Management and treatment in tooth discoloration

Buzatu R.[1], Luca M.M.[2], Valceanu A.S.[1], Chirila A.V.[3], Miron M.I.[4]

[1]Department of Dental Aesthetics, Faculty of Dental Medicine, "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania
[2]Department of Pediatric Dentistry, Faculty of Dental Medicine, "Victor Babeş" University of Medicine and Pharmacy, Timişoara, Romania
[3]Young dentist, Privat Ofifice
[4]Department of Oral Rehabilitation and Dental Emergencies, Faculty of Dentistry, "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania

Correspondence to:
Name: Magda Luca
Address: Bd. Revoluţiei 1989, no. 9, Timişoara, Romania
Phone: +40 725724706
E-mail address: luca.magda@umft.ro

Abstract

Recommendations for original studies

Original studies must include a structured abstarct of maximum 150 words, containing the following titles and informations: Aim and objectives; Material and methods; Results; Conclusions; Key words: give 3-5 key words; The abstract will be translated into an international circulation language.

The aims of this study is evaluation of color change and sensitivity that occur in all the teeth. By

Mean, a comparison between 2 main categories of treatment to cure tooth discoloration. In – office bleaching treatment and home bleaching treatments. This article is a systemic review study research.

Bleaching techniques and other methods used for removing discolorations and stains suffered various improvements over the years such as aesthetic outcome and the reduction of secondary reactions. Development of Home Bleaching products is an outcome of improvements made in this domain, though they are not realised by a professionist and do not qualify as quality equal. Therefore, professional bleaching represents an efficient, safe and sustainable method for this kind of therapy, but home bleaching techniques do give relative good results at a considerable lower cost of treatment.

Keywords: Bleaching, Tooth whitening, Home Bleaching, Discolorations, professional techniques

INTRODUCTION

In recent years, cosmetic dentistry has been receiving increasing attention due to the growing interest of patients in the aesthetic appearance of their smile. It is undeniable that today's society is looking for white teeth and attractive smiles. A bright smile is a sociological asset, with a strong psychological impact on the subject himself, but also on the people around him. The natural and aesthetic appearance of a tooth is determined not only by its morphology and its position in relation to the other teeth, but also and above all by its color. Even though the bleaching technique has been known for long time, it was by a handful of practitioners in the past. Like pioneers, they gradually developed and adjusted various techniques. In the 19th century, the use of oxalic acid (Chapple, in 1877) and (Taff and Athenon, in 1879) was proposed for bleaching vital teeth, before hydrogen peroxide was introduced by Harlan for the first time in 1891. However there were also other method has been used in the past such as electric current in 1895 and the application of ultraviolet by Rossental in 1911. In 1918, Abbot used hydrogen peroxide activated by light or heat. This technique was updated by Torres in 1983, and by Goldstein in 1987. Finally, in 1989, the ambulatory techniques by Haywood and Heymann, as opposed to the classic chair side techniques. In the present time, there are 2 techniques that have been outlined, first is Ambulatory or at home bleaching which need to have intraoral device or tray that patient can apply peroxide gel. Second technique is in office by professional technique, dental practitioner will be using photo -activation. This allows the modification in the color of the enamel from the first treatment. [1]

However, many products are commercially available, as are treatments supervised by a dentist, offered to the patient in order to solve a wide variety of dental dyschromias without restorative intervention. Choosing the correct treatment methods, it is important for dental practitioner to understand the etiology and severity of dental dyschromias for the best results and no harm to the dental health of the patient. [2]

Teeth whitening, also called teeth bleaching, is an aesthetic procedure to meet the needs of patients who want to have white teeth. Home-based whitening products with bleaching properties have become popular and accessible to more people because bleaching with bleaching agents can be done at home with prescribed of dentist or purchased over-the-counter. There are many products available on the market today such as hydrogen peroxide, carbamide peroxide, sodium percarbonate, sodium hexametaphosphate, sodium tripolyphosphate, and calcium peroxide. All These agents have a wide range concentrations and characteristics acting as gel in tray, strips, paint-on gel, chewing gum, and mouthwash which have varying application times and duration of treatment. [3]

