Advances in Tooth Whitening

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Introduction
It is generally believed that white stands for brightness, youthfulness and attractiveness. In recent years, the demand for tooth whitening has increased dramatically. Many new home-use products and professional techniques for tooth whitening are being developed. With this increase of interest in tooth whitening, this article aims to review current tooth whitening systems available in the market.

Aetiology and general management of tooth discoloration
Extrinsic: it is due to absorption of chromogens onto salivary pellicle of the enamel surface e.g. tea, tobacco, metal salts, bacteria, etc. It can be removed by a professional prophylaxis and controlled by the regular use of effective toothpastes.

Intrinsic: it refers to discoloration of enamel and/or underlying dentine e.g. aging, trauma, fluorosis, tetracycline, prophyria, etc. Mild to moderate intrinsic discoloration can be managed conservatively by tooth whitening measures. However, severe cases often require more extensive procedures like composite/porcelain veneers or crowns (caps).

Mechanism of tooth whitening agents
Nearly all tooth whitening systems in the market employ the same mechanism - bleaching. These products often contain hydrogen peroxide or carbamide peroxide as the active ingredient. It works by diffusion through the enamel to the dentine where it oxidizes coloured pigments to a lighter colour.

Types of tooth whitening systems
At-home
There are many home-use bleaching products available. The most common one is applying peroxide gel in trays (nightguards) which are worn a few hours a day or throughout the night for several days or weeks depending on the severity of the discoloration. The trays are better to be made by oral health care professionals. Because custom fitted trays can reduce the amount of bleaching agents being used and confine the bleaching gel on the tooth surface without irritating the soft tissues. Nightguard bleaching has been shown to be effective to correct mild to moderate discoloration. However, the acceptance and compliance of using the nightguards may be poor in some patients.

Recently, gel impregnated strips or paint-on gels are developed. The strips are designed to conform to the shape of the teeth. During application, the strip is placed on the front surfaces of the teeth and kept in place by folding it behind the teeth. The peroxide on the gel side of the strip will act on the contacted tooth surface. The strip is left for half an hour and then removed. Any remaining gel can be removed by rinsing or brushing. The strips are applied twice a day for one to two weeks.

Paint-on gels like strips are patient-administered tooth whitening agents. They are peroxide containing gels applying on the tooth surfaces using disposable applicators. The mouth is kept open for thirty seconds while the gel dries. The gel is left for half an hour and the procedure is done twice a day for one week or more.

These new products are handy, convenient and comfortable when being used. Patients can decide selectively to whiten teeth in the aesthetic zone only. However, some moderate and severe discoloured cases may not respond to the treatment.

Whitening toothpastes are also popular in the market. They act either purely mechanically to remove extrinsic stains by the addition of high cleaning silica base or combine with chemical action by incorporating low level of peroxide. Whitening toothpastes work well in mild discoloured cases and may be helpful as a maintenance tool after the bleaching therapy.

In-office
It is carried out at the dental office under the supervision of the dentist. Each visit may take from thirty minutes to one hour. Sometimes it may require multiple visits to achieve a better result. During bleaching, the dentist will apply either a gel or a rubber shield to protect the oral soft tissues. A bleaching agent is then applied on the teeth. In order to activate the bleaching agent and enhance its penetration and action, a special light is often required depending on individual systems e.g. xenon-halogen, gas plasma, metal halide or laser.

Because of using a higher concentration of bleaching agent with better penetration, even some severely discoloured
teeth may respond to the in-office bleaching treatment. The whitening effect is immediate and more long-lasting than at-home bleaching products. The procedure is well controlled with minimal risk of soft tissue irritation or accidental swallowing of the bleaching gel.

Complications

Studies have shown that tooth whitening agents, if used properly, do not cause any systemic problems to the body or deleterious effects to the tooth pulp, tooth structure or existing fillings. However, tooth sensitivity and soft tissue irritation may occur following the bleaching therapy though they are transient and manageable by simple measures.

Conclusions

Tooth whitening agents are effective in managing tooth discolorations. However, it should be stressed that a professional consultation before the use of these products are strongly advised. It is not uncommon to find many perceived tooth discolorations are actually organic dental problems like tooth decay or failed fillings. Dentists can assess each patient’s oral condition and tailor-make the most appropriate bleaching regime. A professional prophylaxis is also helpful to remove the extrinsic stains and enhance the effectiveness of the bleaching agent. Moreover, dentists can monitor the colour changes more objectively, manage any complications arise during bleaching phase and undertake alternative treatment for cases not responding to the treatment.