride treatment, confirming the results of previous studies showing the effectiveness of stannous fluoride as a plaque inhibitor. A cap splint pilot study comparing stannous fluoride and sodium monofluorophosphate dentifrices did not result in any improvement in the gingiva of these subjects.

Several studies have been carried out using rinses or gels containing stannous fluoride. It is doubtful whether the results from these studies are strictly applicable to dentifrices containing stannous fluoride. Nevertheless, the data are worth exploring because they may help to clarify the therapeutic potential of stannous fluoride.

Svaton (Ref. 95) compared the plaque-inhibiting effects of mouthrinses containing 0.2 and 0.3 percent stannous fluoride, 0.1 percent chlorhexidine, and distilled water randomly distributed among 12 dental hygienist students. Subjects rinsed with 10 mL for 1 minute twice a day for 4 days, with no other oral hygiene permitted. Plaque index scores were brought to 0 at the beginning of each test period. Mean plaque scores were 0.35 for 0.2-percent stannous fluoride, 0.20 for 0.3-percent stannous fluoride, 0.12 for chlorhexidine, and 1.02 for the placebo. A long-term study (Ref. 95) in another group of 5 students showed that the effect of a 0.3-percent stannous fluoride mouthrinse could be maintained for 3 weeks.

Klock *et al.* (Ref. 96) compared the effects of rinsing with stannous fluoride or sodium fluoride (200 ppm fluoride) twice daily for 2 years on oral health in adults. Thirty-seven subjects started the study; 15 withdrew during the first year and 3 withdrew during the second year. After 2 years, there were 12 in the stannous fluoride group and 7 in the sodium fluoride group, a total of 19 subjects. The authors commented: "The population of subjects was generally unreliable." Plaque scores were not compared among the groups because the values were skewed at the baseline. Both groups showed a reduction in plaque at 1 year and subsequent

increase after 2 years. Bleeding sites were significantly reduced after 1 year in the stannous fluoride group. This trend continued into the second year, but the results at 2 years were no longer statistically significant. The lack of statistical significance is probably due to the loss of subjects between the first and second years. Other possible factors are the inability of subjects to comply with the mouthrinsing regimen and the development of bacterial resistance to the stannous fluoride rinse. The stannous fluoride group harbored significantly fewer *S. mutans* than did the sodium fluoride group.

Several studies examining the effects of 0.4-percent stannous fluoride gels have been carried out in persons wearing prosthetic or orthodontic appliances. The validity of extrapolating data from these studies to support clinical claims for 0.4-percent stannous fluoride dentifrice is open to question even though these studies may provide information on the potential therapeutic effect of stannous fluoride.

Derkson and MacEntee (Ref. 97) examined the effects of a 0.4-percent stannous fluoride gel in 17 subjects with overdentures using a double-blind, crossover design. A nonfluoridated gel was used as a control. Each gel was applied daily for 6 months. Gingival and plaque index scores were recorded. A total of 34 teeth in 12 subjects who completed the study were available for assessment. No difference between the effects of two gels was observed in Gingival Bleeding Index scores from subjects who used the stannous fluoride gel first. Subjects who used the placebo first showed a 19-percent reduction in gingival index scores following use of stannous fluoride gel. The plaque index scores did not show any significant difference.

Tinanoff *et al.* (Ref. 98) conducted a double-blind study in 61 adults with fixed or removable dental prostheses. Subjects were given a thorough prophylaxis, including scaling and root planing, and were instructed to brush once daily for 2 weeks with a regular dentifrice. After the 2-week washout period, subjects then brushed twice daily (without rinsing) with a 0.22 percent sodium fluoride gel or 0.4 percent stannous fluoride gel. Subjects were not permitted to have a dental prophylaxis during the course of the study. At the end of 6 months, gingival index scores in the stannous fluoride group, using all teeth (including abutment teeth), were 48 percent lower than in the control group. The authors noted "increasing change between groups over time in the percent bleeding site scores appears to be due to rise in

the number of bleeding sites in the sodium fluoride group during course of the study." (There was no reduction in the number of bleeding sites compared with baseline.) Differences in plaque scores were statistically significant only when computed for abutment teeth. The authors noted "higher baseline plaque index scores in the sodium fluoride group as compared to the stannous fluoride group might in some way influence other clinical or microbial indices." The stannous fluoride group harbored 2.5 log fewer *S. mutans* than did the sodium fluoride group.

Two relatively long-term studies of 0.4 percent stannous fluoride gel gave apparently contrasting results. However, the apparent disparity may be a reflection of the type of subjects and the hypothesis studied. Boyd, *et al.* (Ref. 87) monitored the gingival health of 81 adolescents undergoing orthodontic treatment with fixed appliances while investigating the effects of daily brush-on 0.4 percent stannous fluoride gels. One gel contained 98 percent available tin (used twice daily), and the other gel contained 2 percent available tin (used once daily and later twice daily). The control group did not use any gel. Subjects were instructed not to rinse after using the gel. Subjects continued their normal oral hygiene practices. Sites were scored at baseline and at 1, 3, 6, and 9 months after appliances were applied. There was a gradual increase in plaque accumulation from baseline to 9 months in all groups and no statistically significant difference in plaque scores among the groups. The gingival and plaque indices showed similar patterns. However, the percentage of sites with an index greater than 1 was statistically significantly less than observed in other groups. The percentage of sites with a Bleeding Tendency score greater than 1 also followed a similar pattern. Thus, use of stannous fluoride gel was associated with a smaller increase in gingival index and percent Bleeding Tendency compared with controls. However, there was no reduction in the indices compared with baseline.

In a second long-term study, Wolff *et al.* (Ref. 88) studied the effects of 0.4 percent stannous fluoride gel, 0.22 percent sodium fluoride gel, and a fluoride-free placebo gel in three groups of 281 subjects over 18 months. All subjects brushed with a sodium monofluorophosphate dentifrice twice daily. Subjects then used either a stannous fluoride, sodium fluoride, or placebo gel twice daily immediately after brushing with no rinsing for 30 minutes after using gel. Plaque, bleeding, and gingival indices were assessed after 6, 12, and 18 months.