Tooth Whitening Procedures and Products

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Disclaimer

This webinar is intended for informational purposes only and should not be interpreted as specific medical advice. A qualified healthcare provider should be consulted before making decisions about therapies and/or health conditions.

While some complementary and alternative techniques have been studied scientifically, high-quality data regarding safety, effectiveness, and mechanism of action are limited or controversial for most therapies.

Whenever possible, it is recommended that practitioners be licensed by recognized professional organizations that adhere to clearly published standards. In addition, before starting a new technique or engaging a practitioner, it is recommended that patients speak with their primary healthcare providers.

Potential benefits, risks (including financial costs), and alternatives should be carefully considered. The following webinar is designed to provide historical background and an overview of clinically oriented research and neither advocates for or against the use of a particular therapy.

Objectives

- Provide background information on tooth whitening
- Discuss specific techniques used in the whitening of teeth
- Discuss the scientific evidence of procedures and products used to whiten teeth
- Discuss the safety and potential side effects of specific products

Synonyms

- Bleach whiteners
- Carbamide peroxide
- Hydrogen peroxide
- Hydrogen peroxide tooth whitening
- Peroxide tooth whiteners
- Tooth bleaching
- Tooth whitening
- Whitening gels
- Whitening products
- Whitening strips
- Whitening trays
- Tooth pastes

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providers and researchers to provide high-quality, evidence-based information about complementary and alternative therapies. Grades reflect the level of available scientific data for or against the use of each therapy for a specific medical condition.

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Grading System

- A — Strong Positive Scientific Evidence
- B — Positive Scientific Evidence
- C — Unclear Scientific Evidence
- D — Negative Scientific Evidence
- F — Strong Negative Scientific Evidence

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Background

- Procedures or products that make teeth look brighter
- Gaining popularity since the 1990s
- Teeth may be whitened with or without bleach
- Home or natural remedies for teeth whitening teeth
- Cosmetic procedures for tooth whitening
  - Bonding
  - Veneers
  - Crowns

Background

Extrinsic Stains

- Stains on surface of tooth
- Over-the-counter or home-use products
- Will not alter color of tooth

Intrinsic Stains

- Beyond tooth's enamel
- More difficult to remove
- More effective if treated in a dentist's office

Background

- Bleach products
  - Peroxide agent – usually carbamide peroxide
  - To take away surface and underlying stains
  - Usually treated professionally by a dentist
- Non-bleach products
  - Chemicals or abrasive agents
  - Clean stains off the tooth's surface
  - Usually home-use or over-the-counter products

Scientific Evidence

These uses have been tested in humans or animals. Safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a healthcare provider.

Natural Standard evidence-based validated grading rationale™

Grade	Evidence
A	Strong Scientific Evidence
B	Good Scientific Evidence
C	Unclear or Conflicting Scientific Evidence
D	Fair Negative Scientific Evidence
F	Strong Negative Scientific Evidence

Natural Standard evidence-based validated grading rationale ™

- Grades reflect the level of available scientific evidence in support of the efficacy of a given therapy for a specific indication.
- Expert opinion and folkloric precedent are not included in this assessment, and are reflected in a separate section of each monograph ("Strength of Expert Opinion and Historic / Folkloric Precedent")
- Evidence of harm is considered separately; the below grades apply only to evidence of benefit.

Level of Evidence Grade	Criteria
A (Strong Scientific Evidence)	Statistically significant evidence of benefit from >2 properly randomized trials (RCTs), OR evidence from one properly conducted RCT AND one properly conducted meta-analysis, OR evidence from multiple RCTs with a clear majority of the properly conducted trials showing statistically significant evidence of benefit AND with supporting evidence in basic science, animal studies, or theory.
B (Good Scientific Evidence)	Statistically significant evidence of benefit from 1-2 properly randomized trials, OR evidence of benefit from >1 properly conducted meta-analysis OR evidence of benefit from >1 cohort/case-control/non-randomized trials AND with supporting evidence in basic science, animal studies, or theory. *This grade applies to situations in which a well designed randomized controlled trial reports negative results but stands in contrast to the positive efficacy results of multiple other less well designed trials or a well designed meta-analysis, while awaiting confirmatory evidence from an additional well designed randomized controlled trial.*
C (Unclear or Conflicting Scientific Evidence)	Evidence of benefit from >1 small RCT(s) without adequate size, power, statistical significance, or quality of design by objective criteria,* OR conflicting evidence from multiple RCTs without a clear majority of the properly conducted trials showing evidence of benefit or ineffectiveness, OR evidence of benefit from >1 cohort/case-control/non-randomized trials AND without supporting evidence in basic science, animal studies, or theory, OR evidence of efficacy only from basic science, animal studies, or theory.
D (Fair Negative Scientific Evidence)	Statistically significant negative evidence (i.e., lack of evidence of benefit) from cohort/case-control/non-randomized trials, AND evidence in basic science, animal studies, or theory suggesting a lack of benefit. *This grade also applies to situations in which >1 well designed randomized controlled trial reports negative results, notwithstanding the existence of positive efficacy results reported from other less well designed trials or a meta-analysis. (Note: if there is >1 negative randomized controlled trials that are well designed and highly compelling, this will result in a grade of "F" notwithstanding positive results from other less well designed studies.)*
F (Strong Negative Scientific Evidence)	Statistically significant negative evidence (i.e., lack of evidence of benefit) from >1 properly randomized adequately powered trial(s) of high-quality design by objective criteria.*
Lack of Evidence	Unable to evaluate efficacy due to lack of adequate available human data.

