SUMMARY

Examination of the effects of peroxides on human enamel structure

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In the past decade the importance of peroxide base tooth bleaching materials has been increased in clinical practice. On the other hand these materials can produce several side effects.

The aim of the study was to examine the effect of hydrogen and carbamide peroxide on human enamel surface and inner structure. Three different methods were used to demonstrate the changes in enamel. Surface morphology alterations were studied by atomic force microscopy (AFM). The changes in the organic phase of enamel were demonstrated with the determination of the numbers of thiols using Ellman reagent. Inorganic phase of enamel was studied by Fourier transformed infrared spectroscopy (FT-IR).

The results of our in vitro examinations showed that hydrogen peroxide even in low (5-10 %) concentration can alter the surface morphology and inner structure of enamel. In AFM images showed groves on natural surface on enamel which became wider and deeper after carbamide peroxide treatment. Two types of thiol groups were differentiated in the organic phase of enamel. The free thiols that were oxidized by the 10 % hydrogen peroxide, but the so called buried ones, which were oxidized by the more concentrated solutions only. According to the results of the FT-IR spectroscopic measurements the apatite structure degraded in enamel. This degradation was directly proportional to the peroxide concentration and the treatment time. Spontaneous reversion of the enamel structure was not observed.

It can be concluded that hydrogen and carbamide peroxide are capable of changing the surface morphology and inner structure of enamel. Since alterations were directly proportional to peroxide concentration the use of properly selected material and treatment time are important parts of the application of these materials.

Keywords: *atomic force microscopy, FT-IR spectroscopy, hydrogen peroxide, tooth enamel*