Title: Dental Science of Tooth Whitening Wizardry: A Patient’s Perspective

Introduction:
Shirley: Margaret J. Fehrenbach, RDH, MS is from her home office in Seattle, Washington. She is a Dental Science Writer because she is also an Oral Biologist and Dental Hygienist. Oral Biology is the study of life in the mouth!

Margaret has written professional dental textbooks and journal articles as well as consumer guides to dentistry. Her latest project is providing education to dental professionals via webinars.

Margaret: Hey Shirley…

Shirley: Why do you use the term whitening and not tooth bleaching?

Margaret: Using the term ‘whitening’ sounds more positive than calling it ‘bleaching’, so it is more frequently used by dental professionals, even when describing products that contain bleaching agents.

Of course, one would never use actual bleach to whiten their teeth… (Chlorox company states on their website that its bleach is “not for personal usage”.)

In this positive mode of thought, I would like to discuss whitening from the PATIENT’S PERSPECTIVE today, using less jargon and more useful information to share- we will make it a form of role playing for the Dental Office!

Shirley, you play the patient in the chair, and I will be the chairside dental hygienist. (I was once in the play “Odd Couple” in high school and of course, I played the clean one!). An additional transcript of today’s discussion to use for patient care on tooth whitening will be available on my website at http://www.dhed.net/ as well as an Archived Podcast at http://www.blogtalkradio.com/shirdent1/2013/04/30/tuesday--one-more-thing on your website Shirley.
Patient in the Chair: Why should I consider tooth whitening?

Chairside DH: Tooth whitening represents the safest, most effective, and economical method for one’s smile enhancement. It is SO true that a more attractive smile has a tremendous impact the quality of a person’s life.

Many people want to have tooth whitening done but are often too embarrassed to ask or feel that they are being vain in having tooth whitening done. To forestall all this patient angst, I usually start all my mouth related discussions about how the person feels about their mouth right at the first appointment with the patient: “Is there something you would like to change about your mouth?” Nine times out of ten, the person says whitening my teeth and studies back this up.

And additional studies show that people with whiter teeth tend to take better care of their mouth (just like watering a green lawn as opposed to a brown one.)

Also as we get older, our underlying tooth materials gradually take on a yellowish hue. We don't know yet what causes this tooth yellowing at this time. But it is true that those with whiter teeth are perceived as younger than those with less desirable yellowed smiles. Yellow teeth, as well as stained teeth, can add up to 20 years to a person’s perceived age.

Patient in the Chair: What makes the color of my teeth?

Chairside DH: It is important to know that the teeth display a wide range of shades of white. There is no one specific color which a person's teeth are supposed to be. Some person's teeth are just naturally lighter in color than others.

Thus the overall coloration of teeth is influenced by a multitude of factors. It is important for your dental office to determine the possible causes of tooth discoloration. Shade guides are used to help with this; these are hand-held displays of wide ranges of tooth colors. (The dentist also uses them in choosing caps/crowns and other tooth-colored filling shades.) Having an idea of what has caused the discoloration will help estimate how much lightening the teeth whitening process can be expected to achieve.
Over time teeth tend to get in contact with lots of staining materials causing an external stain. Thus the degree to which a person's teeth will stain can often be related to the amount of repeated exposure they have had to chromogenic agents such as tobacco, coffee, red wine, tea, and dark colas. Usually this type of stain is compliant to whitening if the stain has not entered worn tooth areas such as the grinding surface. Recessed gums often reveal their yellowish root surfaces at the gumline. That yellow color at the gumline has proved difficult to whiten as well.

Some stains are internal such as such as exposure to certain medicines as a child, while their tooth enamel was initially forming. One family of antibiotics, the tetracyclines, is known for causing brown internal stains. This type of stain can be resistant to whitening (We will discuss this more in just a moment.)

A grey tooth shade is perhaps the most difficult color to remove from teeth and often is found in the older people as well as redheads. This is not to say that dramatic results cannot be achieved with grayer teeth, just that extended time may be required.

A single tooth can become darker than its neighboring teeth. This is very common in a tooth that has had a root canal with endodontic treatment, leaving the tooth nonvital but still functioning for chewing, which will darken as years pass. Or teeth that have a history of having been traumatized will often darken with time too. This type of stain can be almost impossible to whiten without special treatment internally by the dentist.

Patient in the Chair: What really happens during tooth whitening?

Chairside DH: The tooth enamel is made of rod-shaped crystals that can be visualized as tightly packed spaghetti. However, there are spaces between the spaghetti where stains from the chromogenic agents occur; we call them interprismatic spaces due the crystalline nature of enamel. Oxygen radicals from the peroxide in the bleaching agents come in contact with stains in the spaces within the enamel layer. When this occurs, stains will be whitened.