** Objective criteria are derived from validated instruments for evaluating study quality, including the 5-point scale developed by Jadad et al., in which a score below 4 is considered to indicate lesser quality methodologically (Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ, McQuay HJ. Assessing the quality of reports of randomized clinical trials: is blinding necessary? Controlled Clinical Trials 1996; 17(1):1-12).*

† Listed separately in monographs in the "Historical or Theoretical Uses which Lack Sufficient Evidence" section.

Scientific Evidence

Synonyms
Background
Theory/Evidence
Safety
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Technique

- Many experts and organizations, including the American Dental Association (ADA), recommend consulting a dentist before making any decisions about whitening or using whitening products. This consultation is intended to deliver information that suits the client's particular situation, as well as to learn about potential side effects, cost, etc.
- Products that can be bought over-the-counter or from a dentist include whitening toothpastes, brush-on whiteners, strips, and various kits that contain strips, bite-shaped trays, and gels. These products are typically intended to be used for 2-4 weeks.
- Procedures at a dentist's office include bleaching or laser/light-assisted bleaching. These procedures take about 60 minutes.
- Tooth whitening bleaches that are approved by the ADA for home use contain 10% carbamide peroxide. Dentists usually use products with concentrations as high as 35%.
- Natural methods for teeth whitening include applying lemon juice, wood ash, strawberries, aloe vera gel, baking soda, hydrogen peroxide, salt, vodka, bay leaves, orange peel, or others on the teeth. Note: Some sources warn about potential decay and damage to the tooth's enamel with some these methods. Therefore, patients should consult their healthcare providers before trying any of these methods.
- The effects of whitening depend on how teeth looked before treatment, how often foods and beverages that stain are consumed, and whether or not the person smokes. According to product reviews, professional whitening may last five to seven years.

Theory/Evidence

- Teeth can be stained by beverages (such as tea, coffee, colas, red wine), foods (such as berries, tomatoes, soy sauce, and balsamic vinegar), tobacco products, certain medicines, and genetic factors.
- Whitening toothpastes remove stains on the tooth's surface (extrinsic stains) with abrasives and chemicals that buff away stains, but unlike a bleaching agent, they will not alter the color of teeth.
- Bleaching with a peroxide agent (typically carbamide peroxide) attacks stains that are under the tooth's surface (intrinsic stains) when applied. The agents break down and sink into the tooth, where they attach to stain particles and break them up.
- Lasers and lights are said by some to activate or speed up the whitening process, although evidence of effectiveness is mixed.
- Natural methods include avoiding agents that cause stains, such as abstaining from or limiting smoking, drinking coffee, etc. Some also suggest that by eating foods that are high in fiber and that trigger a lot of salivation, the bacteria that contribute to staining may be eliminated.

Scientific Evidence

- Studies criticized due to funding bias
- Varied results on effectiveness of lasers/lighting have led to disagreement among dentists
- Lack of long-term research on the safety and effectiveness of whitening products and procedures

Patient Case

- AC is a 40 yr-old man who recently heard of a new tooth whitening product on TV. After brushing this morning he noticed the yellow tint of his teeth and wonders if this may be the reason he is unable to find a proper mate. He would like to try this new OTC whitening gel. After talking to AC, you find out:

- PMH: hypertension & smoker
- Medications: lisinopril
- Herbal supplements: none
- Allergies: none

Patient Case

What could you say to AC?

A- Show AC to the dental hygiene aisle and send him on his way.

B-Advise AC to try an online dating service so he can get to know his mate without showing his teeth

C- Tell AC that smoking may contribute to this condition but there is a lack of long-term research on the effectiveness of these products and to consult a dentist first.

