

Minimally invasive treatment of brown spot fluorosis

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Case Report (Dr. Leonard Tau)

A 12-year-old male patient was introduced to my office, initially through a phone consultation with his mother. She explained that her son's teeth were a normal color when they first erupted into his mouth, but portions of his teeth gradually took on an intense brown color. She stated that he had been a very happy and outgoing child who smiled a lot. However, with time, she said that his teeth had developed dark brown spots and he had become the target of teasing by other children. As a result, he had stopped smiling entirely, always trying to cover his teeth, and becoming more withdrawn and even reclusive.

Other dentists had informed her that the type of discoloration seen in her son would not respond to any type of whitening procedure. She asked if I might be able to whiten his teeth. I explained to her that there was a newer whitening system that some dentists were not aware of yet. With no promises (since I had not yet clinically examined the patient), I explained that there was an excellent chance that the brown spots could be improved significantly, and maybe even almost entirely removed. I asked her to set up an appointment so I could see her son.

Initial examination appointment

A few days later, the young man and his mother arrived for the first appointment. Before seating our patient, we took some photographs of him. We asked him to smile, but his face appeared a bit forced and asymmetrical as he tried to smile without showing his teeth (Figure 1). Upon examination, it was noted that the brown spots were primarily in the incisal half of the central incisors (Figure 2). It was immediately obvious that he had trained himself to cover the brown spots with his lower lip, and to raise his upper lip to show the gingival half of his teeth where there were no brown spots.

Impressions were taken and sent to the KÖR Laboratory for the fabrication of the KÖR-Seal Whitening Trays. The trays fit precisely, not only sealing in the KÖR Whitening gel but also, more importantly, sealing out saliva and sulcular fluids. Both saliva and sulcular fluids are heavily concentrated with the natural antioxidant enzyme glutathione peroxidase. Peroxidase destroys peroxide on contact, which is why seepage of saliva and sulcular fluid into whitening trays is so destructive, routinely resulting in very short periods of activity of whitening gels. With the seal created by the KÖR-Seal Whitening Trays, the extended release of the lower viscosity and fully aqueous base KÖR Whitening gels provides several hours of continuous whitening activity.

There is a common misconception that young patients should not have their teeth whitened because the pulp is still rather large. However, it has been shown that molecular hydrogen peroxide routinely enters the pulp within 15 minutes of whitening, regardless of the patient's age. Studies indicate that the very young, larger, and more vascular pulp is able to deal with peroxide even better than thinner, more fibrous, and less vascular pulps of adults.¹⁻⁴ Therefore, there is no age restriction to teeth whitening,^{1,4} even with the use of higher strength in-office hydrogen peroxide.¹

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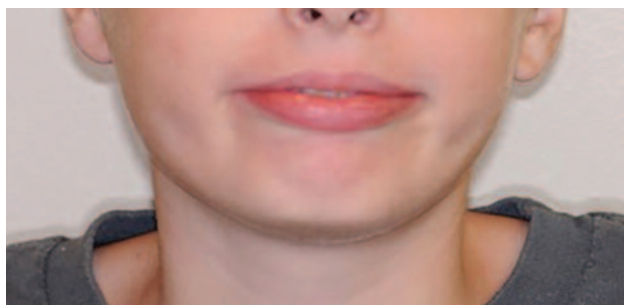


Figure 1. Note how the patient strains to cover his teeth with his lower lip.



Figure 2. Brown areas are primarily in the incisal half.



Figure 3. Post-op photo. Note that discoloration after Kör Whitening is nearly 100% gone.

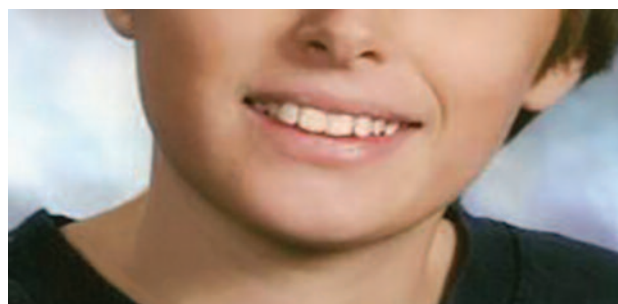


Figure 4. Post-op smile (taken from a school photo). Note the relaxed lip musculature and more uniform smile.

Home whitening was a success

After the trays were returned from the Kör Laboratory, the mother brought our young patient to the office to receive his at-home whitening kit and instructions. The patient's mother was informed that her son still had mixed dentition, and additional whitening trays would be necessary for maintenance in the future as jaws and dental arches change with growth.

