

# Interaction of Peroxides with Amalgam: A Case Report

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## ABSTRACT

Nightguard vital bleaching with 10% carbamide peroxide was shown to have some minor effects on certain brands of amalgam mainly related to mercury release. However, in this case report, amalgam staining of the bleaching tray was detected in correspondence of the left and right first upper molars following tooth whitening for a week. These teeth presented MOD amalgam fill-  
ings with superficial chipping at the cavosurface margins. The same phenomena did not occur in the mouth with other amalgam intracoronal restorations not showing marginal defects. No decay or discoloration was noted around the amalgam fillings both in the upper and lower teeth. At the 1-week recall visit, patient was recommended to avoid the bleaching gel application in the maxillary first molar teeth. The existing fillings were replaced with composite resin restorations after a 2-week elapse time.

## CLINICAL SIGNIFICANCE

The unusual amalgam staining of the bleaching tray suggests that amalgam restorations with defective cavosurface margins should be monitored during the tooth whitening therapy. Alternatively, their replacement should be considered prior to bleaching.

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## INTRODUCTION

Since the introduction of nightguard vital bleaching, carbamide and hydrogen peroxide have been used as the main component of the bleaching gel. Manufacturers' efforts were directed at combining the whitening gel with both desensitizing (potassium nitrate and more recently amorphous calcium phosphate) and re-mineralizing agents (fluoride); water content was also increased to reduce dehydration and thermal sensitivity.

Minimal effects on various restorative materials have been reported to be associated with 2 to 6 weeks at-home bleaching<sup>1</sup>. Effects of peroxides on amalgam are not considered clinically significant; however, certain brands of amalgam were reported to release mercury when exposed to certain brands of carbamide peroxide<sup>2,3</sup>.

In the last decade, concerns have been expressed regarding the potential amalgam toxicity related

to the release of mercury.

Rotstein and colleagues<sup>4</sup> suggested pre-coating of amalgam surfaces with a protective varnish such as copalite (10% copal resin in a combination of ether, alcohol, and acetone) in an attempt to reduce mercury release during the tooth whitening treatment. Attin and coworkers<sup>5</sup> proposed a polishing of amalgam restorations prior to starting of a bleaching therapy to reduce corrosion potential of the amalgam restorations and to reduce patient

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exposition to amalgam components.

The purpose of this case report is to describe a bleaching tray staining after exposure of amalgam fillings to a 10% carbamide peroxide gel.

#### CASE REPORT

A 28-year-old female patient presented to the office to bleach her discolored upper and lower teeth. The anamnesis did not result in any significant medical or past dental findings. The left and right first upper molars presented extensive MOD amalgam restorations; conversely, upper and lower premolars presented small to medium intra-coronal amalgam fillings. No decay or discoloration was noted around the amalgam fillings in both the upper and lower teeth. Superficial chipping of the MOD amalgam fillings was detected at the cavosurface margins. Alginate impressions of the maxillary and mandibular arches were taken, poured with dental stone, and the resultant casts were trimmed and prepared for a custom stent; a light-cured resin block-out material (Triad Gel-Dentsply Preventive Care, York, PA, USA) was placed on the facial surface extending to within 1 mm of the gingival margin. Trays were fabricated with a 0.035-inch thick, 5 × 5-inch soft tray material (Soft-tray-Ultradent Products, South Jordan, UT, USA) used in a

heat/vacuum tray-forming machine (UltraVac-Ultradent Products, South Jordan, UT, USA). Trays were scalloped to perfectly fit each model before trying in on the patient. Patient was instructed on the correct care and use. Tooth whitening was accomplished using a 10% carbamide peroxide at-home bleaching agent (Nupro White Gold, Dentsply Preventive Care, York, PA, USA). At the 7-day recall visit, substantial tooth color change was noticeable on both anterior and posterior teeth including the first upper right and left molars. The patient reported she bleached her teeth for 6 to 8 hours each night. However, amalgam staining of the bleaching tray was detected in correspondence of the left and right first upper molars, which presented extensive MOD amalgam

restorations. The outline of the amalgam fillings could be seen in the tray (Figure 1). The gray discoloration on the bleaching tray could be easily scrapped out using a dental explorer. No amalgam staining occurred for the premolar amalgam fillings. The patient was recommended to avoid the bleaching gel application in these two teeth. The patient agreed to replace the existing fillings with composite resin restorations after a 2-week elapse time; at this point, bleaching gel application could be limited to the first molars to better match the shade of the adjacent teeth.

#### DISCUSSION

The interaction of peroxides with restorative materials is becoming one of the most popular topics of



*Figure 1. Amalgam staining of the bleaching tray was detected in correspondence of the left and right first molars; occlusal perforation or wear of the bleaching tray occurred in differing teeth.*

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restorative dentistry; the effect of this interaction seems to be material-dependent.