D- There is nothing in his medical history that needs to be addressed so any OTC whitening product should work for AC

Patient Case

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A- Show AC to the dental hygiene aisle and send him on his way.

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C- Tell AC that smoking may contribute to this condition but there is a lack of long-term research on the effectiveness of these products and to consult a dentist first.

D- There is nothing in his medical history that needs to be addressed so any OTC whitening product should work for AC

Technique

- The American Dental Association (ADA) recommends consulting a dentist before making any decisions about using whitening products

- Intended to deliver information that suits the client's particular situation, as well as to learn about potential side effects, cost, and alternative products or procedures

Technique

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Technique

- Many experts and organizations, including the American Dental Association (ADA), recommend consulting a dentist before making any decisions about whitening or using whitening products. This consultation is intended to deliver information that suits the client's particular situation, as well as to learn about potential side effects, cost, etc.
- Products that can be bought over-the-counter or from a dentist include whitening toothpastes, brush-on whiteners, strips, and various kits that contain strips, bite-shaped trays, and gels. These products are typically intended to be used for 2-4 weeks.
- Procedures at a dentist's office include bleaching or laser/light-assisted bleaching. These procedures take about 60 minutes.
- Tooth whitening bleaches that are approved by the ADA for home use contain 10% carbamide peroxide. Dentists usually use products with concentrations as high as 35%.
- Natural methods for teeth whitening include applying lemon juice, wood ash, strawberries, aloe vera gel, baking soda, hydrogen peroxide, salt, vodka, bay leaves, orange peel, or others on the teeth. Note: Some sources warn about potential decay and damage to the tooth's enamel with some these methods. Therefore, patients should consult their healthcare providers before trying any of these methods.
- The effects of whitening depend on how teeth looked before treatment, how often foods and beverages that stain are consumed, and whether or not the person smokes. According to product reviews, professional whitening may last five to seven years.

Theory/Evidence

- Teeth can be stained by beverages (such as tea, coffee, colas, red wine), foods (such as berries, tomatoes, soy sauce, and balsamic vinegar), tobacco products, certain medicines, and genetic factors.
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- Bleaching with a peroxide agent (typically carbamide peroxide) attacks stains that are under the tooth's surface (intrinsic stains) when applied. The agents break down and sink into the tooth, where they attach to stain particles and break them up.
- Lasers and lights are said by some to activate or speed up the whitening process, although evidence of effectiveness is mixed.
- Natural methods include avoiding agents that cause stains, such as abstaining from or limiting smoking, drinking coffee, etc. Some also suggest that by eating foods that are high in fiber and that trigger a lot of salivation, the bacteria that contribute to staining may be eliminated.

Technique

Over-the-Counter	Dental Procedures
• Whitening toothpaste • Brush-on whiteners • Whitening strips • Whitening rinses • Whitening gels	• Bleaching • Laser-assisted bleaching • Deep bleaching
• Typically 2-4 week use	• Usually 30-60 minute sessions

OTC vs. Dental Procedure

- Bleaches approved for home-use contain 10% carbamide peroxide
- Extrinsic stains are more easily removed
- Good candidates for OTC products

- Professional products contain up to 35% carbamide peroxide
- Intrinsic stains are generally tougher to remove
- Better outcomes when treated in a dentist's office

Dental Procedures

- Chairside bleaching
  - 30-60 minutes
  - Rubber shield or special gel to protect gums and oral tissues
  - Whitening agent is applied to teeth
  - May involve more than one office visit
- Deep bleaching
  - Two in-office bleachings
  - Combination of chemical whiteners plus at-home application
  - May cost up to $1,500

Efficacy

- Depends on the baseline state of an individuals teeth
  - How teeth looked before treatment
  - How often foods and beverages that stain are consumed
  - Whether or not the person smokes
- Professional whitening may last five to seven years according to various product reviews
- Studies have been criticized due to funding bias by companies that sell these products

Let’s Review!

Question One

Which of these statements is true regarding OTC vs. Dental procedures?

A- OTC bleaches usually contain the same strength peroxide as a dentists' product

B- Intrinsic stains are easily treated with OTC whitening products

C- Many products used by dentists require 2-4 weeks of office visits for the best results

D- Results typically depend on the baseline state of the teeth, the amount of staining beverages consumed, and smoking status

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D- Results typically depend on the baseline state of the teeth, the amount of staining beverages consumed, and smoking status

Traditional or Theoretical Methods

The below uses are based on tradition, scientific theories, or limited research. They often have not been thoroughly tested in humans, and safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider. There may be other proposed uses that are not listed below.