The patient's mother had been very distressed about his school photograph. After her son's whitening was completed (Figure 3), she called the school to request permission to have his photo retaken. She was so happy with the results that she e-mailed me his new school photo showing off his natural, full smile (Figure 4). I think most dentists would agree that cases like this are what make the practice of dentistry so very rewarding!

A variety of cases can be treated

While some dentists use the Kör Whitening System only for their difficult cases, I use either the Kör at-home-only or the Kör combination system for all patients who need or desire these procedures. The vast majority of my whitening patients would not be considered "difficult whitening cases." Difficult stains, such as tetracycline and dark geriatric discoloration, are in the minority of my whitening cases, and, even though these difficult cases do not always achieve 100% perfect whiteness, the results have always been very impressive when treated with Kör Whitening.

In the photos of the tetracycline stained case (Figure 5), notice how light crown No. 19 was compared to the natural teeth prior to Kör Whitening in the pre-op photo, and how much darker the crown was compared to the natural teeth in the post-op photo. Also notice in the dark geriatric case



Figures 5a and 5b. Before and after (KöR Whitening) of a tetracycline stained case.

(Figure 6) that crowns Nos. 4, 12, 13, 19, and 20 were lighter than the natural teeth in the pre-op photo, and how they are significantly darker than the natural teeth in the post-op photo. Crown No. 5 was the same color as the natural teeth in the pre-op photo, and massively darker than the natural teeth in the post-op photo.

Truly white teeth

For the last few decades, whitening companies have told us that “whitening is the gateway to more cosmetic dentistry and more referrals”; however, dentists have found this not to be true. The typical whitening systems have never had predictability, and routinely did not deliver *truly white teeth* for our patients. Historically, even when whitening was considered successful, patients tended to look at the results and, while many were pleased or mildly pleased, that was about it. They quickly forgot about it and, other than a few lucky patients, most did not experience the change to truly

white teeth that would have really excited them and that others would have noticed.

I have found that my patients who ask for whitening procedures do, in fact, *expect truly white teeth*. Many new patients who come to us, who had their teeth “whitened” previously in other offices, are often less than impressed with the whitening results. So, when I am able to exceed their expectations by giving them *truly white teeth*, their loyalty and confidence in me and my recommendations really increases, and they become “dental missionaries,” greatly boosting our practice reputation through their online reviews, social media postings, and direct referrals. These patients often become infatuated with their teeth; they notice all their existing fillings and crowns now look dark (including molars), and they start to notice chips, spaces, mal-positioned teeth and uneven gingival architecture, etc; frequently requesting that these additional cosmetic problems be treated.



Figures 6a and 6b. Before and after (KöR Whitening) of a dark geriatric staining case.

Psychological impact of childhood teasing due to a cosmetic problem

Note: The following are Dr. Rod Kurthy's comments on Dr. Tau's case and other matters related to whitening procedures.

All too often, tooth-related cosmetic problems, in children and adolescents, are dismissed by parents and health professionals and not treated until adulthood. Often, it is simply due to a lack of understanding of the possible and acceptable treatment modalities available. Sometimes, it is due to a false assumption that certain treatments are contraindicated until older ages.

It is important to understand that there are strong and confirmed links between childhood teasing and damaging psychological impairment in adulthood as a result of cosmetic or physical imperfections.⁵ Children and adolescents with poor dental aesthetics may develop permanent psychological problems.^{1,5} Appearance, including the teeth, is the single most common target of childhood teasing.^{5,6} Child victims of teasing tend to respond by withdrawing, typically encouraging further teasing.⁵

Childhood teasing, in both boys and girls, is strongly related to depression, social anxiety, inadequacy, fear of negative evaluation, and loneliness later in life.⁵ Specifically, children who are teased may develop beliefs that the world is a dangerous place and that they have little control over outcomes in their lives.^{6,7}

Teasing specifically about appearance is also strongly associated with adulthood eating and body image disorders.^{5,8,9} Boys are more likely to be teased than girls,^{6,10} as boys frequently encounter teasing, whereas girls encounter more social exclusion.^{6,10} However, both males and females react in the same way, and have equally destructive psychological problems in adulthood as a result of childhood teasing.^{6,11}

As Dr. Tau pointed out above, there are no age limitations to whitening as long as proper adult supervision is provided.^{1,4} As any dentist who has whitened the teeth of children up to the age of 16 has seen, young teeth whiten extremely well and very quickly. In addition, once the whiteness is achieved, it is easily maintained throughout life. The younger teeth are, the more easily, effectively, and quickly they whiten, as long as there are no unusual problems such as fluorosis or tetracycline staining. In fact, the KöR Whitening patient brochures suggest age 14 as the most ideal age to whiten.¹² In most cases, the permanent teeth have erupted by age 14, and the teeth are still young enough to whiten very effectively and rapidly.

