Epilogue

The idea of this dental bleaching special issue was conceived more than a year ago. The idea came about because dental bleaching is not a required curriculum topic, but much requested by dental students and private practitioners. Many dental personnel lack up-to-date knowledge about the appropriate application of dental bleaching. Though there are no laws in the US that require certification of dentists to perform bleaching, proper training is the best way to achieve competence and keep patients safe.

Our first task was to seek sponsors and to contact potential guest editors. We were fortunate to have Drs. So Ran Kwon and Michael Meharry on board early in the project. They helped to suggest names of experts and reviewed the bulk of the manuscript submissions.

The next task was to invite international experts in the field to contribute. There were certainly ups and downs. Some experts who promised to contribute were delayed because of special circumstances. In the end, we were lucky to have contributions covering the topics that we were interested in.

We deliberately put ethics as the opening article. We routinely see general practitioners advertising using free examination and/or dental bleaching as a loss leader to attract new patients. Questions that need to be addressed are "do all patients really need bleaching?" and "are we doing the patient a service?"

Artificial Intelligence (AI) needs special mentioning. AI is touted as the leading disruptive force in dentistry because it has the potential to significantly improve diagnostic accuracy, treatment planning, and analyses of large volumes of dental data with greater precision, enabling personalized treatment approaches. The AI article on bleaching looked at the validity of information patients can check on the internet, the proper methods to incorporate AI in dental education and the proposal to utilize large volumes of dental image data to predict bleaching treatment outcomes.

LED light source for dental bleaching in theory acts as a secondary energy source to potentiate and accelerate the bleaching action through their photochemical impact on the tooth surface. Much depends on the power and wavelength compatibility of the specific LED. The use of the LED light may arise first as a gimmick pushed by marketing and patient demands. Many of the devices that one can get from online shopping seem to be too weak in power to affect any meaningful bleaching actions.

The American Dental Association research has found that using an LED light to whiten teeth will result in an initial shade change which is mainly caused by tooth dehydration and will reverse after time. Pulpal irritation and tooth sensitivity may be higher with the use of bleaching lights or heat application. In fact, the effects on tooth color change were variable in studies carried out, and some differences were not detectable visually. Long term clinical studies are needed to confirm the usefulness of LEDs.

Charcoal toothpaste with whitening power is a product that defies logic. One must fight discoloration by incorporating an ingredient that is dark in color. Again, controversies exist, and we are just introducing the readers to the possibility. One major US oral health product company has aggressively marketed such a product so there must be some magic behind the concept.

One important issue concerning dental bleaching is that of public safety. To add to the confusion, the European Union regulations are much stricter than those in the USA. FDA classified dental bleaching as a cosmetic procedure and not under its supervision. We often see advertisements on cruise ships and shopping kiosks recruiting clients for "teeth whitening". They are careful with the terminology since according to the FDA, whitening restores natural tooth color and bleaching whitens beyond the natural color.

There is no doubt that hydrogen peroxide is effective in teeth whitening. The public must be reminded that tooth bleaching involves basic chemistry and is often not readily reversible. Side effects such as gum irritation and tooth sensitivity come with improper diagnoses. Therefore, ongoing searches for substitutions for hydrogen peroxide and its derivatives must be encouraged and supported. Recently, the search for substitutes included the family of natural remedies which usually involved long-chain carbon molecules. Such large organic molecules invariably are less effective in teeth whitening but may cause less sensitivity. Of these non-peroxide bleaching agents, a longtime reducing agent used primarily in the paper pulp industry showed promising laboratory data. Currently, there are multiple ongoing clinical studies and we will wait for conclusive clinical data to help guide us.

Lastly, I would like to thank all the contributors and the editorial staff at the *American Journal of Dentistry* who were so patient with us through this process. Without them, the issue would not be possible.

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