Theory and Evidence

- Teeth may be stained by beverages

Tea	Soda
Coffee	Red wine

- Foods

Berries	Soy Sauce
Tomatoes	Balsamic Vinegar

- Tobacco products
- Certain medicines – tetracycline, doxycycline
- Genetic factors

Natural Methods

- Natural methods for teeth whitening
  - •Lemon juice
  - •Wood ash
  - •Strawberries
  - •Aloe vera gel
  - •Baking soda
  - •Hydrogen peroxide
  - •Salt
  - •Vodka
  - •Bay leaves
  - •Orange peel

- WARNING
  - Some sources warn about potential decay and damage to the tooth's enamel with some these methods
  - Patients should consult their healthcare providers before trying any of these methods

Natural Methods

- Other natural methods include avoiding agents that cause stains
- Abstaining from or limiting smoking, drinking coffee, etc
- Some also suggest that by eating foods that are high in fiber and that trigger a lot of salivation, the bacteria that contribute to staining may be eliminated

Theory and Evidence

- Extrinsic stains
  - Whitening toothpastes remove stains on the tooth's surface with abrasives and chemicals that buff away stains
  - Will not alter the color of teeth
- Intrinsic stains
  - Bleaching with carbamide peroxide attacks stains that are under the tooth's surface
  - Agents break down and sink into the tooth, where they attach to stain particles and break them up
  - Disagreement exists among dentists on whether lasers or lights activate or speed up the whitening process

Let’s Review!

Question Two

For which indication is there <u>strong</u> scientific evidence behind the use of teeth whitening products and procedures?

A- Smoker's teeth

B- Intrinsic stains

C- Extrinsic stains

D- Genetic discoloration

E – None of the above

Question Two

For which indication is there <u>strong</u> scientific evidence behind the use of teeth whitening products and procedures?

A- Smoker's teeth

B- Intrinsic stains

C- Extrinsic stains

D- Genetic discoloration

E – None of the above

Patient Case

TB is a 32 year-old female who comes in to the pharmacy looking for products to help remove the discoloration of her teeth. She would like to try something "natural"

More information on DJ:

- Past medical history (PMH): Smoker
- Relevant diet: 3-4 coffees per day, wine with dinner
- Complementary alternative medicines: none
- Allergies: strawberry

Patient Case

As a pharmacist, what would you say to TB?

A- Strawberries may whiten teeth and TB is a good candidate due to her extrinsic stains

B- Lemon juice is the only natural method proven to whiten teeth

C- Abstaining from smoking and limiting staining beverages may be a starting point for TB in her quest for whiter teeth

D- None of the above

Patient Case

As a pharmacist, what would you say to TB?

A- Strawberries may whiten teeth and TB is a good candidate due to her extrinsic stains

B- Lemon juice is the only natural method proven to whiten teeth

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D- None of the above

Safety

The U.S. Food and Drug Administration does not strictly regulate herbs and supplements. There is no guarantee of strength, purity or safety of products, and effects may vary. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy. Consult with a health care provider immediately if you experience side effects.

Safety

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Safety

- A qualified dentist should be consulted before making decisions about tooth-whitening procedures or products.
- The American Dental Association (ADA) and other health experts note that hydrogen peroxide and carbamide peroxide products may cause short-term sensitivity in the teeth, and irritate the gums and tissues in the mouth. The ADA notes that the sensitivity is short-lasting and that poorly fitting trays are usually to blame for irritation of the gums. One 2008 study noted that 10% carbamide peroxide tooth whiteners that included potassium nitrate seemed to produce less sensitivity.
- The ADA does not advise consumers to limit use to a certain time period, but encourages consumers to first consult a dentist for the best course of action, and then to follow the manufacturer's instructions on any over-the-counter product.
- Individuals with fillings, crowns, and very dark stains should talk with their dentists about whether bleaching is appropriate. Bleaching is often not as successful in these cases.
- Some researchers who have studied various whitening products and other health experts note that there is a lack of long-term research on the safety and effectiveness of these products and procedures.
- Some researchers have shown particular concern in bleaching for children and teenagers. The tooth sensitivity and gum irritation that typically occurs with bleaching may be elevated for children and teenagers. There is also concern about the potentially harmful or toxic effects of excessive exposure to peroxide for this age group, particularly because researchers speculate that some teens use whitening products more often or for longer than the typical two to four weeks indicated by manufacturers, in hopes of achieving better or faster results.

Author Information

- This information has been edited and peer-reviewed by contributors to the Natural Standard Research Collaboration (www.naturalstandard.com).

