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Making the "White" Choice: OTC Tooth-Whitening Products

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Today, more than ever before, consumers are bombarded with a selection of products designed to help them look attractive, feel healthy, and appear younger. OTC tooth-whitening products are among them, and within this category of health and beauty aids are a variety of options to achieve whiter, brighter teeth.

A variety of OTC tooth-whitening products are available, including toothpastes, whitening strips, one-size-fits-all tray systems, gels, mouth rinses, gum, sprays and paints, dental floss, and tablets. All claim to achieve whitening effects, but they vary in efficacy based on their composition and their mechanism of whitening action. Understanding what these products can and cannot do—and how—is important when making recommendations to customers.

Bleaching vs Whitening

Although the terms are increasingly used interchangeably, they are, in fact, different, according to Robert Gerlach, DDS, MPH, principal scientist in Worldwide Clinical Investigations for Procter & Gamble and a noted authority on tooth whitening.

Bleaching refers to the use of a solution containing a sufficient percentage of peroxide—either carbamide peroxide or hydrogen peroxide. This substance is placed in close contact with the teeth and held in place long enough to allow penetration of the bleaching agent into the tooth structure so as to change the color. While the bleaching agent removes stains and discoloration from the tooth's surface (extrinsic), its more important action is the alteration of color from inside the tooth structure (intrinsic). The key to bleaching, he explains, is prolonged direct contact of the bleaching agent, peroxide, with the teeth.

According to Gerard Kugel, DMD, MS, a practicing dentist and a faculty member at Tufts University in Boston, MA, bleaching or whitening kits that contain peroxide are usually safe and do not damage natural tooth enamel.

Whitening agents, Dr. Gerlach explains, remove and prevent extrinsic stains that result from behavioral factors, such as using tobacco, eating certain foods, and drinking coffee, tea, or red wine. The effects of whitening products—usually toothpastes—will be most visible if consumers' teeth had extrinsic stains. The stains will be removed—so teeth will appear cleaner and whiter—but the internal color of the teeth may not change.

"People who didn't get their teeth cleaned might be at higher risk for this kind of stain and could possibly benefit from abrasive toothpastes. But they'll only see a difference if their teeth are dirty to start with," says Peter L. Jacobsen, PhD, DDS, professor in the Department of Pathology and Medicine at the University of the Pacific School of Dentistry in San Francisco, CA. Dr. Jacobsen is a national expert on OTC dental products and lectures nationally about the subject.

Trays, Strips, and Other Bleaching Tools

The most efficacious tooth-whitening products are those that contain carbamide or hydrogen peroxide and keep the bleach in close proximity to the teeth for prolonged periods of time. Products are available that deliver the bleaching agent to the teeth in trays and in strips that fit over the top of the teeth. Consumers wear the tray or strip with the bleaching product for a specific length of time every day or at night. Although they cannot eat while wearing the product, they can talk.

The results from bleaching kits will vary, depending on the discoloration of the teeth. Yellowish-colored teeth generally bleach better than brownish ones, and grayish teeth may not lighten at all with tooth-whitening products. A yellow filling will remain the same color even after bleach is applied.

Most OTC bleaching products contain about 5% carbamide peroxide, whereas kits available in a dentist's office contain a little more—from 10% to 15%. Professional kits function similarly to OTC bleaching products, but a customized tray sculpted from an impression, and trimmed by the dentist to fit at the gum line, is provided. Currently, only dentist-provided 10% carbamide peroxide bleach products carry the American Dental Association seal of approval. In addition to the custom trays, dentists have a number of options, including chairside treatment and professional-strength strips.

The bleaching strips, such as Crest White Strips, are different from other direct-to-consumer systems, Dr. Gerlach explains, in that these strips carry a higher peroxide concentration, more like that available in dentist trays. This allows for greater initial color improvement and sustained whitening, more like the professional systems. According to Roger Levin, DDS, MBA, founder of the Levin Group, a dental management consulting firm, "The only well-researched over-the-counter bleaching product is the [Crest] white strip," which will show whitening results within a couple of weeks.

Although OTC products have long been rumored to damage enamel, studies do not support this belief, says Nicholas Zacharczenko, DDS, RPh, MSD, a practicing dentist and pharmacist in Clifton Park, NY. Only repeated use of acidic products such as soda or fruit juice over a long period of time could possibly damage enamel and cause tooth sensitivity, according to Dr. Zacharczenko.

The less carbamide peroxide bleaching products contain, the less likely they will be to cause side effects. In a 2001 study published in the *Compendium of Continuing Education in Dentistry*, researchers assessed tooth hypersensitivity 1 week after 1 group of patients applied an OTC bleaching product containing 5% carbamide peroxide and another group used another product containing 10% carbamide peroxide.¹ Results showed that the 5% carbamide peroxide product was associated with less discomfort. Of the group using the 5% carbamide peroxide product, 20% reported transient sensitivity of their teeth after product use for 1 week. In contrast, 53% of the group using the 10% carbamide peroxide product reported sensitivity.