The oxidizing effect of the bleaching agents may be responsible for increased mercury release from amalgam; exposure of silver amalgam to both carbamide and hydrogen peroxide solutions resulted in increased mercury release<sup>2,3</sup>. A reduced microhardness of dental amalgam was also reported<sup>6</sup>; the authors supported that this phenomena was related to surface oxidation following the bleaching gel exposure. Haywood<sup>7</sup> reported greening of the tooth-amalgam interface during extended tooth whitening with 10% carbamide peroxide in a couple of one patient's molar teeth; the author was unable to explain whether the discoloration was a result of amalgam degradation or recurrent decay.

In the case described, the amalgam restorations appeared to be clinically and radiographically satisfactory at the pre-bleaching examination except for the superficial chipping at the cavosurface margins. This finding was not considered relevant during the initial examination. However, abundant amalgam staining occurred on the patient's bleaching tray in correspondence of extended amalgam-filled teeth. Interestingly, this unique phenomena was detected at

the first recall visit, just a week after the beginning of tooth whitening treatment. The patient referred she may have overloaded the bleaching tray the first few days of treatment.

Other patients did not demonstrate this occurrence even though they had amalgam fillings with similar defective margins and performed the bleaching therapy using the same tooth whitening products adopted in this case report. Nupro White Gold 10% contains 10% carbamide peroxide, glycerin, carbopol, and flavors; it has a slight acidic pH (6.24)<sup>8</sup>. Once amalgam restorations were removed in the maxillary first molars, dark gray tattoos were detected on the residual cavity walls deepening into dentin. Tattoo of the tooth structure may be a common finding upon removal of old amalgam restorations and cannot be related to the tooth whitening application. Conversely, it is attributed to the reaction products of intra-oral sulfides and the copper or silver ions of the amalgam<sup>9</sup>. Tattoos were eliminated during cavity preparation using diamond burs. No decay was detected.

Whether the bleaching tray staining was the result of carbamide peroxide application or amalgam-defective cavosurface margins is not clear in this single-patient situation; it was speculated that the

combination of the tooth whitening gel application and the amalgam superficial chipping may be responsible for this finding. Interestingly, tooth whitening gels do not all have the same chemical composition<sup>10</sup>; as matter of fact, this interaction may be bleaching material-dependent. The patient was not a patient of our office at the time of the amalgam restorations; as matter of fact, it is not known how old were the amalgam restorations and if the amalgam utilized had a high copper or low copper content.

Further research studies are needed to determine if the occurrence of bleaching tray staining relates to the composition of a particular brand of amalgam (associated with marginal defects) or the interaction of amalgam with a particular brand of carbamide peroxide.

## CONCLUSION

Pre-bleaching examination is key for a successful tooth whitening therapy. At this time, clinicians should inform patients that the bleaching gel may come into direct contact with the existing restorations. Generally, the effects of this interaction are not considered clinically significant. Ideally, fillings should be substituted after completing the bleaching therapy to better match the surrounding tooth structure. However, clinicians should monitor defective amalgam restorations during the tooth whitening

therapy. Alternatively, their replacement should be considered prior to bleaching.

#### DISCLOSURE

The author has no financial interest in any of the companies whose products are included in this article.

#### REFERENCES

1. Swift EJ Jr., Perdigo J. Effects of bleaching on teeth and restorations. *Compend Contin Educat* 1998;19:815-20.
2. Robertello FJ, Dishman MV, Sarrett DC, Epperly AC. Effect of home bleaching products on mercury release from an admixed amalgam. *Am. J Dent* 1999;12:227-30.
3. Rotstein I, Dogan H, Avron Y, et al. Mercury release from dental amalgam after treatment with 10% carbamide peroxide in vitro. *Oral Surg Oral Med Oral Pathol* 2000;99:216-9.
4. Rotstein I, Dogan H, Avron Y, et al. Protective effect of copalite surface coating on mercury release from dental amalgam following treatment with carbamide peroxide. *Endod Dent Traumatol* 2000;16:107-10.
5. Attin T, Hannig C, Wiegand A, Attin R. Effect of bleaching on restorative materials and restorations—a systematic review. *Dent Mat* 2004;20:852-61.
6. Campos I, Briso AL, Pimenta LA, Ambrosano G. Effects of bleaching with carbamide peroxide gels on microhardness of restoration materials. *J Esthet & Restor. Dent* 2003;15:175-82.
7. Haywood VB. Greening of the tooth-amalgam interface during extended 10% carbamide peroxide bleaching of tetracycline-stained teeth: a case report. *J Esthet & Restor. Dent* 2002;14:12-7.
8. Basting RT, Rodrigues AL Jr., Serra MC. The effects of seven carbamide peroxide bleaching agents on enamel microhardness over time. *J Am Dent Assoc* 2003;134:1335-42.
9. Dale BG. Bleaching and related agents. In: [redacted], editor. *Esthetic Dentistry: a clinical approach to techniques and materials*. [redacted] (PA): Lea & Febiger; 1993, pp. [redacted]-[redacted].
10. Haywood VB. Considerations and variations of dentist-prescribed, home-applied vital tooth-bleaching techniques. *Compend Contin Educat*. 1994; Suppl 17:S616-21.

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