By far the most prevalent limiting factors on dental practice success are the patients who never see the dentist. Why do these individuals, who have teeth like everyone else, who have dental pains and problems like everyone else, and who often have dental insurance like many others, deliberately and consciously choose NOT to seek dental treatment?

The answer is simple; fear and pain. This information has been provided both anecdotally and by research. Fear is by far the more important of the two, because at this time, dentistry has largely conquered pain; as dentists, we have a multitude of techniques and products to control and alleviate discomfort, including local and topical anesthetics, desensitizers, and skill. Unfortunately, the very anesthetic techniques that eliminate operative pain arouse new fears due to the presence of the intraoral “needle” portion of the syringe.

Discomfort can also be caused by the application of cool water and/or air to the tooth surface during high speed cavity preparation. The temperature difference between the tooth (body at 37°C) and the water/air spray (room at 16°C to 18°C) can stimulate the dentinal fluid in an open tubule to migrate away from the odontoblast, causing negative pressure within the tubule, and therefore, pain.

For additional discomfort, metal and diamond burs remove both healthy and decayed dentin indiscriminately. While the removal of diseased dentin is unlikely to cause any discomfort whatsoever (no pain receptors), the opening of healthy dentinal tubules can again stimulate dentinal fluid movement and odontoblast sensitivity, and hence cause pain. Thus, the process of drilling unanaesthetized tooth structures with metal and diamond can be an uncomfortable experience for the patient, and a stressful one for the dental team.

The introduction of the SS White SmartPrep™, the first polymer cavity preparation instrument, offers a technological solution to the above-mentioned dilemmas. The most significant innovation of this instrument is that instead of a metal body and cutting edge, the SmartPrep is made of a specifically designed polymer. This polymer is designed to selectively remove diseased dentin, but leave healthy tooth structure (both enamel and dentin) intact.

The technology behind this feature is self-evident: healthy dentin has a Knoop hardness of 70-90 (the hardness of enamel is 360-430 Knoop). Diseased dentin has a hardness of 0-30 Knoop. The SmartPrep instrument has been designed with a hardness of 50 Knoop. Thus, it will NOT cut healthy dentin, while easily removing decay. If the SmartPrep instrument does come into prolonged contact with a surface harder than itself (healthy dentin, enamel, composite, amalgam), it tends to wear away, and become blunted, rather than affect the opposing material.

Inside the tooth, the round SmartPrep functions as a diagnostic tool; it is able to differentiate between healthy and diseased dentin, and to remove the latter selectively. In eliminating the minimum possible tooth structure, the SmartPrep is a tool of advanced minimally invasive dentistry. Since the SmartPrep is incapable of opening up intact dentinal tubules, it can usually be used without the need for local anesthetic, with complete patient comfort. This improved treatment comfort encourages and motivates patients to seek necessary dental treatment, and can begin to access the 50% of the population that generally stays away from the dentist. Once their discomforts, and particularly fear, are overcome, this large, under serviced group begins to seek dental care from those practitioners who are able to answer their concerns.

Using the SmartPrep Technique

- The decay in the offending tooth is identified radiographically or tactiley (Fig. 1), and the most conservative access route is chosen.
- The access route is created or enlarged by the use of an SS White Great White (Fig. 2) until the amalgam and/or enamel are removed to reveal the decayed dentin.

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Fig. 4: SmartPrep selectively removing decayed dentin

The SmartPrep instrument is then brought into gentle rotary contact with the decay (Fig. 4); diseased dentin, and only diseased dentin, is selectively removed from the cavity. A light touch on the decayed areas is probably the best technique for maximizing the useful cycle of the SmartPrep instrument. The tactile proprioception from healthy and decayed dentin are quite easy to differentiate, and are either already familiar to the dentist or easily learned. (We tend NOT to use caries detecting dyes because of the high incidence of false positives associated with this technique, causing clinically unnecessary extensions of the tooth preparation into the healthy dentin.)