However, techniques of home bleaching use a low concentration of 10-20% of bleaching agents that's why patients have to do multiple bleaching sessions to achieve satisfactory results. While professional technique in the office, teeth whitening will use about 35% high concentration whitening solution and various technologies. To stimulate the effectiveness of the teeth whitening solution to work better, such as cool light, LED light, or laser light to whiten patient's teeth several shades in one session. [4]

Home bleaching with custom trays (Dentist-supervised home bleaching)

Supervised dental bleaching using dental trays is one of the most commonly used approaches to whiten patient teeth. The technique of tray whitening was first described in dental research in 1989. In 1990s this method became more widespread and it was accepted by dental community as a whole. The advantages of this method are easy to use, less time consuming, cause less sensitivity and gingival irritation when compared to the professional technique of teeth whitening. 10% carbamide peroxide has been the most used for this kind of

procedure. However, increasing the concentration of the bleaching agents have been used or new bleaching agents containing 3% to 10% hydrogen peroxide have been released. Home bleaching with hydrogen peroxide with custom trays was introduced to reduce bleaching time but maintaining the effectiveness. A carbamide peroxide gel containing desensitizing agents that could be applied in a shorter time has also been proposed to reduce the intensity of tooth sensitivity. [5]

Home Bleaching with trays can be done at home following dentist's advice. Before starting process of whitening patient teeth, professional dental hygiene and treatment of any other dental problems like decay or periodontal disease are essential. Next step is making patient's tray. [6]

Even though, at home bleaching with custom trays method is convenience, short time consuming and cheaper than professional (in office) technique. There are still side effects that can be sometimes encountered by the patient. Tooth sensitivity and gingival irritation were the most common side effect that has been reported after bleaching procedure. [7]

Bleaching tray

There are 2 types of bleaching tray that available on the market. Some are thin and hard, it is suitable for treating individual teeth and give a better seal as oxygen release by the active agent is diluted by saliva. There are also standard trays with most bleaching systems which are thicker and softer but it can be used only full arch coverage due to their non-retentive properties. They are less irritating and easier to use for both dentist and patient. [8]

Over-the-Counter Teeth Whitening

In the present time, there are various types of home bleaching products available in the market all around the world. Most of the manufacturers claim that these products It has the ability to make teeth whiter. [9]

Chewing gum

Chewing gum containing sodium hexametaphosphate (4.0 - 7.5%) was added on the market. This product claims to prevent the formation of colored spots on the tooth and whiten teeth. But this kind of product usually doesn't give dramatic results. Whitening chewing gums contain abrasives which scrub the surface of teeth and remove stains. Titanium dioxide and baking soda are also found in whitening gums, it has properties of polishing the surface of the teeth and whitening. Some whitening gums have an ingredient called Calpox or calcium peroxide. It helps oxidize stains, making them easier to remove from the teeth. [10]

Mouthwash

Mouthwashes, or rinsing solutions have recently appeared on the market, and manufacturers say they can remove stains and decrease plaque formation. Usually, mouthwash has a low concentration of hydrogen peroxide and sodium hexametaphosphate can also be included in the formulation. [11]

Dental floss

Whitening dental floss has been created by manufacturers to promote reduction of colorations in interproximal areas. The shrinkage properties of stains are associated, by the presence of silica in the composition, with properties abrasive at the superficial level when applied in the interdental region. [12]

Toothbrush

In addition to being used as part of normal oral hygiene, the toothbrushes manual and electric teeth can also be used to maintain a brightening effect or to prevent extrinsic staining after bleaching treatmen. [13]

Toothpaste

Toothpastes claiming whitening properties represent more than 50% of products available over the counter and rarely contain sodium peroxide carbamide or hydrogen, or any other kind of bleaching agent. Their ability to removing stains is linked to the large amount of

abrasive elements contained in their formulation, which eliminates extrinsic superficial colorings. The active components of "whitening" toothpastes include enzymes that break the organic molecules of the biofilm. In addition, abrasives such as alumina, dehydrated dicalcium phosphate, and silica are also included in the formulation to help eliminate discoloration. However, the abrasiveness of these toothpastes must be moderate in order to prevent excess wear of the underlying enamel and dentin. [14]

Varnish (paint-on-gel)

