Minimally Invasive Dentistry for the Pediatric Patient

A Peer-Reviewed Publication
Written by Hershel Ellenbogen, DMD

Abstract
Over the past century, modern dentistry has made great advances in scientific knowledge, specifically in pediatric dental care. New technology and materials have allowed practitioners to continue development in both research and clinical forums. These include, but are not limited to, minimally invasive diagnostics and greater understanding in the treatment of children.

Educational Objectives
During this course the participant will:
1. Recognize the specific principles and philosophies of pediatric dentistry.
2. Describe early caries assessment and diagnostics.
3. Identify characteristics of minimally invasive dentistry vs. traditional restorative care.
4. Recognize psychological methods and techniques for enhanced patient comfort and anxiety reduction.

Author Profile
Dr. Hershel Ellenbogen DMD graduated from the Boston University Goldman School of Dental Medicine and completed a General Practice Residency at the Albany Medical Center Hospital in Albany, NY. He has been in Private Practice for over 25 years, as well as working in Hospital and Academic settings. He is also currently a Clinical Instructor in the Dept. of General Dentistry at Boston University.

Author Disclosure
Dr. Ellenbogen has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

Publication date: Sept. 2016
Expiration date: Aug. 2019

This educational activity was developed by PennWell's Dental Group with no commercial support. This course was written for dentists, dental hygienists and assistants, from novice to skilled.

Educational Methods:
This course is a self-instructional journal and web activity.

Provider Disclosure:
PennWell does not have a leadership position or a commercial interest in any products or services discussed or shared in this educational activity nor with the commercial supporter. No manufacturer or third party has had any input into the development of course content.

Requirements for Successful Completion:
To obtain 3 CE credits for this educational activity you must pay the required fee, review the material, complete the course evaluation and obtain a score of at least 70%.

CE Planner Disclosure:
Heather Hodges, CE Coordinator does not have a leadership or commercial interest with products or services discussed in this educational activity. Heather can be reached at hhodges@pennwell.com

Educational Disclaimer:
Completing a single continuing education course does not provide enough information to result in the participant being an expert in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

Image Authenticity Statement: The images in this educational activity have not been altered.

Scientific Integrity Statement: Information shared in this CE course is developed from clinical research and represents the most current information available from evidence based dentistry.

Known Benefits and Limitations of the Data: The information presented in this educational activity is derived from the data and information contained in reference section. The research data is extensive and provides direct benefit to the patient and improvements in oral health.

Registration: The cost of this CE course is $59.00 for 3 CE credits.

Cancellation/Refund Policy: Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.
Educational Objectives
At the conclusion of this educational activity participants will be able to:
1. Recognize the specific principles and philosophies of pediatric dentistry.
2. Describe early caries assessment and diagnostics.
3. Identify characteristics of minimally invasive dentistry vs. traditional restorative care.
4. Recognize psychological methods and techniques for enhanced patient comfort and anxiety reduction.

Abstract
Over the past century, modern dentistry has made great advances in scientific knowledge, specifically in pediatric dental care. New technology and materials have allowed practitioners to continue development in both research and clinical forums. These include, but are not limited to, minimally invasive diagnostics and greater understanding in the treatment of children. Following the philosophy that “no treatment is the best treatment,” dentists use testing regimens such as the CAMBRA method and the Bacterial Model to care for pediatric patients earlier and more consistently. In addition, helping children who are anxious about receiving dental care, will allow a more pleasant experience and allow the treating dentist to work more efficiently.

Introduction
It has now been nearly 180 years since GV Black, the father of modern dentistry, taught his groundbreaking techniques. His was a time that heralded urbanization, development of new technologies, and codification of treatment modalities. During his lifetime and the years that followed, dentistry moved into the modern age. This included the realization that patients are individuals who require unique evaluation and treatment. It took many decades hence to realize that one group meriting special treatment was children.

History of pediatric dentistry
As a specialty, pediatric dentistry has existed for nearly a century. The International Association of Dentistry for Children was established in 1925, and the American Society of Dentistry for Children was established a year later. Although pediatric dentistry was recognized as a specialty in 1940, it did not gain full recognition until the mid-1960s. Patients of that era faced less-than-ideal conditions, and many patients, especially children, grew up highly anxious about receiving dental care.

