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### **Dentine Protection by Stannous Fluoride-Containing Toothpaste**

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**Objectives** Exposed dentine in the oral environment is at risk from mechanical damage due to brushing or mastication as well as chemical dissolution due to acidic food or bacterial attack. Stannous fluoride ( $\text{SnF}_2$ ) in toothpaste forms a barrier over exposed dentine, protecting it from mechanical and chemical attacks. The objective of this study was to evaluate the protection offered by two commercially available toothpastes containing  $\text{SnF}_2$  compared to an experimental Sensodyne toothpaste formulation containing  $\text{SnF}_2$  using nanoindentation and scanning electron microscopy (SEM).

**Methods** 32 human dentine samples were divided into 4 treatment groups, one per toothpaste, and one artificial saliva (AS) control group (each  $n=8$ ). The samples underwent brushing twice daily for 2 minutes over 4 days and were stored in AS between brushings. Following this, 3 samples were extracted for surface imaging using SEM to confirm the formation of protective layers, while 5 samples were subjected to nanoindentation using a Berkovich tip. Subsequently, the samples were immersed in 15 ml of 1 wt.% citric acid solution (pH 3.8) for 2 minutes to assess the resistance of the protective layers formed by each toothpaste against acid challenge. This involved repeating the nanoindentation process to measure hardness and calculate percentage changes, as well as reimaging the samples to observe any surface changes.

**Results** Nanoindentation data showed that the layer formed by the experimental Sensodyne toothpaste formulation containing  $\text{SnF}_2$  was harder than the dentine control and commercial formulations. It also had a significantly smaller hardness reduction after the citric acid challenge.

**Conclusions** Following 4 days of brushing, the experimental Sensodyne formulation formed the hardest layer with superior acid resistivity. Therefore, it may provide better protection against the mechanical, chemical, and abrasive challenges within the oral cavity.