The teeth appear also lighter in color. As stain dissolves, this surface also becomes more OPAQUE reflecting light while keeping the underlining stained tooth structure from showing through. Thus, not only do teeth appear whiter, they now reflect light greatly making teeth appear brighter as well.
The spaces in the tooth contain water from your spit. The bleaching agent then displaces the water and begins to change the color of the enamel from within. The teeth are then flushed with more water from your spit and the bleaching agent is driven out. This process of whitening can dry the teeth out making them look *chalky* but it is only temporary as the spit begins to fill in again. (Just like carpet cleaning, which can scarily expand your carpet for a short time- they should let us know that can happen!)

**Patient in the Chair: What about my fillings (or restorations) during tooth whitening?**

**Chairside DH:** Whitening may not really enhance the person’s smile if they have had caps/crowns, veneers, or tooth-coloring fillings/restorations placed on the front teeth. Since the *whitener will not affect the color of these materials*, they will **STAND OUT** in the newly whitened smile; this results in what is frequently called "*Technicolor Teeth.*" (Not a good thing, unlike entering Oz with Dorothy in the Falling House). In these cases, it is recommended that they may want to **investigate other options**, like caps/crowns, porcelain veneers, or dental bonding.

Importantly, during most cases of extensive dental work, a person's teeth should be **whitened first** and then afterwards their dental work replaced so to match the new shade of their teeth. It is important to **wait 2 weeks** after whitening before a filling/restoration is replaced in order to give time for the shade of the whitened teeth to **stabilize** (as discussed earlier). This will also allow the peroxide from the bleaching agent to diffuse out of the teeth, which will also give better restorative bonding.

**Patient in Chair: Is it best to my mouth cleaned before whitening the teeth?**

**Chairside DH:** It is best to FIRST schedule with me, the dental hygienist, to have surface stains and tartar removed so that the teeth are **thoroughly clean and the gum tissue is healthy**. After all, there is little point in spending all that time whitening stains and tartar that could have been easily removed before we start whitening. And the gum tissue may be too sore for comfortable whitening until all the tooth deposits are removed!
Patient in Chair: What kind of whitening is usually done in a dental office?

Chairside DH: The most common technique uses a plastic tray that has been custom made so it fits comfortably over a person's teeth. At home, the person places bleaching agent into the tray and the tray is then worn for multiple hours a day, and for some weeks, as the effects of the whitening process take place over time. This tends to be a moderate level of financial commitment. For trays, the maximum results occur over the next 14-21 days and then are continued for difficult case levels.

Compared this to OTC boil-and-bite trays and painted on gels that let spit and the bleaching agent mix together and ooze throughout the mouth; these are not very comfortable and not very effective.

Fully done in-office procedures can be more complicated and expensive but do result in dramatic results. The staff can use products to cover the gum tissue as they apply the bleaching agents at higher percentages for short times, and using lights to activate the agents. Sometimes the two procedures, in-office and at-home are combined for best results.

The OTC whitening strips are the lowest cost whitening solution, but they take longer than in-office or at-home treatments done by the dental office. The manufacturer acknowledges that the whitening benefits are significantly less than those provided by custom-tray whitening. The whitening strip is placed onto the teeth for about 30 minutes and then removed, brushing off the excess material.

The problem is that the whitening strip can slip, reducing its effectiveness. Coverage is one-size fits all so it only works if teeth are perfectly aligned. These can be used only on the front teeth, so they're not right if the person has a super-wide, molar-baring smile like Taylor Swift (enjoy your next boyfriend Taylor, we all will enjoy your next songs too...)

However, the OTC whitening strips are great for young adults who are growing and those who may not be ready for at-home trays or in-office whitening. And it is a choice if the person wants to touch up the whitening procedure that is a few years old or if the teeth are not significantly stained.
What about the painted on whitening being sold on home shopping networks? Studies show around 99% of the painted on bleaching agents is actually washed away from the tooth surface within the first 5 minutes of its placement. Many work quickly by being acidic too, causing tooth damage.

**Patient in Chair: How good is teeth whitening done by a dental office?**

**Chairside DH:** *Using custom patient trays shows that over 20%* of the people will achieve a mean whitening effect of 5 shade guide units. And *over 73%* will exhibit whitening that is 2 shade guide units greater than the placebo tray filled with non-active agent.

