

Sensitivities when bleaching vital teeth

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The desire for shiny white teeth nowadays is very strong and the artificial teeth bleaching meanwhile belongs to the standard in every practice. There are different approaches for teeth whitening which differs especially in type and intensity of the bleaching gel. However, all bleaching methods have one thing in common: they bear the risk of sensitivities. The handling of these sensitivities or their prevention were examined and discussed in detail in a special edition of the journal *Inside Dentistry* of 2008.^[1]

There are three main methods of bleaching: office, home and strip method. The office method is performed by the dentist in the practice, the used bleaching gel is usually based on about 35 % hydrogen peroxide. The home method can be performed by the patient at home after detailed instruction by the dentist. An individual bleaching tray is fabricated for this purpose which the patient fills independently and wears for about two hours a day or overnight. The bleaching substance here is based on 10-20 % carbamide peroxide. The strip method is less common and uses bleach-active films with an even lower concentration of carbamide peroxide. Patients can apply the strips to their teeth themselves. The methods differ mainly in the duration of the application but they are all able to provide satisfactory results. However, in the same way all three can cause sensitivities.

Emergence of sensitivities through the whitening of teeth

Bleaching of teeth can be compared in the broadest sense with hair bleaching. Hydrogen peroxide is the active bleaching substance and provides so-called radicals, which destroy the colour-giving chromophores of the colour pigments (of coffee, nicotine, wine etc.) stored in the teeth and thus whiten the teeth. Furthermore, water is proportionally removed from the tooth substance during bleaching, which contributes to the brilliant white colour of the teeth.

In the case of carbamide peroxide, the hydrogen peroxide is chemically bonded to ammonia and is therefore released with a delay and the bleaching effect is lower. In comparison, the effect of a 30 % carbamide peroxide bleaching gel matches the effect of a 10 % hydrogen peroxide bleaching gel. Peroxides are not harmless, therefore caution is advised when handling them. They cause burns and the tissue turns whitish at contact with skin or gingiva. Usually peroxides only attack the upper tissue layers, but with prolonged exposure, they can also penetrate deeper into the body and cause further damage. If the skin that has come into contact with peroxides is thoroughly rinsed with water, only mild symptoms will occur, which then will have subsided completely after three days at the latest.

The irritant effect of peroxide results in different degrees of sensitivities in many bleaching patients. Dentine (hyper) sensitivity is defined as a short, sharp and located pain that emerges as a stimuli reaction on temperature, evaporation, compression, osmosis and chemicals. The mechanism considered responsible for sensitivities is based on hydrodynamic movements of the dentine liquor caused by the above stimuli, thus irritating the nerve. Dentine sensitivities are favoured by, for example, exposed dentine due to gingival recession or cracks in the tooth structure. Even during the bleaching of healthy teeth, severe pain can emerge within 5 to 15 minutes. As the hydrogen peroxide molecule is very small it is able to pass the enamel and penetrate the dental tubules.

Minimization and prevention of sensitivities

For the minimization and prevention of sensitivities, the use of sodium or potassium fluorides in combination with potassium nitrate has proven to be favourable, which is why these substances are used in nearly all bleaching materials available on the market. The effect of the fluorides occurs through sealing the dental tubules as well as through stable insertion of the fluoride ions into the tooth substance.

The potassium nitrate does not affect the bleaching either but shows a different mode of action. The potassium nitrate is able to penetrate the enamel and get to the pulp chamber through the dental tubules. The potassium ion in particular is able to stop the stimuli conduction of the nerves and quasi has an anaesthetic effect. An *in vivo* study has proven, that the occurring sensitivities of more than 90 % of the patients was reduced during the bleaching treatment by using potassium nitrate containing gel or tooth paste for 10 to 30 minutes in the bleaching tray additionally.

Prophylaxis is preferable to treating sensitivities, therefore the usage of potassium nitrate containing toothpaste for two weeks before bleaching is recommended. However, when using toothpastes containing potassium nitrate it needs to be considered that these often contain sodium lauryl sulfate (SLS), which can cause gingival irritations in some patients.^[1]

Recommended treatment

Bleaching sensitivities can be caused by a combination of already existing tooth defects, gingival condition, type of bleaching material and tray. The dentist in any case should raise a reliable anamnesis and plan an optimized treatment accordingly in order to avoid sensitivities and continuously adapt the treatment to minimise any complaints in good time.

Result: Bleaching gels provide effective whitening of teeth. However, the used hydrogen peroxide often causes sensitivities even in healthy teeth, which sometimes are very painful for the patients. The prevention or treatment of sensitivities should be carried out with fluoride and potassium nitrate containing materials. Fluorides strengthen the tooth structure and potassium nitrate has an “anaesthetic” effect.

[1] Dentin Hypersensitivity: Consensus-based recommendations for the diagnosis & management of dentin hypersensitivity; Inside Dentistry, Vol. 4, Special Issue 9, 2008.