Circling with the specialization of pediatric dentistry, the entire dental field was undergoing a revolution. What we now recognize as preventive care, by definition, preempts the disease process. Composite restorations varied greatly from the traditional GV Black cavity preparation philosophy of extension for prevention, which included resistance, retention, and outline forms. New treatment models allowed the pedodontist and general dentist to develop care that was gentler for patients. This has come to include advanced nitrous oxide delivery systems and sedation, as well as later-generation adhesive dentistry that was more conservative and esthetic than amalgam. While these components were developed over many decades, they were signs that dentists realized the necessity to treat pediatric patients (and patients in general) in a profoundly different manner.

Minimally invasive dentistry (MID) or microdentistry
Initially, the diagnosis and treatment of caries required the use of a dental light, explorer, and radiograph followed by the removal of decay and restoration of the cavity preparation. Over time, new concepts and armamentaria were added, most notably near the end of the 20th century. An expanding group of dental professionals started the MID (Minimally Invasive Dentistry) movement. The objective of MID was to evaluate the conditions in the mouth earlier and on a more regular basis in order to ascertain the extent of problems and treat them as early as possible. It created new systems that would diagnose and treat dental decay at its earliest stages and improve patient care with the use of new medicaments.

The WCMID (World Congress of Minimally Invasive Dentistry) was formed in 1999 by a group of concerned dentists, researchers, and educators committed to the concept of minimally invasive care. The unwritten philosophy of the organization was that the best restoration was no restoration at all. Originally focused on treatment, The WCMID has shifted its efforts toward accurate diagnosis and prevention. This new model of diagnosis and management of disease risk has dramatically changed the practice of dentistry.

Bacterial model
Although there are nearly 300 kinds of bacteria in the oral cavity, the microorganisms primarily responsible for the disease of dental caries are Streptococcus Mutans and the Lactobacilli. When harbored in oral biofilm and nourished by simple and complex carbohydrates, acid levels rise and tooth structure is compromised. In the past the only way to treat his process was to remove damaged tooth structure and replace it with restorative materials. However, that sole option is now one of many methodologies, ranging from diagnostics to full intervention.

Today there are a number of assessment and diagnostic tools and tests available to determine the presence of bacterial types and the extent of their progress. The most well known is the Caries Management by Risk Assessment model (CAMBRA). Developed by the CAMBRA Coalition, the assessment is helpful in diagnosing the amount and variety of bacteria present in the oral cavity. When done properly, it is an in depth evidence-based approach of where and how caries grows. It can be divided into a variety of risk factors, including age, diet, fluoride exposure, and socioeconomics, among others. Once this evaluation has been completed, a damage assessment can be made without waiting for further damage to
develop. The CAMBRA Coalition also works toward educating dentists in incorporating these systems, especially when treating children.

**Medicaments**

When it is determined that the bacterial count in the oral cavity has the potential to or begun to cause damage, such as the ability to visualize early demineralization, microbial load must be reduced and remineralization of the affected areas initiated. Remineralization now involves topical gels, varnishes, and rinses, with the goal of reducing the acidity in the mouth, normalizing pH levels, and providing enhanced protection of tooth structures. Pastes that have anticariogenic properties and the ability to remineralize damaged tooth structure are now available including Low-Fluoride Dentifrices, Casein Phosphopeptide, Amorphous Calcium Phosphate, Casein Phosphopeptide-Amorphous Calcium Phosphate Fluoride, and Arginine.

Anti-cavity products containing fluoride can be helpful for patients with tooth sensitivity, acid erosion, or a high incidence of dental decay. However, excessive fluoride intake during tooth brushing has been a downside, especially with younger patients. LFD (Low-Fluoride Dentifrices) have been recommended for young children with the aim of minimizing this intake. Yet, given the uncertainties surrounding the clinical efficacy of such formulations, alternatives to increase their anticaries effects have been investigated. Current results indicate that clinical efficacy of LFD supplemented with TMP (trimetaphosphate) is superior to that observed for a conventional formulation containing 1100ppm fluoride. Children brushing with 500ppm fluoride toothpastes containing phosphate salts developed fewer carious lesions when compared with those using 1100ppm fluoride dentifrice. The tested toothpastes can be regarded as a safe alternative to conventional formulations for children less than 6 years of age, based on risk-benefit considerations.