Whitening varnishes are lightening products available in the market that have carbamide or hydrogen peroxide in suspension. The varnish is affixed to the surface of the teeth with an applicator, usually comparable to brush, and will adhere to the surface of the enamel. [15]

Universal trays with commercial gel

We can now find in shops or on the internet imitating the ambulatory technique proposed by dental surgeons. These are universal thermoformable trays that the user adapts himself to his teeth after having immersed them for a few seconds in the water. Heat making them soft and pliable. Then immediately places them in mouth, compresses them with his fingers so that they take the shape of the teeth; and wait a few minutes for them to harden. [16]

Once the trays are molded, they can receive a bleaching gel, most often containing carbamide peroxide, but the concentrations of which are rarely indicated. Manufacturers claim results comparable to professional outpatient treatment. [17]

Whitening strips

These products were created to avoid the use of trays. Those are adhesive strips with bleaching agents contained in a very viscous in a thin layer on the adhesive side of the strip. They are bonded to the buccal surface of the maxillary anterior teeth and mandibular, usually up to the first premolar, and have a small flap folding over the lingual surface. The active agent, applied evenly to the surface teeth, is hydrogen peroxide in concentrations ranging from 5 to 14%, and is released over relatively short periods of time, ranging from 5 to 60 minutes. [18]

Professional techniques (In-office)

In office bleaching technique was introduced in the last two decades, It is a technique that can be offered in certain severe cases or in patients in a hurry wishing to limit the treatment in the time.

This technique has a faster result, the control of the contact of agents with soft tissues and that of the possible ingestion of product. [19]

Many techniques have been developed since the 1970s. However, they all consist of the application of a product highly concentrated in hydrogen or carbamide peroxide directly on the pulped teeth after protection of gum tissue. The concentrations are generally 35% for carbamide peroxide, and can range for 15 up to 35% hydrogen peroxide. [20]

Today we have them often found in the form of ready-to-use gels, packaged in a single or two tanks. The new generations offer a higher viscosity. The principle active agent can be combined with a copolymer, with sodium and calcium fluoride, as well as for some, to titanium dioxide. [21]

Some of these adjuvants give the gel a putty consistency and a color, which allows to visualize and control the excess at gum level. There are also products in powder and liquid form to mix, considered to be more stable, and used in particular in the Baratieri technique: the mixture has the property of changing color; turquoise green at the start of activation, it turns white when no longer active, indicating that it needs to be renewed. [22]

These various techniques are distinguished by the specific products used, but are also

characterized by specific activation systems and protocols precise operating procedures. So today we find many modes of activation of peroxides of hydrogen, which accelerate and potentiate the lightening effect. AT the origin we used the classic halogen lamps intended for the photopolymerization composites; then appeared high-energy lamps: halogen, plasma, laser, xenon, UV; which allow both arcades to be illuminated simultaneously. Currently we even find methods using chemical or ultrasonic activators.

In all cases, the important thing is to have a good match between the chosen gel, its

concentration, and its mode of activation, which must be adapted in terms of power and wavelength. [23]

Aim and objectives

The aims of this study is evaluation of color change and sensitivity that occur in all the teeth. By mean a comparison between 2 main categories of treatment to cure tooth discoloration. In – office bleaching treatment and home bleaching treatments.

MATERIAL AND METHODS

This article is a systemic review study research. This literature review was carried out in two stages.

The first search was in January to February 2021 on the professional bleaching techniques and its efficient, including adverse effect. A comprehensive search was perform on vary of textbook and from sites such as Pubmed, Web of science, Scopus, Cocharane, reserchgate and Springer link.

The studies was searched in 2 languages: English, French. The following keywords:

Whitening, bleaching, tooth whitening, home bleaching, professional technique, discoloration, commercial whitening product.

All the researches were from 2011 to 2020. The studies that was included in this thesis were Meta-analyzes and systematic reviews, Critical reviews, longitudinal studies and case reports. When there was limited literature to find on a topic, case reports were used. We have also used relevant books to complement some topics.

Then, from March to May 2021, the same research on the home bleaching techniques. Which performed in the same databases and concerning the same types of articles with the search equation.

