

Evidence Based Tooth Whitening

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Part 1 Need for Bleaching and In-office Bleaching

Introduction

Goal is to remove stain

- Extrinsic—Stain, which is deposited on the outside surface.
- Intrinsic—Stain, which is incorporated into the tooth structure before or after eruption.
Tooth whiteners penetrate tooth surface to affect the color.

In-office Bleaching

- Respondents' satisfaction with In-office bleaching:
Very satisfied 16%, Satisfied 32%, Unsatisfied 23%, Very unsatisfied 5%
CRA Newsletter 29:2;2005
- In vivo study of eight In-office bleaching systems: A pilot study (alphabetical order):
Accelerated In-Office by Life Like ArchBrite by Biotrol
Illumine by Dentsply BriteSmile by BriteSmile
Niveous by Shofu PolaOffice by Southern Dental Industries
One Hour Smile by Den-Mat Corp Zoom! by Discus Dental
Matis et.al. Op Dent 28:324;2007
- In-office tooth lightening: 1 year recall, shows bulb light causes no increase in lightness.
Opalescence Xtra Boose PolaOffice Rembrandt Lighten Plus
LumaArch Niveous LaserSmile
Zoom!
CRA Newsletter 28:1-2;2004
- Effects of In-office tooth whiteners on hardness of tooth colored restoratives.
*Yap et. al., Op Dent 27:137;2002
- Effects of In-office tooth whiteners on surface finish of tooth colored restorations.
*Watanapayungul et al. Op Dent 28:15;2003.
- ADA accepted In-office product is not as effective as ADA accepted At-home product.
*Zekonis et. al., 28:114;2003.

Part 2 At-home Bleaching- The Science

At-home Bleaching

- Respondents' satisfaction with At-home bleaching:
Very satisfied 49%, Satisfied 45%, Unsatisfied 1%, Very unsatisfied 1%
CRA Newsletter 25:2;2001
- Concentrations to use
- Effectiveness of different concentrations of carbamide peroxide: An *in vitro* study has shown it just takes longer with lower concentrations.
Leonard et. al., Quint Int 29:503;1998
- American Dental Associations (ADA) first guidelines on safety and efficacy of bleaching agents were issued in 1994.
J Am Dent Assoc 125:1140;1994
- The following products are accepted as "safe" and "effective" by the ADA.

<http://www.ada.org/prof/prac/seal>, September 2002

Colgate Platinum Daytime Professional Whitening System **10% CP**

Nite White Classic Whitening Gel **10% CP**

Opalescence Whitening Gel **10% CP**

- Scandinavian Institute of Dental Materials has also recommended “to avoid using concentrations higher than 10% carbamide peroxide”.
- Breakdown – 10% CP=3% HP+7% Urea; HP=Oxygen + Water; Urea=Ammonia + Carbon Dioxide
- Make tray with blackout placed to 1 mm from mesial, cervical and distal soft tissue.

Studies to review effectiveness of whitening agents

-Efficacy of 10% CP for two weeks shows 20% large change, 50% moderate, 20% slight and 10% none.

Matis et. al., Quint Int 29:555;1998

- All had at least **24** subjects, bleached maxillary teeth for **14** days and used **reservoirs** in trays.
- No difference between 10% and 15% four weeks post-bleaching.

10% CP and 15% CP, overnight.

Matis et. al., Quint Int 31:303;2000

- CP has same bleaching capacity as HP.

15% CP and 5.5% HP, ½ hour 2X daily.

Panich, Masters Thesis, IUSD, 1999

20% CP and 7.5% HP, 1 hour 2X daily.

Mokhlis et. al., J Am Dent Assoc 131:1269;2000

- 10% CP overnight produces same lightness as 20% CP or 7.5% used 1 hr twice daily.

Histological changes after bleaching

- Minor histological changes that were observed with 10% CP used overnight are considered to be reversible

Fugaro J., Masters Thesis IUSD 2002

Sensitivity

- Tray alone causes tooth sensitivity in 15-20% of patients; add placebo agent and 20-30% report tooth sensitivity; add active agent and 55-75% report tooth sensitivity.

Haywood, JDR 79:519;2000

- To reduce tooth sensitivity:

Have patient use gel or paste with potassium nitrate before and/or after bleaching.

Have patient use bleaching agent less often.

Have patient wear the tray with bleaching agent for a shorter period of time.

Have patient use bleaching agent with lower amount of active agent.

Effects on teeth

- Study *in vivo* completed recently showed no changes in microhardness and adhesion returns to baseline values in two weeks.

Metz et.al., accepted for publication in Op Dent

- How long should patients use it? Until cuspids are as light as central and lateral incisors.

- How long to rebleach? One day for every week that patient initially bleached.

