

THE DIFFERENT ASPECTS OF BLEACHING: PART THREE

In the third article in the series, **Diane Rochford** discusses the causes of sensitivity during bleaching, ways to assist patients in managing sensitivity and the variety of products available

Sensitivity during dental bleaching affects up to 80% of patients (Greenwall, 2006) and is the most common reason they stop bleaching (Haywood, 2008).

Patients may experience anything from a mild awareness of their teeth to more severe throbbing pain, in anything from one tooth to all their teeth.

Possible causes of sensitivity

Traditionally, the hydrodynamic theory has been associated with dentine hypersensitivity. Fluid movement inside the dentinal tubules, triggered by changes in temperature, osmotic pressure and tactile pressure, stimulates the nerve endings in the pulp, causing pain.

Sensitivity experienced by patients during bleaching treatment seems to have a different theory.

Recent studies have shown that sensitivity is caused by hydrogen peroxide and urea molecules passing easily through intact enamel and dentine to penetrate the pulp, causing a reversible pulpitis within five to 15 minutes. How the pulp responds differs from patient to patient and tooth to tooth; however, the pulp remains healthy and the sensitivity goes entirely once the treatment is complete.

This is evident as patients with their teeth in excellent condition – no cracks, exposed dentine or deep restorations – may still experience severe sensitivity.

The primary cause of sensitivity during bleaching is chemically induced. Higher concentrations of hydrogen peroxide increase the chance of sensitivity. In-office bleaching using 15-35% hydrogen peroxide may cause extreme sensitivity. Lower concentrations of 10% carbamide peroxide used for home bleaching may cause sensitivity to a lesser degree.

Mechanical pressure of improper fitting trays or occlusion may also contribute to sensitivity; this was evident in studies where patients wore bleaching trays without any bleaching materials in them and still experienced sensitivity.

Other factors that may cause sensitivity include:

- Rigid tray materials
- Composition and viscosity of the bleaching material
- Flavouring agents in the materials
- Patient habits such as clenching or bruxism.

Gingival and soft tissue irritation can be another side effect of bleaching, mainly due to poorly fitting trays, occlusion on the tray or chemical irritations such as high concentrations of carbamide peroxide or hydrogen peroxide.



Figure 1: No sensitivity



Figure 2: Extreme sensitivity



Figure 3: Very sensitive



Figure 4: No sensitivity

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Managing sensitivity

There is no way to know which patients will be sensitive during treatment – Figures 1-4 illustrate this.

However, patients need to be informed of the possibility that they are likely to experience some degree of sensitivity during treatment.

In the clinical examination, the dentist should ask if the patient has any sensitivity to cold foods or drinks. Using air from the three-in-one or a probe (tactile) can determine any possible sensitivity.

Before they commence with treatment, the patient should know that:

- They may experience some sensitivity: anything from a mild awareness of their teeth, to more severe shooting/throbbing pain
- Sensitivity is normal and can be managed
- Sensitivity is not permanent and will go once they complete treatment
- Sensitivity usually starts on about the third day due to maximum saturation of oxygen molecules in the pulp.

If patients are warned and given clear instructions for managing the sensitivity, they are usually more accepting and comply with treatment. Review appointments are essential for not only monitoring patients' progress, but to provide reassurance, further instruction or adjustment of the protocols according to the degree of sensitivity they may be experiencing.

Treating sensitivity

Sensitivity can be treated in two ways – passive or active.

Passive

Changes to the normal protocols or modifications to the bleaching trays can assist in elevating sensitivity. For example:

- Bleaching trays made without reservoirs are closer fitting and less bleaching material is required, reducing sensitivity and gingival irritation
- Ensure that the trays are fitting correctly and not irritating the gingival; if so, trim the tray to reduce the irritation
- Demonstrate to the patient the amount of bleaching gel required and where to place the gel in the tray, which should be a pinhead-sized dot or a thin line at the incisal edge on the tray
- Reduce the concentration of bleaching material. If 15% or 20% carbamide peroxide is used normally, reduce to 10%. Inform the patient that the duration of the treatment will take longer to achieve the desired results
- Reduce the frequency, bleach every other night or for a shorter period of time each day. Again, the patient must be informed that the treatment will take longer to complete
- Research by Leonard (1997) showed that 55% of patients who replenish the bleaching solution more than once a day had increased sensitivity. Advise patients to use the bleach once a day/night.

Active

This involves the use of desensitisers, such as fluoride, potassium nitrate and amorphous calcium phosphate.

Fluoride is frequently used to reduce sensitivity. The fluoride ions occlude the dentinal tubules, and increase the strength of enamel. Peroxide molecules are so small that they can travel in the interstitial spaces between the dentinal tubules towards the pulp. Fluoride alone may not always be beneficial.

Potassium nitrate acts in a very different way to fluoride. Potassium nitrate passes through the enamel and dentinal tubules to the pulp, creating a calming effect on the nerve. When the nerve depolarises in response to pain, potassium nitrate prevents the nerve from re-polarising, therefore reducing the excitability of the nerve.

Studies have shown that applying 5% potassium nitrate in a tray for 10-30 minutes reduced sensitivity in 90% of patients. Five per cent (maximum concentration permitted by the FDA) is in most desensitising toothpastes.

Amorphous calcium phosphate (ACP) has also been shown to reduce sensitivity. ACP delivers extra calcium and phosphate ions to the enamel.

These calcium and phosphate ions reform into calcium phosphate crystals that fill enamel defects and occlude the dentinal tubules, making the tooth smoother, stronger and reduces sensitivity. Options for active treatment include:

- Desensitising toothpaste can be used when brushing teeth, prior and during the bleaching treatment. These toothpastes can also be used as a cream and massaged into all or specific teeth
- Fluoride gel applied to the bleaching tray and worn for one hour during the day may also be beneficial
- Applying desensitising toothpaste to bleaching trays, and worn for 10 to 30 minutes during the day. Patients can



Figure 4: Desensitising products

	Fluoride	Potassium nitrate	Amorphous calcium phosphate
Sensodyne Original		✓	
Sensodyne Pronamel	✓		✓
Sensodyne Repair & Protect	✓		
Colgate Sensitive Pro-Relief	✓		
GC Tooth Mousse			✓
GC MI Paste	✓		✓
Ultradent Ultraez	✓	✓	
Ultradent Flor-Opal	✓		
SDI Soothe	✓	✓	
Discus Relief Gel	✓	✓	✓

experience gingival irritation due to the foaming agent, sodium lauryl sulphate (SLS) (Sensodyne Original and the newer Sensodyne Pronamel are both SLS free)

- ACP – Tooth Mousse (GC UK) can also be worn in the bleaching trays for 10 to 15 minutes daily one week prior to bleaching and during treatment
- Materials specifically designed to reduce sensitivity such as Soothe (SDI), Ultraez (Ultradent) and Relief Gel (Discus) can be worn for one hour during the day, or 10 to 30 minutes prior to bleaching
- The new generation of bleaching gels also contain desensitisers such as fluoride, potassium nitrate and ACP to assist in reducing sensitivity. Studies have shown that when desensitisers are added they do not reduce the bleaching effect.

Conclusion

Sensitivity can affect 80% of patients who undertake bleaching treatment, and the most common reason for patients to stop bleaching. Inform the patient of this side effect. Reassuring them that sensitivity can be managed and is temporary increases the opportunity for the patient to complete treatment successfully.

Establishing protocols for the patients to follow and closely monitoring them with review appointments is vital.

References

For a full list of references to accompany this article, please email siobhan.lewney@fmc.co.uk. [PD](#)