Exclusion and Inclusion criteria

Inclusion criteria

1. The studies from the year 2011 to 2020
2. Articles evaluating the efficiency of different bleaching product
3. The studies that has the result or descried the efficient of one of bleaching technique
4. The studies that contain the adverse effect of bleaching technique

Exclusion criteria

1. Studies that are too old. Or the studies that contributed for more than 10 years
2. Articles like product advertising
3. The articles that are in other languages

Data collection

A first selection was made using the titles of the articles. Subsequently, the abstracts were analyzed to keep Meta-analyzes and systematic reviews, Critical reviews, longitudinal studies and case reports. Comparing between profession bleaching technique and home bleaching technique. Finally a search manual was carried out using the sources contained in the selected journals and not detected by the search equation.

RESULTS

Effectiveness of professional techniques

As part of clinical research (BIZHANG, CHUN and DAMERAU, 2011), two professional whitening systems were compared: one is a treatment outpatient (Illumine Home, a 10% carbamide peroxide gel worn at night in a splint for two weeks), the other a chairside treatment (Illumine Office,15% hydrogen peroxide gel in a tray for 45 minutes, three times every three weeks). It emerged that the two treatments allow to evenly to brighten teeth and maintain results beyond three months.

Similarly, a recent study (DAN, et al., 2012) comparing a treatment outpatient (10% carbamide peroxide gel worn at night in a gutter) and chairside treatment (25% hydrogen peroxide gel for one hour) shown that 5 days of outpatient treatment at home produces the same clarification than a one-hour chair treatment session. However, the patients in the trial said they preferred outpatient treatment, especially for convenience.

In 2011, Kim (Kim, et al., 2011) demonstrated that wearing during the night of a splint with 15% carbamide peroxide produced lightening significantly more than 10% carbamide peroxide gel.

However, a similar comparison (MATE, et al., 2015) showed that the difference obtained by the use of these two agents became insignificant if the study was continued for a further 4 weeks.

Gerlach (GERLACH, GIBB and SAGEL, 2011) compared three concentrations different

carbamide peroxide applied for two hours a day and not noted no difference in results between 10% and 15% carbamide peroxide, but a statistically significant color difference between 10% and 20%, and between 15% and 20%.

Effectiveness of over-the-Counter teeth whitening

By Evaluation of different commercial products

- **Chewing gum**

A study (GRAND and PAIGE, 2015) showed that chewing gum whitening containing sodium hexametaphosphate reduces the formation of stains by 33% compared to a treatment without chewing gum.

However, another study (MASON, HANA and SAMANTHA, 2012) comparing the ability to eliminate coloring of two chewing gum containing nicotine with a chewing gum whitening has shown that the former were more effective in the removal of extrinsic stains as lightening chewing gum.

- **Toothpaste**

In addition, an in vitro study, published in Brazilian Oral Research (LIME,

SILVA and AGUIAR, 2018), sought to determine the whitening potential of three toothpastes compared to a placebo. Twenty bovine incisor blocks, including enamel and dentin, were randomly divided into four groups: G1 distilled water, G2 Colgate Regular toothpaste, G3 Crest Extra Whitening toothpaste, G4 Rapid toothpaste White. The teeth were stained by immersion in black tea, then brushed by a electric toothbrush with the corresponding toothpaste. After analyzing the photo reflectance, only Rapid White toothpaste was found to be effective in removing extrinsic stains, while there were no notable differences between the control group and Colgate Regular or Crest Extra Whitening.

In another study examining the effectiveness of stannous fluoride toothpaste and sodium hexametaphosphate (HE, BAKER and BARTIZEK, 2019), the tests demonstrate a significant effectiveness of this type of toothpaste in removing stains extrinsic colors.

- **Varnish**

Concerning varnishes, some authors (HAMAYASHI and YAKIBANI, 2019) estimate that the application of a 6% hydrogen peroxide gel by a paint-on-gel system shows significant

clinical results, whether applied by a practitioner in the office or by patients themselves at home.

The trial of a new varnish (ZIRRY, et al., 2016) containing peroxide 8% carbamide has been shown to be effective, with an improvement of two shades on the Chromascope shade guide.

Another study (KISHA, et al., 2016) compared four varnish. Of the four, only two, the Crest Night Effects and the Colgate Simply White, managed to brighten teeth significantly, unlike Beautifully Bright and Sparkling White, without effects after two weeks of treatment.