Safety

- The ADA encourages consumers to first consult a dentist for the best course of action, and then to follow the manufacturer's instructions on any over-the-counter product

- There is a lack of long-term research on the safety and effectiveness of these whitening products and procedures

Adverse Effects

- Hydrogen and carbamide peroxide products
  - Short-term sensitivity in teeth
  - Irritate gums and oral tissues
- These effects are short-lasting
- Poorly fitting trays may be to blame for irritation of the gums
- Potassium nitrate containing whiteners may produce less sensitivity

Warnings

- Sensitivity and irritation may be worsened in children and teenagers
- Concern for potentially harmful or toxic effects of excessive exposure to peroxide for this age group
- Teens may use whitening products more often or for longer than indicated by manufacturers, in hopes of achieving better or faster results

Let’s Review!

Question Three

What are some reported side effects associated with teeth whitening products?

A- Sensitive teeth

B- Irritated gums

C- Irritated oral tissue

D- All of the above

Question Three

What are some reported side effects associated with teeth whitening products?

A- Sensitive teeth

B- Irritated gums

C- Irritated oral tissue

D- All of the above

Patient Case

- JO is a 16 yr-old teen who hated brushing his teeth as a kid. His teeth are discolored because of the neglect in his younger years and now wants a quick fix for a whiter smile before prom. He and his mother come to the pharmacy to ask your advice.

- PMH: depression
- Medications: fluoxetine
- Herbal supplements: none
- Allergies: none

Patient Case

As a pharmacist, what would you NOT tell JO and his mother?

A- JO cannot use any whitening product because the adverse effects are long-lasting in teenagers

B- The ADA encourages consumers to first consult a dentist to discuss the best course of action

C- Tooth sensitivity and gum irritation from bleaching may be worsened in teenagers

D- Teens may misuse whitening products in hopes of achieving better or faster results. Be sure to follow the manufacturers directions on any OTC product

Patient Case

As a pharmacist, what would you NOT tell JO and his mother?

A- JO cannot use any whitening product because the adverse effects are long-lasting in teenagers

B- The ADA encourages consumers to first consult a dentist to discuss the best course of action

C- Tooth sensitivity and gum irritation from bleaching may be worsened in teenagers

D- Teens may misuse whitening products in hopes of achieving better or faster results. Be sure to follow the manufacturers directions on any OTC product

Summary

Scientific evidence	Dosing
• Long term research on the safety and effectiveness of these products and procedures is currently lacking	• The ADA does not advise consumers to limit use to a certain time period • Consumers are encouraged to consult a dentist for the best course of action • Follow the manufacturer's instructions on any over-the-counter product

Summary

Side effects	Warnings
• Hydrogen and carbamide peroxide products • Short-term sensitivity in the teeth, and irritate the gums and tissues in the mouth • Poorly fitting trays are usually to blame for irritation of the gums	• Tooth sensitivity and gum irritation may be elevated for children and teenagers • Concern about the potentially harmful or toxic effects of excessive exposure to peroxide for this age group • Teens may misuse whitening products in hopes of achieving better or faster results

Patient Case

- KA is a 47 yr-old female who is unable to afford expensive professional whitening treatment and is looking for a cheaper alternative. She states that she does not smoke or drink coffee. She asks your advice on using a natural method vs. a whitening rinse vs. brushing everyday

- PMH: HTN, hyperlipidemia
- Medications: losartan, simvastatin, MVI
- Herbal supplements: none
- Allergies: none

Patient Case

Your advice for KA is…

A- Natural methods like applying lemon juice, baking soda or hydrogen peroxide may help whiten teeth

B- Whitening rinses can help freshen breath, reduce dental plaque, and may whiten teeth with hydrogen peroxide

C- Whitening toothpastes may contain baking soda, calcium carbonate, or sodium tripolyphosphate which may help breakdown and dissolve surface stains

D- Contact your dentist for more information on these strategies due to the lack of good evidence for their efficacy.

E – All of the above

Patient Case

Your advice for KA is…

A- Natural methods like applying lemon juice, baking soda or hydrogen peroxide may help whiten teeth

B- Whitening rinses can help freshen breath, reduce dental plaque, and may whiten teeth with hydrogen peroxide

C- Whitening toothpastes may contain baking soda, calcium carbonate, or sodium tripolyphosphate which may help breakdown and dissolve surface stains

D- Contact your dentist for more information on these strategies due to the lack of good evidence for their efficacy.

E – All of the above

Author Information

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References

- Natural Standard developed the mentioned evidence-based information based on a thorough systematic review of the available scientific articles. For comprehensive information about alternative and complementary therapies on the professional level, go to www.naturalstandard.com. Selected references are listed below.

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