Toothpastes, Rinses, and Other Mechanical Action Tools

Whitening toothpastes and other products work in 1 of 4 ways: abrasion, chemical dissolution, peroxide lightening, or cosmetic masking. Lightening effects are primarily due to changes on the surface of a tooth. Toothpastes with a low abrasion potential, however, may be best for taking off mild extrinsic stains through removal of pellicle (a thin skin or film), prevention of the buildup of calculus (a hard, stonelike concretion), decolorization of stains, or masking (hiding of stains).

Almost all whitening toothpastes rely more on mechanical action (similar to polishing compounds) than chemical reaction (as in bleaching), even though they may contain a bleaching agent.

Toothpastes contain a mixture of abrasives to maximize their cleaning effectiveness. Some abrasives, such as hydrated silica, effectively remove stains without significantly removing tooth structure. Detergents, such as sodium lauryl sulfate, are added to toothpastes to enhance their cleaning action. Although abrasive toothpastes have a reputation for being inefficient, they will wear off extrinsic stains on the teeth to reveal a whiter, healthier-looking layer in the base enamel. It typically takes several weeks to change the teeth by just a few shades, however. Whitening rinses, often sold in kits with toothpastes, are generally considered ineffective.

According to Dr. Kugel, consumers must keep in mind that, if their teeth are worn, the harsher, more abrasive toothpastes that claim whitening effects may actually "scratch" the surface of the teeth. Also, according to Dr. Gerlach, there are abrasives that can actually damage tooth structure, while others have been proven gentle to enamel.



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Among the toothpastes available, some contain surface-acting agents that not only help dissolve stains and “lift” them off the teeth, but also leave a barrier on teeth to inhibit future stains.

Typically, these may contain pyrophosphates or polypyrophosphates—found in many “tartar control” toothpastes—which hinder the mineralization of plaque into calculus. The whitening effect is achieved by maintaining a clean enamel surface, because tartar control toothpastes cannot remove preexisting calculus on teeth.

Products that include chemical lighteners remove extrinsic stains by dissolving the stained pellicle on teeth. They may result in occasional sensitivity, and the natural tooth color remains unchanged. Peroxide-containing whitening products lighten extrinsic stains. However, the relatively short exposure time during a typical episode of tooth brushing, flossing, and mouth rinsing, combined with the rapid breakdown of peroxides in the mouth by bacteria and saliva, limit the tooth-lightening effectiveness of these products, compared with other bleaching kits that contain peroxide. Such products may be most beneficial when used to maintain previously bleached teeth, since they do not lighten to the degree that available bleaching kits can.

Cosmetic toothpastes—which cover extrinsic stains or tooth structure with titanium dioxide, an ingredient in paint—are safe and do produce an extrinsic color change. Results vary, however, and can be difficult to maintain, because the existing stains are essentially covered with a lighter-colored material.

Conclusions

Some OTC tooth-whitening products can take longer to produce results than a professionally dispensed kit—several weeks vs 1 to 2 weeks, but they are also less expensive than the kits available in dentists’ offices. “For someone with limited funds who’s willing to be patient, over-the-counter whitening products are a good solution,” says Claire Gill, DDS, PharmD, associate professor of clinical dentistry at the University of Southern California, Los Angeles. Custom-made kits created in a dentist’s office sell for \$300 to \$500.

OTC bleaching products are relatively free of side effects, although like professional systems they can cause gum irritation or hypersensitivity of the teeth during use. The reason is that the peroxide can stimulate nerve endings in the teeth and can trigger a low-level inflammatory response. “The good thing is that these effects are only transient, and there’s no real injury, so the inflammatory response dies down,” Dr. Jacobsen says.

The effects of some of the less powerful OTC whitening products are likely to wear off in 6 to 12 months. To achieve the same effects, the product must be used again. However, OTC bleaching products create some lasting effects; some of the more effective systems show color changes that last for years. Although teeth will eventually darken again when the product is not used, they will never become as dark as they were originally. “The teeth never get as dark as they were at baseline,” says Dr. Zacharczenko.

Dentists do not recommend prolonged use of any OTC bleaching product because of the danger of tooth sensitivity. Consumers should also consult their dentists if they develop side effects. Pregnant women and young children should not use these products. “Children have very sensitive teeth and should not use anything that could make them more sensitive,” Dr. Zacharczenko says.

Consumers can get better results from OTC products by making sure that their teeth are as clean as possible beforehand. A dental cleaning can actually lighten the teeth one shade and may lessen the need for OTC whitening products, Dr. Gill says. Furthermore, pharmacists should advise consumers to check with their dentists before using OTC products to ensure that there are no cavities or unsound fillings, to determine what type of results can be expected, and to discuss what guidelines should be followed.