• **Strips**

In 2012, 30 students from a university in Mexico City participated in an essay on Crest

White strips Professional 6.5% Hydrogen Peroxide Strips. He was demonstrated a very significant improvement in the color of the teeth after three weeks of use (GURRABIRO, et al., 2012).

Another study, conducted in 132 children and adolescents, also showed that the strips were an effective means of tooth whitening (DONLY and GERLACH, 2012).

In a study followed over a somewhat longer term, Gerlach reported that six months after treatment using Crest Whitestrips, most teeth had retained their color improvement, significant compared to the initial situation or the placebo group. On the other hand, it turned out that younger subjects showed initially a greater decrease in yellows compared to older subjects, but after 6 months there was no longer any color difference between young and old subjects.

Comparison of professional and over - counter methods

Aushill's study (AUSCHILL, HELLWIG and SCHMIDALE, 2015) aimed to assess the ability of three different lightening techniques to clarify the teeth of 39 patients in 6 shades on the Vita Shade Guide shade guide. Group A (n = 13) has used commercial whitening strips (Hydrogen peroxide whitestrips at 5.3%, twice 30 minutes per day), group B (n = 13) outpatient system Opalescence PF, a 10% carbamide peroxide gel wore overnight for eight hours in a custom-made gutter in the laboratory after alginate impression mouth of the patient, and group C (n = 13) was treated in the chair with the Ultra system Opalescence boost with 38% hydrogen peroxide applied to the surface vestibular teeth for 15 minutes, the gum protected by a dam. All treatments cleared the teeth to six shades, but at different speeds. It therefore took an average of 31 strips of use cycles to achieve this result, about 7 for outpatient treatment, and only three chairside treatment sessions. So the speed of action seems directly linked at the concentration of lightening agent.

In another study (FERRARI, M., CAGIDIACO, 2017), the Opalescence outpatient treatment system (a gel containing 10% carbamide in a suitable gutter) was confronted with Crest Whitestrips (6% hydrogen peroxide strip). Using these 30 minute treatments per day for two weeks in both cases cleared the teeth, but with significantly better results with strips. However, it should be noted that in this study the strips benefited from a larger quantity of agent brightening, since the 10% carbamide peroxide of the Opalescence system corresponds in terms of peroxide ions released to 3% hydrogen peroxide (compared to 6% for the strips tested here). Likewise, Crest 6.5% Hydrogen Peroxide Whitestrips have been compared to the Nite White Excel system, a 10% carbamide peroxide gel in a suitable gutter. Once again, the strips have shown effective superior in terms of clarification, but again they were more concentrated in agent lightening than the gel of the gutter (KARPINIA, MAGNUSSON and SAGEL, 2012) (GERLACH, ZHOU, 2012).

Thus, another study (GERLACH, GIBB and SAGEL, 2012) undertook to compare Whitestrips Crest (with 5.3% hydrogen peroxide) with the Opalescence system but with different levels of carbamide peroxide concentration: 10, 15 and 20%. If the concentrations at 10 and 15% did not reveal any significant differences with the strips, the 20% Opalescence gel

on the other hand provides a significant lightening greater than that resulting from the use of Whitestrips.

Similarly, two professional techniques tested by Bizhang (outpatient treatment with 10% carbamide peroxide gel worn at night in a splint for two weeks; and chairside treatment with peroxide gel 15% hydrogen in a gutter for 45 minutes, three times every three weeks) after 3 months show better results than Crest Whitestrips, 6% hydrogen peroxide lightening strips, available over the counter (BIZHANG, MIN and HAMAYACHI, 2011).

Likewise, the study of Woo (WOO, 2013) found a significant difference between the use of Day White gel with 16% carbamide peroxide and that of strips with 6.5% hydrogen peroxide, in favor of gel in the gutter, even though it delivers a lower amount of peroxide ions. It is therefore interesting to carry out the meta-analysis of these comparisons between whitening strips (hydrogen peroxide concentrations 5.3 to 6.5%) and gel in a trays with three levels of carbamide peroxide concentration: 10, 15/16 and 20%. Strips are thus significantly more effective than trays with gel when this contains 10% carbamide peroxide, but the gel becomes significantly more effective when the carbamide peroxide reaches 20%.

