

Evidence Based Tooth Whitening

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The objective of this presentation is to increase your understanding of tooth whitening. We will do this by reviewing the clinical studies in the scientific literature that have been published. The presentation has been divided into six sections. They are:

Introduction

Material considerations

Tooth considerations

Pulpal considerations

Effectiveness of systems

Clinical Cases

Introduction

- What are the two kinds of stains that develop?
 - Extrinsic—Stain, which is deposited on the outside surface. Whiteners will lighten calculus and the stain on the outside of teeth.
 - Intrinsic—Stain, which is incorporated into the tooth structure before or after eruption.
- There are four major systems, three are At-Home systems and one an In-office system.
 - At -home in a custom tray bleaching (daytime and nighttime)
 - Advantages-Less tooth sensitivity, more effective.
 - Disadvantages-Not predictable, takes longer.
 - At-home over-the-counter bleaching
 - Advantages-Less expensive, no doctor visits
 - Disadvantages-Not as effective, higher concentration than recommended
 - In-office bleaching (Sometimes called “power bleaching”)
 - Advantages-Rapid tooth whitening; no gel ingested.
 - Disadvantages- Greater sensitivity; rapid reversal of tooth whitening; possible “burning” of tissues.
- What criteria are required for American Dental Association’s Seal that a materials is “Safe” and “Effective”?
 - American Dental Associations (ADA) first guidelines on safety and efficacy of bleaching agents were issued in 1994.
 - J Am Dent Assoc 125:1140-42;1994
 - Efficacy standard was revised in 2006.
 - The following product is accepted as safe and effective by the ADA.
 - Opalescence Whitening Gel 10% CP
 - http://www.ada.org/ada/seal/adaseal_consumer_shopping.pdf Aug 2009

Material Considerations -- Bleaching Agent

- How long is the carbamide peroxide bleaching material active?
 - Determined by ability to recover agent after it is placed.
 - Rapid initial degradation of carbamide peroxide agent and then it slows down.
 - 87% of agent recoverable after 15 seconds *in vivo*
 - 66% of agent recoverable after 1 hour *in vivo*
 - 53% of agent recoverable after 2 hours *in vivo*
 - 31% of agent recoverable after 4 hours *in vivo*
 - 18% of agent recoverable after 6 hours *in vivo*
 - 6% of agent recoverable after 10 hours *in vivo*

Matis et al., J Am Dent Assoc 130:227-235;1999

-Does hydrogen peroxide degrade at the same rate as carbamide peroxide?

--HP degrades more rapidly than carbamide peroxide

---61% of agent recoverable after 5 minutes *in vivo*

---56% of agent recoverable after 10 minutes *in vivo*

---49% of agent recoverable after 20 minutes *in vivo*

---44% of agent recoverable after 30 minutes *in vivo*

---38% of agent recoverable after 45 minutes *in vivo*

---32% of agent recoverable after 60 minutes *in vivo*

Al-Qunaian et al., Op Dent 28:236-241;2003

Tooth Concerns

-Is there loss of adhesion after bleaching?

--Study *in vivo* completed recently showed changes in shear bond strength returned to baseline values two weeks after bleaching.

*Metz et al., Op Dent 32(5) 427:2007

--The reason is “oxygen inhibition” that occurs with Bis-GMA resins.

-Is there a loss of microhardness?

--Study *in vivo* shows no changes in microhardness after bleaching for two weeks.

*Metz et al., Op Dent 32(5) 427:2007

-Are there morphological changes on tooth surface?

-Effect on enamel micromorphology when 38% HP used in an *in vivo* study on teeth.

Cadenaro et al., Op Dent 33(2):127-134;2008

-Is there an increase in caries susceptibility?

--Use of PF will make tooth more resistant to caries.

*Al-Qunaian, Op Dent 30:265;2005

Pulpal Concerns

-Does peroxide placed on the tooth during cause histological changes to the pulp?

--Mild histological changes that were observed with 10% CP used overnight are considered to be reversible. No moderate or severe histological changes observed.

Gonzalez-Ochoa, J. Masters Thesis IUSD 2002

-Will discomfort occur during tooth whitening?

--Patient may have one of two different kinds of discomfort: Tooth or Gingival sensitivity.

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

Haywood, J Dent Res 79:519(#3001);2000

-What can be done to reduce tooth and tissue sensitivity?