CPP (Casein Phosphopeptide) and ACP (Amorphous Calcium Phosphate) are naturally occurring molecules that release calcium and phosphate ions. They have been successful in reversing white spot lesions or other minor tooth discoloration caused by lack of calcium. A study by Talaat and Mahmoud evaluated the acid resistance of enamel subsurface lesions treated with CPP-ACP (Casein Phosphopeptide-Amorphous Calcium Phosphate Fluoride). Fifty extracted primary molars were immersed in a demineralizing solution for 72 hours to produce subsurface enamel lesions. They were sectioned in a buccolingual direction. One half of the sample, the control group, remained untreated. The other sample half was treated with the remineralizing agent CPP-ACP. After 10 days, the sample was evaluated quantitatively using energy dispersive x-ray spectroscopy. The treated samples were immersed into the demineralizing solution for 72 hours and the mineral content reevaluated. The mean calcium content of these samples was significantly higher than that of the control group (P<.001) and higher than after the values determined at the second demineralization. The mean calcium content of the second demineralization was significantly higher than those of the control group (P<.001). The conclusion was that CPP-ACP increased the resistance of enamel surfaces to further demineralization.

Arginine, an amino acid, has also been found to aid in enamel health. A study by Yamashita et al. found that when treated with various combinations of arginine and/or fluoride, enamel microhardness was significantly better than the other treatment groups in the prevention of erosive surface damage, attributed to the possible effect of the arginine associated with fluoride. A separate study by Huang et al. tested the remineralization efficacy of toothpaste containing 8% arginine and calcium carbonate with other toothpaste groups on enamel surfaces. The group treated with the 8% arginine and calcium carbonate combination presented significantly greater remineralization than the other toothpaste groups.

**Caries Diagnostics**

A major advance in caries diagnostics, especially in pediatric care, is non-invasive, early detection of carious lesions. Previous studies have demonstrated that the structural changes of enamel due to demineralization and remineralization can be exploited through optical imaging methods. These methods include laser fluorescence, DIFOTI (Digital Imaging Fiber-Optic Transillumination), and optical coherence tomography, among others. Despite some limitations in technology, these tools have proven invaluable in diagnosing caries that was previously undetectable by traditional means of visual exam, explorer, or radiographs.

**Modes of treatment: Conservative adhesive dentistry**

**Sealants**

MID was developed at the same time as improvements in adhesive dentistry, and while treatment may be required, it need not be aggressive. The most well known preventive procedure is the placement of occlusal sealants. Once it has been determined that there is no presence of decay in the pits and fissures, resin-based materials can be successfully used to protect these areas.

Resin sealants used on occlusal tooth surfaces were introduced in the 1960s for protecting pits and fissures from dental caries. Although sealants have demonstrated their caries preventing abilities, their efficacy may be related to the background of caries prevalence in a given population. An evaluation of the caries prevention of resin-based pit and fissure sealants and glass ionomer cements or sealants in children and adolescents was undertaken. It concluded that sealing with resin-based sealants is a recommended procedure to prevent caries of the occlusal surfaces of permanent molars.
**Preventive resin restoration**

By definition, a preventive resin restoration is the conservative treatment of an active, asymptomatic carious lesion by topical application of a caries-arresting or inhibiting medicament and without mechanical removal of sound tooth structure. It is interesting to note that this fairly new code specifically refers to conservative treatment. (Established for CDT 2011.)

**Primary Tooth Preparation**

In situations where decay has penetrated the enamel and dentin, minimally invasive procedures can be employed. For pediatric care, several methods are available that remove the minimal amount of healthy tissue. These include air abrasion, specialized burs, and lasers. Conceptually, air abrasion has been around for over 70 years, with the initial work being done in the 1940s by Dr. Robert Black and formally brought to clinics in 1951. Due primarily to technical issues and the simultaneous advent of the high-speed handpiece, it lost favor for many decades. However, air abrasion has gained a popular resurgence. Abrasives include aluminum oxide powder and bioactive glass, among others. This conservative technique is ideal for the removal of initial decalcified enamel superficial layers and caries in deciduous teeth. In addition, devices such as the disposable PrepMaster (Groman Inc., Boca Raton, FL) has made this procedure simple, hygienic and affordable.