In view of all these studies, we can conclude that the whitening strips represent the most effective solution among the techniques available in commerce, which in some cases can even compete in efficiency with professional techniques. However, it is all a question of the concentrations of bleaching agent, and at high levels, especially in the case of colorings supported, professional techniques remain the first choice solutions; the ambulatory technique is also the preferred one, because it is better supported, by patients.

DISCUSSIONS

In the present time, manufacturers have been able to develop a complete range of bleaching products, available in supermarkets or on the internet, within the reach of all patients. Easy to use, the most efective use the same active ingredient, hydrogen peroxide as professional products. [24]

Logically, by using identical molecules, these products in some cases provide results similar to those of the Professional treatments. Everything is a question of the choice of system (Tray, strips, direct application on the teeth), application time, treatment duration, but above all concentration. The dosage between concentration of the bleaching product and processing time is especially important. In any case, some systems available in the trade, in particular lightening strips, can provide, from a certain concentration of active principle, results deemed satisfactory in terms of for clarification. [25]

The undeniable advantage of these commercial techniques lies in the cost of significantly lower treatment for the patient. Indeed, the price of the systems of whitening available over the counter is in a range of 10 to 60 euros, a session in a "smile bar" costs on average 79 euros, while the price of whitening treatment in a dental office generally varies between 400 and 800 euros. We can thus understand the enthusiasm of patients for these treatments do-it-yourself alternatives. [26]

In term of quality of treatment and great result, Professional treatments will always have a primary advantage: the knowledge and experience of a dentist. As has already been demonstrated, this knowledge often plays an essential role in the success of a whitening treatment. They are in particular a guarantee of quality. Only the dentist is able to make the etiological diagnosis and to identify the various interacting factors in a whitening treatment, such as the presence of restorations, crowns, pulped teeth etc. Once all these elements are in hand, he will be able to propose the most suitable treatment. Indeed, each case of clarification is specific, and it is nonsense to sell universal solutions as is done in shops. [27]

Expertise and medical knowledge for a precise treatment, in addition to this qualitative aspect, it must also be admitted that only recourse to the dentist guarantees all the safety conditions necessary for the smooth running of the treatment.

However, this duality in terms of quality in the treatment offer the pernicious thing about this clarification is that it creates a two-tier system of care. Patients who cannot afford the treatments provided by a dental surgeon, or not having understood the interest, expose themselves to significant risks related to the insufficiently controlled use of highly active products. They are not able to avoid the various pitfalls inherent in this type of treatment. Many the authors warn against certain abuses, which may in particular lead to overdoses, patients sometimes combining treatments (for example sessions in smile bar accompanied by a treatment with strips at home). [28]

CONCLUSIONS

The many improvements made to bleaching dental techniques have led to the development of a wide range of products, putting a consumer increasingly demanding in terms of aesthetics in front of a complex choice when he decides to lighten his smile. He can thus call on a dental surgeon and in this way trust the expertise of a professional enlightenment professional, or rely on a more economical solution by choosing one of the many systems today delivered in the trade.

The treatments offered by dental surgeons are techniques proven to be effective for some time. They also benefit from the practitioner control, guaranteeing real safety. We can note a preference for outpatient treatment, less aggressive while treating the tooth more depth, and offering the advantage of being carried out in the patient's home. Faced with these professional means, there is a large number of techniques in over-the-counter, with a wide variety of effectiveness levels. If some products have unsatisfactory results, such as mouthwashes or chewing gum, others with contrary allow a real clarification. These include gutters universal combined with a peroxide gel, inspired by outpatient treatments professionals, and lightening strips or "strips". Along with these DIY techniques a new type of business has developed, bars smile, copying the methods of dental surgeons, without however benefiting from the knowledge necessary for their perfect mastery.

Indications for the appropriate use of methods and products teeth whitening are dependent on a correct diagnosis of dyschromia. The treatments should therefore imperatively be supervised by a practitioner, able to confirm the indication, prepare teeth for treatment, monitor the effects secondary, choose the appropriate method and products, and prepare, if necessary, perfectly adapted gutters; in order to maximize benefits while decreasing the harmful effects.