--Tooth sensitivity

---To reduce tooth sensitivity

----Have patient begin using toothpaste for sensitive teeth two weeks before initiation of bleaching.

----Have patient use agent with potassium nitrate after bleaching for 10-30 minutes.

----Have patient use agent less often.

----Have patient wear the tray for a shorter period of time.

Haywood, Quint Int 32:105-09;2001

--Tissue sensitivity

---To reduce tissue sensitivity, have patient more effectively remove excess bleaching agent that comes out of the tray and have tray trimmed shy of cervical collar of gingiva.

- How common is severe sensitivity?
 - Few people experience severe sensitivity and those that do only have it for a very short time.

Effectiveness of various concentrations and systems

- How effective are the In-office systems?
 - In vivo* study of eight In-office bleaching systems: A pilot study (alphabetical order).
 - Manufacturer's were invited to come observe use of their product.

Accelerated In-Office by Life Like	ArcBrite by Biotrol	
Illumine by Dentsply	BriteSmile by BriteSmile	
Niveous by Shofu	PolaOffice by SDI Industries	
One Hour Smile by Den-Mat	Zoom! by Discus Dental	
 - *Matis et al., Op Dent 28:324;2007
 - Does light use improve the effectiveness of the In-office systems?
 - Effectiveness of In-office products evaluated with and without use of light.

Opalescence Xtra Boost	PolaOffice	Rembrandt Lighten Plus
LumaArch	Niveous	LaserSmile
Zoom!		
 - One-week recall shows that light use does not increase whitening over non-light use.
 - CRA Newsletter 27(3):3;2003
- How effective are the Over-the-counter systems?
 - There are four different over-the-counter systems available: Stock Trays, Strips, Paint-ons and Wraps. They have different concentration of either hydrogen peroxide or carbamide peroxide in them. The concentrations are not indicated on their labels.
- Summary of effectiveness
 - Nine studies with 26 products with both subjective and objective evaluations
 - At-home nighttime in tray with reservoir is most effective system
 - At-home daytime in tray is next most effective system
 - Over-the-counter is next most effective system
 - In-office systems is the least effective system

Odds and Ends

- How long do patients use agent?
 - When cuspids become as light as central and lateral incisors.
- Do I deliver both trays at the same time?
 - Deliver maxillary tray first so patients can see the amount of bleaching that has occurred.
- Rebleaching, how often should it be done?
 - When needed, probably every one to three years.
- Does rebleaching take as long as initial bleaching?
 - No it is much faster, one day of rebleaching is usually required for every 5-7 days of initial bleaching.
- Can we guarantee lightness with bleaching?
 - No, but I tell patients I will apply the money it costs to bleach on a discount for veneers or crowns within three months if they are not pleased with the results.
- How long does tooth whitening last?
 - 42% were happy after 7 year post bleaching
 - Leonard et al., J Esthet Rest Dent 15:142-152;2003

Clinical Cases

19-year-old male, endodontically treated N 11, placed glass ionomer plug, bleached internally and externally for 2 weeks each. Followed for 2 months post-bleaching.

36-year-old female, trauma caused discoloration of tooth N 11, no periapical pathology, bleached 6 weeks. Followed for 4 months post-bleaching

28-year-old male, semi-professional football player/student, canal in tooth N 21 calcified and tooth discolored, bleached for 5 weeks, rebleached after 9 months.

62-year-old female bleached mandibular teeth 6 weeks. Followed for 2 months post-bleaching.

Lightened stained craze line on N 21 on 66-year-old female. Followed for 4 months post-bleaching

Hypocalcified area was bleached for 14 days, white spot lightened rapidly then returned to original color after cessation of bleaching.

Unhappy person who was dissatisfied with vital bleaching and decided on veneers.

Never promise results but help patients understand the possibilities!

End of Presentation Thank you for your attention

* Articles are available on Dr Matis' web site- www.bamatis.com

Other questions patients often ask and their answers

How long do I use the product?

Usually from 2-4 weeks. (On some teeth that are yellow due to aging, I have used the agents for 2 months. Use it as long as teeth continue to lighten. Dr. Haywood has used agents 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.

Can I rebleach?

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

I am pregnant, can I use At-Home whitening agents?

We recommend you not use it 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.)

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.)

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.

There is an excellent article on my web site by Dr Haywood entitled “Frequently Asked Questions about Bleaching”, which was published in Compendium 24(4A):324-338;2004.