

Influence of Desensitizing Agents on Root Caries Development

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Introduction

Following the improved caries-prophylactic developments, tooth loss even in elderly patients is often avoidable. Therefore, it can be assumed that due to prophylactic treatment and the above mentioned factor the number of exposed and denuded dentin surfaces susceptible for dental caries and dentin hypersensitivity might increase in the future. To avoid these consequences, various prophylactic treatment possibilities are described. It is known that the application of fluoride or fluoride containing solution might prevent root caries development (1). Similar effects have been described after the application of dentin adhesive systems on exposed root surfaces building the acid resistant so-called hybrid layer (2). Furthermore, in the treatment of hypersensitive dentin surfaces numerous desensitizing agents are available. Former investigations have shown that dentin adhesives and other sealants can prevent root surface caries (3, 4).

Objectives

The aim of the present study was to determine the caries-protective effect of two different desensitizing agents (Controcar, D/Sense 2) on root surfaces in vitro.

Material und Methods

The root surfaces of 30 freshly extracted caries-free human molars were thoroughly cleaned, thereby removing the cementum. The teeth were then coated with acid-resistant nail varnish, exposing two rectangular windows (Fig. 1).



Fig. 1: Specimen coated with an acid resistant nail varnish exposing two rectangular windows.

One window served as an untreated control, while the other window was treated with one of the desensitizing agents (Fig. 2a, b). All specimens were distributed among the following experimental groups: A: treated with Controcar; AA: untreated control; B: treated with D/Sense 2; BB: untreated control. All specimens were demineralized for 14 days with acidified gel (HEC, pH 4.8, 37 degrees C). From each tooth, two dentinal slabs were cut. The depth of the demineralized areas was determined using a polarized light microscope. For each group mean value and standard deviation were calculated. Statistical analysis was performed using ANOVA and Tukey's test.

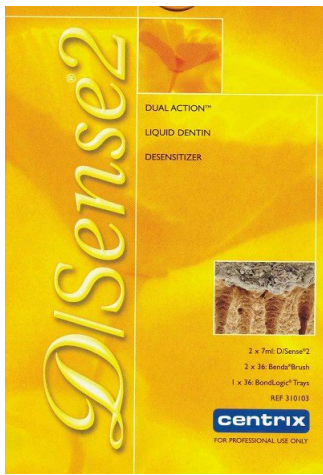


Fig. 2: Desensitizing agent D/Sense 2 used in the present investigation.

Results

All untreated specimens showed uniform lesions with a mean depth of 81 μm ($\pm 17 \mu\text{m}$) in group AA (Fig. 3, 5) and 77 μm ($\pm 18 \mu\text{m}$) in group BB (Fig. 3, 7). The specimens treated with Controcar showed a mean lesion depth of 2 μm ($\pm 1.5 \mu\text{m}$) (Fig. 3, 4). In group B, treated with D/Sense 2, a mean lesion depth of 45 μm ($\pm 11 \mu\text{m}$) was observed (Fig. 3, 6). In both groups (A, B) the lesion depth was reduced significantly compared to the untreated control groups (AA, BB) ($p < 0.05$, Tukey's test). The comparison between group A and B showed a significant higher reduction of lesion depth in the case of Controcar (group A) ($p < 0.05$, Tukey's test).

	Group A Controcar	Group AA Control group	Group B D/Sense 2	Group BB Control group
Lesion depth (microns)	2	81	45	77
Standard deviation	± 1.5	± 17	± 11	± 18

Tab. 1: Mean value and standard deviation within the different groups.

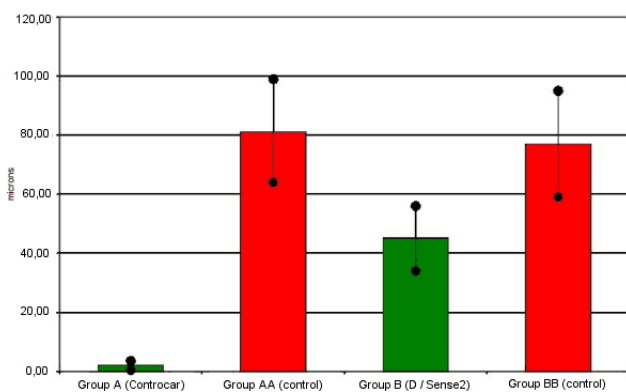


Fig. 3: Mean value and standard deviation within the different groups.

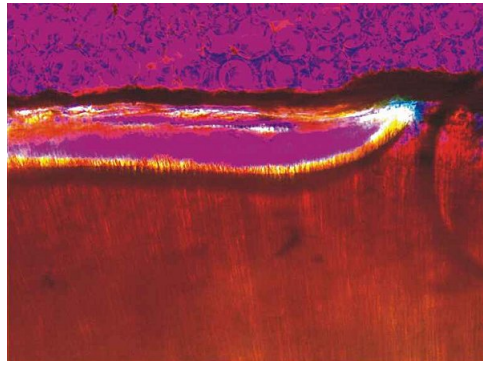
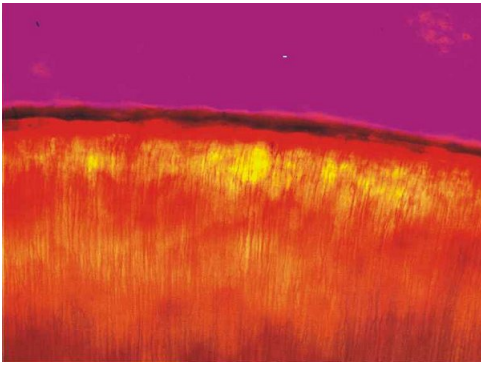


Fig. 4: Group A, treated with Controcar, red I, 100x.