- How soon to rebleach? In one to three years-Do not give both upper and lower tray to patients at the same time. Tell them to try upper first.

Reason: Potential for TMD and able to see relative color changes.

-“All substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy”.

Paracelsus (1493-1541)

-Daily ingestion of CP should not exceed 10 mg. Includes safety factor of 100.

Dahl and Becher, J Dent Res 74;710-14;1995.

-Does not cause oral cancer

Munro et.al., J Esthet Rest Dent 18:119;2006.

-Excellent article entitled “Biological Properties of Peroxide-containing Tooth Whiteners” is available.

Li, Food and Chemical Toxicity 34;887;1996

-Systems most to least effective: Overnight At-home, Daytime At-Home, In-office, OTC

Part 3 Clinical Cases: The Proof is in the Taste

-Bleaching of primary teeth is possible with carbamide peroxide

- 1) 4 year old who fell sown, traumatizing deciduous central incisors, which were bleached for a total of 47 hours. Brantley et al. Pediatr Dent 23:514,2001
- 2) 19-year-old male, endodontically treated #8, placed glass ionomer plug, bleached internally and externally for 2 weeks each. Followed for 5 years post-bleaching.
- 3) 36-year-old female, trauma caused discoloration of tooth #8, no periapical pathology, bleached 6 weeks. Followed for 16 weeks postbleaching
- 4) 28-year-old male, semi-professional football player/student, canal in tooth #9 calcified and tooth discolored, bleached for 5 weeks and rebleached after 9 months for one week.
- 5) 62-year-old female, bleached mandibular teeth 6 weeks and followed for 6 weeks.
- 6) Hypocalcified area was bleached for 14 days, white spot lightened rapidly then returned to original color after cessation of bleaching.
- 7) 66-year old female with dark streak in tooth #9 was bleached and resin placed in area.
- 8) Unhappy person who was unsatisfied with 9 weeks of bleaching and decided on veneers.

Fluoride staining- a post eruptive stain

-Remove fluoride staining in enamel three ways: Microabrasion with HCl acid, beaching and/or use bur to remove stain

Croll, JADA 128:S45-S50;1997

Tetracycline staining- a pre-eruptive stain

-Not all tetracycline staining can be bleached

-Study in China on Subjects with tetracycline staining, using different concentration of get determined that 10% CP was effective in removing stain. Cervical area is the most difficult area for stain removal.

Matis et al. Quint Int 33:645;2002

-Bleaching is time and concentration dependent.

-Never promise results.

* article is available on Dr Matis' web site

**My prescription for successful and safe tooth whitening:
Place 10% CP agent into tray with reservoirs and use it overnight!**

Questions patients often ask and their answers

How long do I use the product?

Usually from 10-14 days. (On some teeth that are yellow due to aging, patients may need to use bleaching agent for 2 months. Use it as long as teeth continue to lighten. Dr. Haywood has used it for 12 months on tetracycline stained teeth.)

When will I notice some effect?

In about three days.

What if I cannot wear the tray all night?

Wearing the tray is usually not a problem. The tray is like a contact lens; it stays in place with the gel. Some people will salivate more the first couple of nights. If you find you cannot sleep with it through the night we will have you wear it in the morning or evening for a couple of hours. That way will just take a little longer .

What happens if I miss a day?

No problem, just wear it the following evening.

How long does the lightness from the bleaching last?

It usually lasts from one to three years. In some patients there is no reversal. (They very seldom return to the original discoloration, except for smokers. Smokers have a greater chance to return to baseline values.)

Can I rebleach?

Yes, use the same tray. The product is good for 18 months in the refrigerator.

How fast does rebleaching work?

You will need to bleach one day for each week you originally bleached.

I am expecting, can I use At-home whitening agents?

You should not bleach until you have completed nursing. (There is no evidence it would harm the newborn, but no studies have conducted to determine if it would harm the offspring. This is an elective procedure so it is better to wait.)

Do I bleach both arches at the same time?

No, first bleach the maxillary arch. (Patients do not sense teeth are lightening if both arches are bleached at the same time.) You will have less chance of TMD discomfort if you bleach one arch at a time.

Is it true that laser bleaching is more effective than At-home bleaching?

No. (The American Dental Association has stated that laser bleaching is not more effective than At-home bleaching.)

How young can you begin bleaching?

Dr. Haywood has bleached patients as young as four when there has been a need for it.

Will it damage my teeth or overall health?

There are five agents, which have been accepted as “safe” and “effective”. If you use any of those products as recommended, they have been shown not to harm the teeth or your overall health.

Will it damage my crowns or fillings?

No, it will not damage fillings or crowns. It will not lighten them either. It will discolor some temporary filling materials.