On the other hand, if, according to the literature, the risks associated with these techniques appear to be limit to dentinal hypersensitivities and transient mucosal irritations, it However, it should be noted that many of these studies show significant biases, because sponsored by pharmaceutical producer groups, and what is more on very short observation periods. Many authors warn against drifts and excesses linked to the trivialization of the use of these very corrosive substances by inexperienced people.

These treatments can therefore only be considered as a comprehensive therapy including a specific examination and full patient care, bringing together all the medical aspects of dental treatment. This aspect has led various countries to strengthen their regulations. So the UK health department has already banned preparations containing more of 0.1% hydrogen peroxide, while in the United States, the birthplace of development of over-the-counter dental whitening, American Dental Association has published recommendations that must meet the products for clarification. Finally, in response to concerns surrounding the

use unfortunate lightening substances, the decision taken by the European Union to reserve to dental surgeons only the delivery of products containing more than 0.1% hydrogen peroxide constitutes, if necessary, a recognition of the practitioner's authority in dental whitening.

Different treatment modalities are available to the patient designing a whiter smile. Tooth sensitivity and gingival or mucosal irritation are the most common side effects of vital tooth-bleaching. However, ADA recognized products tend to include agents to minimize or

prevent these side effects. Dentists should educate themselves to be able to inform their patients about the benefits and risks of different whitening methods based on the current scientific evidence and to suggest the best treatment option based on a correct diagnosis.

REFERENCES

1. Lajnert V, Pavičić DK, Gržić R, Kovač Z, Pahor D, Kuis D, et al. Influences of age and maxillary anterior teeth status on patient's satisfaction with dental appearance and tooth colour. Gerodontology. 2012;29(2):e674-679.
2. Al-Zarea BK. Satisfaction with appearance and the desired treatment to improve aesthetics. Int J Dent. 2013;2013:7.
3. Tin-Oo MM, Saddki N, Hassan N. Factors influencing patient satisfaction with dental appearance and treatments they desire to improve aesthetics. BMC Oral Health. 2011;11:6.
4. Berteretche M-V. Esthétique en odontologie. Editions CdP; 2014. 240 p.
5. He L-B, Shao M-Y, Tan K, Xu X, Li J-Y. The effects of light on bleaching and tooth sensitivity during in-office vital bleaching: a systematic review and meta-analysis. J Dent. 2012;40(8):644-53.
6. Alqahtani MQ. Tooth-bleaching procedures and their controversial effects: A literature review. Saudi Dent J. 2014;26(2):33-46.
7. Buzek J, Ask B. SANTÉ ET CONSOMMATEURS: RÈGLEMENT (CE) No 1223/2009 DU PARLEMENT EUROPÉEN ET DU CONSEIL du 30 novembre 2009 relatif aux produits cosmétiques. Rev Droit Union Eur. 2013;(4):827.
8. de Araújo LSN, dos Santos PH, Anchieta RB, Catelan A, Briso ALF, Zaze ACSF, et al. Mineral loss and color change of enamel after bleaching and staining solutions combination. J Biomed Opt. 2013;18(10):108004–108004.
9. Monteiro D, Moreira A, Cornacchia T, Magalhães C. Evaluation of the effect of different enamel surface treatments and waiting times on the staining prevention after bleaching. J Clin Exp Dent. 2017;9(5):e677-81.
10. Côrtes G, Pini NP, Lima DANL, Liporoni PCS, Munin E, Ambrosano GMB, et al. Influence of coffee and red wine on tooth color during and after bleaching. Acta Odontol Scand. 2013;71(6):1475-80.
11. GERLACH, R.W., BARKER, M.L. Clinical response of three direct-toconsumer whitening products: strips, paint-on gel, and dentifrice. Compend.. contin. educ. dent. 2011; 24 (6): 458, 461-464, 466.
12. GERLACH, R.W., BARKER, M.L. Clinical response of three direct-toconsumer whitening products: strips, paint-on gel, and dentifrice. Compend.. contin. educ. dent. 2003; 24 (6): 458, 461-464, 466.
13. Feiz A, Khoroushi M, Gheisarifar M. Bond Strength of Composite Resin to Bleached Dentin: Effect of Using Antioxidant Versus Buffering Agent. J Dent Tehran Iran. 2011;8(2):60.
14. Anil M, Ponnappa KC, Nitin M, Ramesh S, Sharanappa K, Nishant A. Effect of 10% Sodium Ascorbate on Shear Bond Strength of Bleached Teeth - An in-vitro Study. J Clin Diagn Res JCDR. 2015;9(7):ZC31-33.
15. Miranda TAM, Moura SK, Amorim VH de O, Terada RSS, Pascotto RC. Influence of exposure time to saliva and antioxidant treatment on bond strength to enamel after tooth bleaching: an in situ study. J Appl Oral Sci Rev FOB. 2013;21(6):567-74.