During my own childhood, I remember comments and

some mild teasing about my dark teeth. I had congenitally dark teeth, combined with diffuse tetracycline staining. It seems that I was very successful in passing on my genes to my son Chad, who is now 31. When Chad was age 11, he came to me asking why his teeth were so dark. I asked him why he was wondering, and he said that some of the kids at school were commenting on his teeth. I became concerned and asked, "Are they teasing you?" to which he replied, "No, they are just curious why my teeth are dark." Although Chad was not being teased, even at age 11, he was quite concerned and seemed to be self-conscious. I made him deep bleaching whitening trays (now called KöR-Seal Whitening Trays) and had him whiten for about 4 nights, which provided a huge improvement. As Chad's permanent teeth continued to erupt, I made him new trays every 12 months and he would wear them for a few nights.

Appearance of brown areas due to fluorosis

Many dentists assume that brown spots due to fluorosis are seen at the time of initial tooth eruption; however, this is not typically the case, as was the situation in the 12-year-old patient treated by Dr. Tau. In more advanced cases of fluorosis, it is believed there is a delay in the physiologic removal of integral organic substances formed during enamel growth and maturation, causing areas of significantly higher organic content within the enamel.¹³ After tooth eruption, and throughout time, these organic substances darken, resulting in the characteristic brown areas that become so visible (Figure 2).¹³

Proper sequencing of treatment

While it is a common practice to treat these brown areas first with micro-abrasion, followed by teeth whitening,¹⁴⁻¹⁶ I strongly disagree with this approach. Brown spots are not on the surface of enamel – they are subsurface – and there is no way to know how deep they are when doing a clinical examination.¹⁴

Removal of surface enamel using hydrochloric acid was first developed in 1916 by Dr. Walter Kane, but did not become popular when introduced.¹⁴ It was reintroduced to dentistry in the mid-1980s, combining hydrochloric acid with abrasive paste,¹⁴ and referred to as *microabrasion*. At that time I was a beta tester of the first microabrasion product to be sold, and I also performed clinical studies on it.

We studied the changes in tooth surface morphology using impressions and photography, and found the reflective properties were greatly altered. After microabrasion, teeth tend to reflect more unnaturally – like flattened, smooth

surfaces of glass¹⁴ with larger contiguous areas of reflection instead of the natural sparkly appearance created by multiple small areas of reflection from each tooth surface. In addition, we also found it very difficult to gauge the amount of enamel that had been removed at any point, because there were no distinct "margins" to compare the depth of enamel removal against. When measuring the amount of enamel removed, we routinely found more enamel had been removed than had been realized during the clinical procedure. Enamel removal, especially when more is removed than the operator is aware of, thins the enamel to the point of causing more darkening of the teeth by allowing more of the darker dentin to show through.¹⁴ This can also lead to more tooth sensitivity.¹⁴

It is a common observation and belief that brown spots due to fluorosis do not respond well to whitening, and this is often the case if the whitening system chosen for use is not effective enough to remove the organic brown stains. However, when a highly effective whitening system is used, the combination of both phases of peroxide whitening (oxygenation and conversion^{17,18}) is capable of removing some of the organic matter from the tooth via diffusion (oxygenation)¹⁷⁻²⁰ and conversion of the long-chain dark organic molecules to ultra-small white molecules.^{19,24}

In the majority of cases, highly effective whitening alone will remove 100% of the brown discoloration, or very close to it. Effective teeth whitening is therefore much less invasive, prevents the alteration of tooth surface morphology and reflective properties, and provides the best long-term whiteness by totally preventing any thinning of the enamel. Even if a less effective whitening process were used, at least some of the discoloration could be removed, followed by microabrasion. Performing whitening first reduces the amount of necessary enamel removal by microabrasion.

Closing comments

Correcting the nonaesthetic causes of teasing, if done quickly enough, can eliminate the psychological distress often found later in life.⁵ The authors strongly believe that oral health professionals should be cognizant of how any type of oral cosmetic problem may cause early and permanent psychological problems for our patients. It is important to become educated regarding correction of these aesthetic problems before permanent psychological problems occur.