**Patient in Chair: What are the side effects of tooth whitening I should know about?**

**Chairside DH:** *Tooth sensitivity* often occurs during early stages of whitening treatment. Any gum *tissue irritation*, in most cases, results from an ill-fitting tray rather than the bleaching agents. Both of these conditions usually are *temporary* and stop soon after the treatment. But that is why one should work with a dental office, which can work to prevent or reduce these side effects.

Some bleaching agents through the dental office have a *fluoride releasing ability* that enables hardening of the tooth surfaces, helping in reducing post-treatment sensitivity. Other offices use products such as white neutral fluoride foam or other mineral treatments such as calcium and phosphate *before and after* to reduce sensitivity. It has also been reported that redheads, including those with no other risk factors, are at particular risk for tooth sensitivity and ‘zingers’ that can travel down the tooth to the root. Again, thankfully for them, most of these side effects are only temporary.

**Also if one reports sensitivity to hot and cold**, especially after dental cleanings, a lower percentage of bleaching agents can be used or use of trays may be slowed down over time. This type of individualized treatment is readily available through one’s dental office and *not* at a one-stop Mall bleach shop.
Patient in Chair: What about tooth whitening for my children?

Chairside DH: The safety in those 12 years of age and older has been demonstrated for at-home procedures overseen by the dental office. For those children with medicine-related staining, like tetracycline discussed earlier, this procedure can be a social lifesaver!

However, it is generally recommended by most dental professional associations that one should wait until the age of 16 when tooth enamel has fully calcified. But, if teeth have matured earlier, it may be safe for children as young as 14.

On that note: Pregnant or nursing women are advised by dental professionals to avoid teeth whitening. The potential impact of swallowed bleaching agent on the developing baby is not yet known.

Patient in Chair: Can I over whiten my teeth?

Chairside DH: People tend to compare their teeth to the teeth of those persons they see in movies, TV, and magazine ads that are go into the realm of being unnaturally white. (Calling Tom Cruise, calling Tom Cruise…)

This raises the question of “whitening addiction”: people who have a compulsion to maintain their youth by overuse of tooth whitening products, both OTC and professional. Signs of whitening abuse include people who seek to get their teeth to a “Clorox white” shade until their teeth are almost transparent, yet do not seem to realize their teeth are already white.

It is important again to note that many times these extreme shades of white can abuse and over expose themselves to tooth whiteners, and thus place themselves at safety risk and risk of damaging their teeth.

(Persons trying to achieve these extreme shades of white can abuse and over expose themselves to tooth whiteners, and thus place themselves at safety risk and risk of damaging their teeth.

(Remember the TV show Friends; the one with Ross deciding to whiten his teeth and then can't wait for his blind date that night -- until he looks in the mirror and sees his new radioactive,
glow-in-the-dark whitened teeth that then make the date run from his apartment.)

So how do we know when to stop? When your teeth match the white of your eyes! The most attractive and natural look is when the shade of the teeth and the white of the eyes are in HARMONY.

**Patient in Chair: How do I maintain my tooth whitening?**

**Chairside DH:** How long tooth whitening done in the dental office lasts depend on the individual and their dietary habits, such as use of chromogenic agents: tobacco, coffee tea, red wine, dark soft drinks, as well as poor personal mouth and dental care.

Studies show that with good personal mouth care and dental care, the results could last up to 47 months for 82% of those whitened. It is always possible to ‘touch-up’ the white color by occasionally using the tray and bleaching agent for one or two treatments. (That is what I do now).

Most importantly, to keep the smile bright as long as possible, it is important to follow the ‘white teeth diet’ for at least 24 to 48 hours after whitening until the teeth stabilize from being dehydrated as discussed earlier. (If it can stain a white shirt, it can stain those temporarily porous teeth!)

This means you need to drink white wine instead of red wine, cappuccino instead of espresso, and grapefruit juice instead of cranberry juice. And use a straw for most staining drinks even coffee! (They make biodegradable straws now too!)

This is a good tip too: continue follow the white teeth diet if you want to have the brightest smile over time too. It is important as well to visit me, your dental hygienist, to keep your smile bright and healthy!

**Shirley:** Be sure to check out Margaret’s website for more on this topic for patient care on tooth whitening at [http://www.dhed.net/](http://www.dhed.net/) as well as our Archived Podcast at [http://www.blogtalkradio.com/shirdent1/2013/04/30/tuesday--one-more-thing](http://www.blogtalkradio.com/shirdent1/2013/04/30/tuesday--one-more-thing). We hope to have you back to discuss more in depth the dental hygienist’s role in tooth whitening such as shade
consideration as well as modes of treating dentinal hypersensitivity. We sure have a good start after today...

Margaret: Thanks Shirley for playing Dental Office with me- enjoy!