Once all the decay has been removed (Fig. 5), the cavity preparation is ready for adhesion and restoration. Note that on occasion, there may be some discolored dentin remaining after the SmartPrep preparation. Before you rush to remove this tissue with a metal bur, check it with an explorer! The discoloration is most likely to be secondary (affected but not infected) dentin that is the body’s response to decay, and should be left intact.

Fig. 6: Single bottle, single step iBond for adhesion

SmartPrep offers an edge

What are the advantages of the SmartPrep polymer preparation with respect to some of the existing minimally invasive dental procedures?

Conventional stainless steel round burs will remove dental tissues effectively, but target healthy and diseased dentin equally. In most cases, it is advisable to use these burs with local anesthetic, particularly in deeper segments of the tooth. The attack angle of most stainless steel round burs is quite aggressive for increased efficiency; unfortunately, this also tends to “lead” these burs deeper into the cavity, occasionally removing more tooth tissue than is intended.

Air abrasion has been available to dentists for more than 70 years, with the most recent surge in popularity occurring in the last decade. Air abrasion can effectively remove hard tooth structure (enamel and some healthy dentin) and composite restorations, but is relatively ineffective against soft, decayed dentin. Thus, its most important target is least

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<th>SMARTPREP</th>
<th>MicroAbrasion</th>
<th>Metal Round Bur</th>
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<tbody>
<tr>
<td>Remove Decayed Dentin</td>
<td>Yes</td>
<td>Not Well</td>
<td>Yes</td>
</tr>
<tr>
<td>Remove Healthy Dentin</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Anesthesia Required</td>
<td>Not often</td>
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<td>Yes</td>
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<tr>
<td>Auto-Diagnostic of Decay</td>
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<td>No</td>
<td>No</td>
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<tr>
<td>Messy</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Predictable</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Targeting Learning Curve</td>
<td>No</td>
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(no patient discomfort in most cases (and therefore often requiring no local anesthesia). Once the decayed dentin is visible and accessible, the Fissurotomy step is complete.)

The completed polished composite restoration (Fig 7).
affected by the technique. In many cases, air abrasion can be used without local anesthetic, which is a positive. However, it is difficult to focus the sand stream and the procedure involves a learning curve. The treatment is also messy inside the mouth and out, and the abrasion dust may degrade dental mirrors and other instruments and equipment. SmartPrep polymer instruments target ONLY diseased dentin. They are in fact simultaneous diagnostic and preparation tools, assisting in minimally invasive dentistry. They can often be used without the need for local anesthetic. When the SmartPrep instrument encounters healthy dentin or enamel it simply wears away. The attack angle is thus a moot point. There is no mess inside or outside the mouth (except for the debris of the dislodged diseased dentin), and there is no negative effect on other instruments that are used during the treatment.

Dr. Freedman is the Associate Director of the Esthetic Dentistry Education Centre at SUNY Buffalo, and Director of the Post-Graduate Programs in Esthetic Dentistry at several universities. Dr. Freedman is a Founding Member, past President, and fellow of the American Academy of Cosmetic Dentistry. He maintains a private practice in Toronto, Canada.

Dr. Jaffar S. Pakroo is a Diplomate of the American Board of Aesthetic Dentistry. He is also a Master of the International College of Oral Implantology and a Fellow of the Academy of Dental Facial Esthetics. Dr. Pakroo has published numerous articles and lectures internationally on esthetic and implant dentistry, while maintaining a full-time clinical practice.

For a limited time, SS White is offering a great opportunity to try the SmartPrep™ System with an Introductory Kit that includes: Caries Access Block: A selection of recommended carbide burs in an autoclavable bur block for creating access to decay, which includes: (2) each of FG 169L; (2) each of FG 329; (2) each of Fissurotomy® (original); (2) each of Fissurotomy® NTF (narrow taper fissure); (1) Great White No. 1; (1) Great White No. 2

The SmartPrep™ Instruments for Selective Dentin Removal: are available in three sizes and are nested in a pliable non-autoclavable dispensing wafer, which contains (10) instruments each of sizes RA#2, RA#4 and RA#6. Details on the Fissurotomy® Bur Kit provided below.

Call 1-877-SSWBURS (779-2877) to order.