16. Niat AB, Yazdi FM, Koohestanian N. Effects of drying agents on bond strength of etch- and-rinse adhesive systems to enamel immediately after bleaching. J Adhes Dent. 2012;14(6):511-6.
17. Bahari M, Alizadeh Oskoee P, Savadi Oskoee S, Pouralibaba F, Morsali Ahari A. Mercury release of amalgams with various silver contents after exposure to bleaching agent. J Dent Res Dent Clin Dent Prospects. 2016;10(2):118-23.
18. Bacaksiz A, Tulunoglu O, Tulunoglu I. Efficacy and Stability of Two in-Office Bleaching Agents in Adolescents: 12 Months Follow-Up. J Clin Pediatr Dent. 2016;40(4):269-73.
19. Carey CM. Tooth Whitening: What We Now Know. The journal of evidence-based dental practice. 2014; 14(Suppl): 70-76.
20. Conseil de l'Europe. Directive du Conseil 2011/84/UE du 20 septembre 2011 modifiant la directive 76/768/CEE relative aux produits cosmétiques en vue d'adapter son annexe III au progrès techniqueTexte présentant de l'intérêt pour l'EEE en ligne. 2011 (consulté le 16 août 2015). Publication no.: 32011L0084. Disponible sur: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:283:0036:0038:FR: PDF
21. France. Décision du 9 juillet 2013 portant suspension de la mise sur le marché, de la distribution, de l'exportation, de l'importation, de la fabrication, de la détention en vue de la vente ou de la distribution à titre gratuit et de l'utilisation de produits mis sur le marché sous le statut de dispositifs médicaux destinés à être utilisés sur la face externe des dents en vue de les blanchir ou de les éclaircir, interdiction de ces mêmes activités pour d'autres de ces produits et retrait de ces derniers en ligne. 2013 (consulté le 16 août 2016). Publication no.: AFSM1300149S. Disponible sur http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000026380863&dateTexte=&categorieLien=id.
22. Madhu KS, Hegde S, Mathew S, Lata DA, & Bhandi SH. Comparison of Radicular Peroxide Leakage from four Commonly used Bleaching agents following Intracoronal Bleaching in Endodontically treated teeth - An In Vitro Study. Journal of International Oral Health: JIOH. 2013; 5(4): 49-55.
23. Ministère des affaires sociales, de la santé et des droits des femmes. Quelles sont les techniques et produits utilisésen ligne. 2011 (consulté le 1 septembre 2015). Disponible sur: http://www.sante.gouv.fr/quelles-sont-les-techniques-etproduits-utilises.html.
24. Scientific Committees. Formule structurelle du peroxyde de carbamideen ligne. (consulté le 19 août 2015). Disponible sur: http://www.google.fr/imgres?imgurl=http%3A%2F%2Fec.europa.eu%2Fhealth%2Fopinions%2Ffr%2Fblanchiment
25. Cocquet M, Delhommais P.-A. Au bon vieux temps. Éditions de l'Observatoire.2018. 26. Debussy T. Les Botot et l'eau eponyme. Actes. Société française d'histoire de l'art dentaire, 2014, 19.100-106.
26. Fournier J.-P. Une histoire industrielle: "les dentifrices du docteur Pierre". Actes. Société française d'histoire de l'art dentaire, 2011, 16.53-56.
27. Briso A, Rahal V, Sundfeld R, Santos P dos, Alexandre R. Effect of Sodium Ascorbate on Dentin Bonding After Two Bleaching Techniques. Oper Dent. 2013;39(2):195-203.