Fig. 5: Control group AA, red I, 100x.

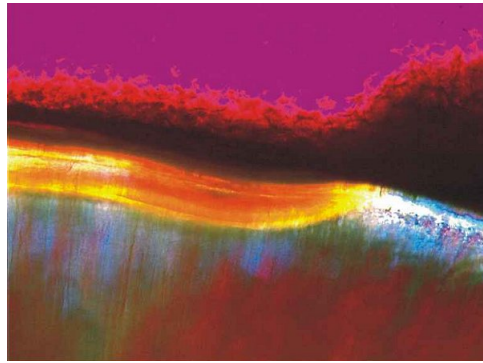
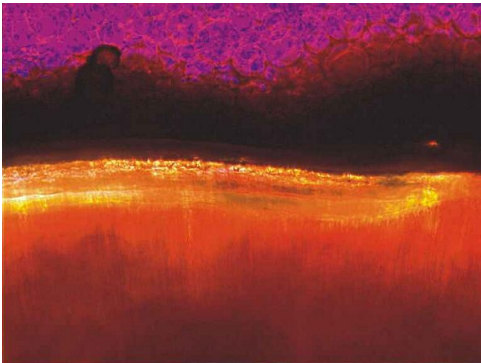


Fig. 6: Group B, treated with D/Sense 2, red I, 100x.

Fig. 7: Control group BB, red I, 100x.

Discussion and Conclusions

It can be concluded that the demineralization of the root surface can be hampered by the application of desensitizing agents in vitro. In the case of Controcar the reduction of lesion depth was 97.5%. The specimens treated with D/Sense 2 showed lesion depth reduced to 41.6%.

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This poster was submitted by Dr. Christian Gernhardt.

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Introduction

Following the improved caries prophylactic developments, tooth loss even in elderly patients is often avoidable. Therefore, it can be assumed that due to prophylactic treatment and the above mentioned factor the number of exposed and denuded dentin surfaces susceptible for dental caries and dentin hypersensitivity might increase in the future. To avoid these consequences, various prophylactic treatment possibilities are described. It is known that the application of fluoride or fluoride containing solution might prevent root caries development. Similar effects have been described after the application of dentin adhesive systems on exposed root surfaces building the acid resistant seal of pellicular layer. Furthermore, in the treatment of hypersensitive dentin surface numerous desensitizing agents are available. Former investigations have shown that dentin adhesives and other sealants can prevent root surface caries. The aim of the present study was to determine the caries-preventive effect of two different desensitizing agents (ContraCare, D-Sense 2) on root surfaces *in vitro*.



Material and Methods

The root surfaces of 30 freshly extracted caries-free human molars were thoroughly cleaned, thereby removing the cementum. The teeth were then coated with acid-resistant nail varnish, exposing two rectangular windows (Fig. 1). One window served as an untreated control, while the other window was treated with one of the desensitizing agents (Fig. 2). All specimens were distributed among the following experimental groups: A, treated with ContraCare, AA, untreated control, B, treated with D-Sense 2, BB, untreated control. All specimens were desensitized for 14 days with acidified gel (HCL, pH 4.1, 37 degrees C). From each tooth, two dental slabs were cut. The depth of the desensitized areas was determined using a polarized light microscope. For each group mean value and standard deviation were calculated. Statistical analysis was performed using ANOVA and Tukey's test.

	Group A ContraCare	Group AA Control group	Group B D-Sense 2	Group BB Control group
Lesion depth (µm/SD)	2	41	43	37
Standard deviation	± 1.3	± 1.7	± 1.1	± 1.8

Tab. 1 Mean lesion depth (µm) and standard deviation for the different groups.

Results

All untreated specimens showed an lesion depth of 41 µm (± 1.7 µm) in group AA (Fig. 3), 43 µm (± 1.5 µm) in group BB (Fig. 3, 4). The specimens treated with ContraCare showed a mean lesion depth of 2 µm (± 1.3 µm) (Fig. 3, 4). In group B, treated with D-Sense 2, a mean lesion depth of 43 µm (± 1.1 µm) was observed (Fig. 3, 5). In both groups (A, B) the lesion depth was reduced significantly compared to the untreated control groups (AA, BB) ($p < 0.05$, Tukey's test). The comparison between group A and B showed a significant higher reduction of lesion depth in the case of ContraCare (group A) ($p < 0.05$, Tukey's test).

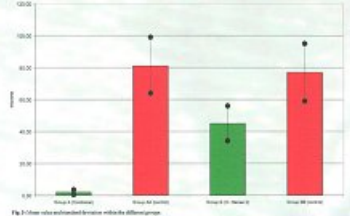


Fig. 3 Mean lesion depth (µm) and standard deviation for the different groups.

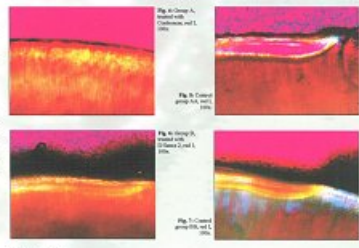


Fig. 4 Root caries lesions in different experimental groups. Fig. 4a: Group A, treated with ContraCare, root caries lesion, 2 µm. Fig. 4b: Group AA, untreated control, root caries lesion, 41 µm. Fig. 4c: Group B, treated with D-Sense 2, root caries lesion, 43 µm. Fig. 4d: Group BB, untreated control, root caries lesion, 37 µm.

Conclusion
It can be concluded that the desensitization of the root surface can be hampered by the application of desensitizing agents *in vitro*. In the case of ContraCare the reduction of lesion depth was 97.5%. The specimens treated with D-Sense 2 showed lesion depth reduced to 43.0%.

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