

Dentine permeability reduction by an experimental formulation containing stannous fluoride

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Aim

To compare an experimental test dentifrice to a commercially available sensitivity control dentifrice (both containing 0.454% w/w SnF₂) using the Hydraulic Conductance (HC) *in vitro* model.

HC has been used extensively to assess the efficacy of dentine occlusion-based desensitising agents *in vitro* in order to understand dentine permeability.¹

Study Products

- **Test dentifrice** – an experimental non-aqueous dentifrice containing 0.454% w/w SnF₂ (Sensodyne Rapid Relief)
- **Control dentifrice** – a commercially available non-aqueous dentifrice containing 0.454% w/w SnF₂ (existing Sensodyne stannous fluoride formulation)

The investigators were blinded.

Methods

Study HC models:

HC1 – 48 hour HC

HC2 – 48 hour HC with Acid Challenge Conditions (ACC)

HC3 – 4 day HC with ACC

Specimen preparation:

Dentine discs (n=10 per dentifrice) with patent tubules were prepared from sound caries-free human molars which were sectioned and progressively polished to give a flat dentine surface. The dentine discs were placed in a fluid reservoir, and hydrostatic pressure (1 p.s.i.) was applied, with flow rate measured before and after treatment. The dentine was treated by brushing with the dentifrice. This cycle of treatment and measurement was repeated daily for the length of the studies. HC2 and HC3 included acid challenge with dietary phosphoric acid (Cola) for 2 minutes immediately prior to the last measurement. Flow rates were compared to baseline at all time points to calculate the reduction in fluid flow.

Results

Both dentifrices reduced dentine permeability. However, the test dentifrice reduced dentine permeability to a greater extent than the control dentifrice with statistically significant reductions at all time points (p<0.05), in all three studies.

The test dentifrice also continued to reduce dentine permeability after acid challenge.

Figure 1: HC1 – Dentine permeability reduction as measured by HC over 48 hours

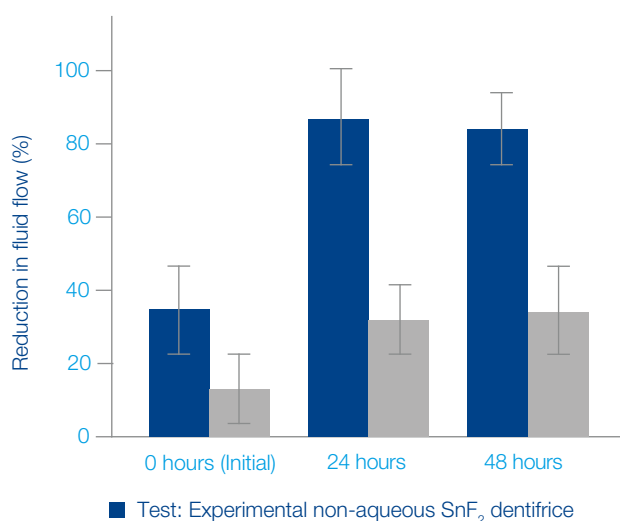


Figure 2: HC2 – Dentine permeability reduction as measured by HC over 48 hours with acid challenge

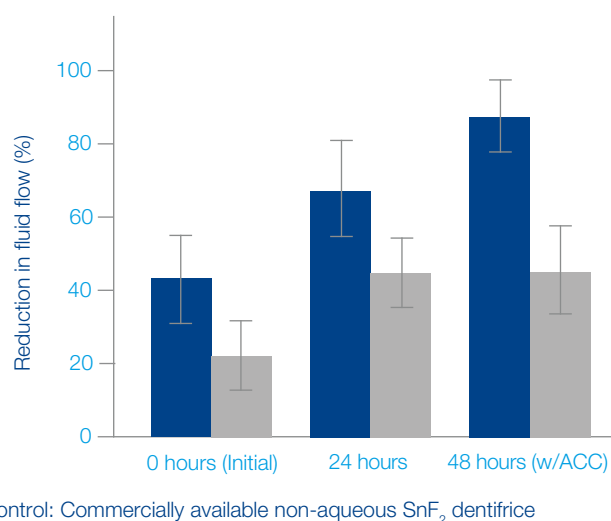
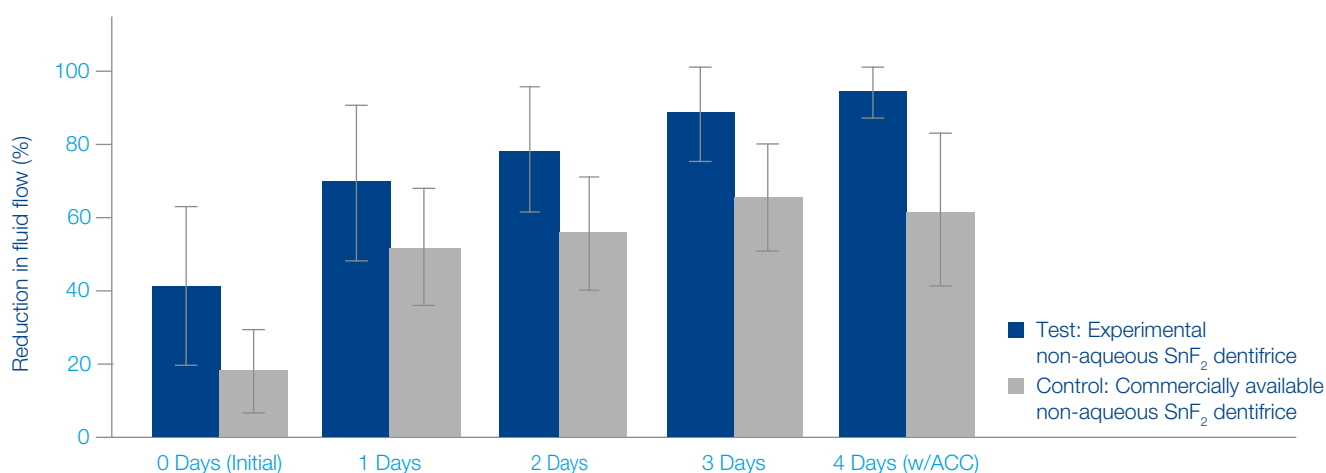


Figure 3: HC3 – Dentine permeability reduction as measured by HC over 4 days with acid challenge



Conclusions

The two 0.454% w/w SnF₂ dentifrices were shown to be effective in reducing dentine permeability. However, the test dentifrice was significantly more effective in 2–4 day *in vitro* models, with and without acid challenge. This difference may have clinical significance.

References:

1. Addy M. Dentine hypersensitivity: new perspectives on an old problem. International Dental Journal 2002; 52(S5P2): 367-375.