In the early 1960s, research was underway in the use of lasers for surgery of hard tissues in the oral cavity, specifically bone. These early studies led to further developments with “the most common dental lasers (identified) by acronyms associated with how the laser light is produced. They include Diode, Nd:YAG, Er:YAG, or CO₂.” Coupled with easy-to-use handpieces, in some cases with air and water for cooling, the sensation of pain was eliminated in many cases making it ideal for treating pediatric carious lesions and pulpotomies. In the case of a hard-tissue laser (Er:YAG), the interaction between the laser and primary enamel and dentin depends on the composition of the tissues—a higher presence of water and lower presence of minerals—comparative to the permanent enamel and dentin. Thus, photoablation of primary enamel and dentin requires lower energy. Studies have shown that the laser parameters of the Er:YAG were efficient for the ablation of tissues of deciduous teeth and demonstrated to be well accepted by young patients.

**Bonding to Primary Teeth**

Advances in adhesive therapy allow for simple, esthetic restorations in the permanent dentition without the need to remove healthy tooth structure. This is due to a low moisture/high mineral content in permanent teeth. Primary teeth demonstrate the opposite ratio a with high moisture/low mineral content. Thus, traditional bonding methods and materials will demonstrate a decreased ability to bond to primary teeth. Therefore, the use of secondary retentive features should be made in the cavity preparations in order to increase bonding. A study of fifty pairs of anterior class III carious teeth with mirror image lesions on their contralateral proximal surfaces were selected. These teeth were prepared with either a slot or a modified dovetail type of cavity preparation. The patients were kept on recall to check the clinical characteristics of the restorations at three, six, and 12 months. The criteria for evaluation included marginal adaptation, anatomic form, surface discoloration, and secondary caries. It was concluded that both the slot and dovetail types of cavity preparations were equally efficacious when clinically reviewed for a period of 12 months. Hence, the use of the slot type of cavity preparation with reduced loss of the tooth structure is indicated for class III cavities in primary anterior teeth. In a separate study by Markovic and Peric, the efficacy of tunnel preparations in primary molars restored with glass-ionomer cement was clinically examined during a 36-month period. They concluded that the tunnel preparation filled with reinforced restorative glass-ionomer cement is a suitable treatment for minimal proximal caries lesions in primary molars.

**Anxiety**

It is estimated that nearly one-fifth of children experience anxiety in the dental chair, thus, reducing or eliminating that stress is vital. This enhances the visit experienced by the child and eases stress for the dentist and his/her staff. It is crucial that the dentist and staff develop a rapport with the patient, and parents. Informing children what to expect during their visit, to their level of understanding, allows everyone to work through any difficulties that may be encountered. Answering questions as they arise can also be helpful. Often, positive reinforcement (such as offering prizes) upon completion of the visit can prove successful.

Once most of the questions are answered, it is hoped that patients will be much more relaxed and cooperative as treatment begins. The Tell, Show, Do method as described by Addleston in 1959 can give children more control of their surroundings, increasing comfort and compliance. Another key part of the treatment regimen may or may not involve the parent. While many dental offices prefer that the parent stay in the waiting room, this should not always be the case. Speaking to the parent prepares them as well, and the office might even provide them with a script to work from that can help to calm their child (Figure 1).

Because the decay is often diagnosed at the hygiene appointment, the process of preparing the child for what to expect at the restorative visit can begin immediately. During this initial encounter, patients have completed an atraumatic visit, and the dental team and parents should reinforce that impression in that the restorative visit will be just as simple.

For patients who remain anxious, a series of distractions can aid as well. Toys, balloons, puppets, dolls, and stuffed animals can all help focus patients’ attention elsewhere so treatment can begin. Many offices have monitors and other electronic viewing in their operatories that help to distract the patient. In addition, the positive reinforcement of a post-op visit trip to a prize filled
When your child has a cavity

At this point, the treating dentist and/or staff have discovered that your child has developed a dental lesion of some sort.

Very often parents and children are not prepared for this news, and are confused about what will happen next. It is important to know that thanks to advanced and updated treatment models, this is a very easily and comfortably treatable situation for your child (and you!).

As the parent, you are an important part of the treatment team, and you have a role to play before, during and after treatment to make this a successful process.

**Before**

If you have any questions or concerns, speak to the dentist and/or staff privately so that you are as informed as possible. Although the news will have already been shared during the visit, please take the time to explain to your child that a cavity has been discovered and that there is a plan to treat it.