References

1. Bussadori SK, do Rego MA, da Silva PE, et al. Esthetic alternative for fluorosis blemishes with the usage of a dual bleaching system based on hydrogen peroxide at 35%. *J Clin Pediatr Dent.* 2004;28:143-146.
2. Haywood V. Tray Bleaching Overview and Indications (DVD). Presented at: Phoenix, AZ: 2009 Western Regional Dental Convention; March 12-14, 2009.
3. Donly KJ, Kennedy P, Segura A, et al. Effectiveness and safety of tooth bleaching in teenagers. *Pediatr Dent.* 2005;27:298-302.
4. Fugaro JO, Nordahl I, Fugaro OJ, et al. Pulp reaction to vital bleaching. *Oper Dent.* 2004;29:363-368.
5. Storch EA, Roth DA, Coles ME, et al. The measurement and impact of childhood teasing in a sample of young adults. *J Anxiety Disord.* 2004;18:681-694.
6. Roth DA, Coles ME, Heimberg RG. The relationship between memories for childhood teasing and anxiety and depression in adulthood. *J Anxiety Disord.* 2002;16:149-164.
7. McCabe RE, Antony MM, Summerfeldt LJ, et al. Preliminary examination of the relationship between anxiety disorders in adults and self-reported history of teasing or bullying experiences. *Cogn Behav Ther.* 2003;32:187-193.
8. Thompson JK, ed. *Body Image, Eating Disorders, and Obesity: An Integrative Guide for Assessment and Treatment.* Washington, DC: American Psychological Association; 1996: 1-20.
9. Schwartz DJ, Phares V, Tantleff-Dunn S, et al. Body image, psychological functioning, and parental feedback regarding physical appearance. *Int J Eat Disord.* 1999;25:339-343.
10. Olweus D. *Bullying at School: What We Know and What We Can Do.* Oxford, England/Cambridge, MA: Blackwell; 1993.
11. Grilo CM, Wilfley DE, Brownell KD, et al. Teasing, body image, and self-esteem in a clinical sample of obese women. *Addict Behav.* 1999;19:443-450.
12. Kurthy RK. *Love Your WHITE Smile* (patient brochure). Irvine, CA: Evolve Dental Technologies; 2012.
13. Denbesten P, Li W. Chronic fluoride toxicity: dental fluorosis. *Monogr Oral Sci.* 2011;22:81-96.
14. Balan B, Madanda Uthaiah C, Narayanan S, et al. Microabrasion: an effective method for improvement of esthetics in dentistry. *Case Rep Dent.* 2013;2013:951589.
15. Chhabra N, Singbal KP. Viable approach to manage

superficial enamel discoloration. Contemp Clin Dent. 2010;1:284-287.

16. Cvitko E, Swift EJ Jr, Denehy GE. Improved esthetics with a combined bleaching technique: a case report. Quintessence Int. 1992;23:91-93.

17. Kurthy RL. Solving Teeth Whitening Frustrations [white paper]. Irvine, CA: Evolve Dental Technologies; 2010.

18. Greenwall L. Bleaching Techniques in Restorative Dentistry: An Illustrated Guide. London, England: Martin Dunitz; 2000.

19. Kacprzak M, Duschner HJ, Goetz H, et al. SEM/CLSM analysis of surface stains treated with whitening formulations. Presented at: IADR 81st General Session; June 15-28, 2003; Göteborg, Sweden.

20. Klukowska M, Goetz H, Duschner H, et al. Raman spectra and autofluorescence of peroxide bleached teeth in vitro. Presented at: IADR/AADR/CADR 82nd General Session; March 10-13, 2004; Honolulu, HI.

21. Duschner H, Goetz H, Klukowska M, et al. Bleaching effects on subsurface enamel and coronal dentin. Presented at: IADR/AADR/ - CADR 82nd General Session; March 10-13, 2004; Honolulu, HI.

22. Dahl J, Pallesen U. Tooth bleaching – a critical review of the biological aspects. Crit Rev Oral Biol Med. 2003;14:292-304.

23. Cotton FA, Wilkinson G. Oxygen. In: Cotton FA, Wilkinson G, eds. Advanced Inorganic Chemistry: A Comprehensive Text. 3rd ed. New York, NY: Interscience Publishers; 1972;403-120.

24. Madhu C, Gregus Z, Klaassen CD. Simple method for analysis of diquat in biological fluids and tissues by high-performance liquid chromatography. J Chromatogr B Biomed Appl. 1995;674:193-196.

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