It is important that your child understand that it is not their fault, but bacteria have taken advantage of the opportunity to grow in their mouth, and they will need to return to have it treated. They should understand that this is not something that they’ve done on purpose, and that it is not uncommon, but also that this can be treated quickly and comfortably. Please do not use this as a time to chastise your child for poor brushing habits or eating excessive sweets – while this is something that should be addressed, we do not want the child to enter into the treatment situation feeling badly or guilty.

It is important that parents use positive language in explaining this to your child. Using technical words like restoration is a good example. You may also suggest some “kiddie words” – cavity bugs instead of bacteria depending upon the age or awareness of your child. Another example could be “sleepy juice” instead of injection, needle, or anesthetic. We do recommend staying away from language such as hole or cavity, which might have negative connotations.

Speaking to the child positively and promptly will set a tone that this is "no big deal". It will also help counter any negative stereotypes or misinformation that they might encounter from the media, peers or family members.

**During**

On the day of treatment, we are counting on you to reinforce in a positive way that this is not a difficult process.

We generally prefer to treat the patient without a parent or guardian in the room; if you feel that your presence will be helpful to the process and your child, please make the treatment team aware of this.

While you are in the room, we consider you part of the treatment team, which means that you must continue to reinforce the same positive environment for the child as they have been experiencing until now. At that time, you will be advised where good spots are to stand or sit, continued reinforcement of what to say, etc.

Allow the treating staff to describe what will be happening and to answer any questions that the child may have.

Please do not ask any questions or make comments that may take your child, the team and yourself "off message". If you have a question that cannot wait until the procedure is over, ask to speak to a staff member privately and outside the treatment room. Positive remarks like "awesome job!" or "you’re doing great!" are welcome; please refrain from other types of comments such as "almost done" or "that wasn’t so bad" or "be a big boy/girl".

While some instances of dental decay are small enough that they do not require the use of an injection of anesthesia, many are not. Allow the dentist to make that determination without commenting. Observing the administration of the anesthesia can be difficult; please be sure you are prepared. Proper local anesthesia will ensure that this process is as pain free as possible for the child; we will establish a means of communicating such as raising a hand if they are not comfortable. Please do not try to interpret other sounds or movements that the child makes, as this could interfere with the trust that the dentist has established with your child.

**After**

When the procedure is complete, the staff will explain everything that you and your child will need to know, for example; what kind of restoration has been placed, how long to expect the tooth to be numb (if local anesthesia was used), what if any kind of sensation will be expected later on, when eating or drinking can resume, and if follow up is required. Children have a tendency to play with or accidentally chew on the numb areas of the mouth. You must monitor your child until the "puffy" sensation is gone.

Once you and your child have left the office, please continue to reinforce that this experience was both necessary and positive.

Should further treatment be required in the future, you will have helped to establish a solid foundation for your child to be relaxed and calm.
treasure chest is valuable. As discussed, MID techniques will all help the dentist have an easier time of beginning treatment. Once the child is relaxed, the dentist can quickly and efficiently complete treatment. Atraumatic visits will make patients cooperative in whatever dental offices they are treated, hopefully throughout their lifetime.

**Conclusion**

We have now seen how assessment and treatment models developed throughout the history of dentistry have taken dental professionals to a point where patients can be treated quickly, easily, and comfortably. These practices, techniques and methods benefit our youngest patients. As these concepts become established in dental school curricula and into common dental practice, a new generation will continue to adapt them to the benefit of both practitioners and patients.

**References**

5. Medical Microbiology. 4th edition. Chapter 99 Microbiology of Dental Decay and Periodontal Disease Walter J. Loesche

**Author Profile**

Dr. Hershel Ellenbogen DMD graduated from the Boston University Goldman School of Dental Medicine and completed a General Practice Residency at the Albany Medical Center Hospital in Albany, NY. He has been in Private Practice for over 25 years, as well as working in Hospital and Academic settings. He is also currently a Clinical Instructor in the Dept. of General Dentistry at Boston University.

**Author Disclosure**

Dr. Ellenbogen has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.
Questions

1. The American Society of Dentistry for Children (ASDC) was founded in what year?
   a. 1914  
   b. 1926  
   c. 1933  
   d. 1945

2. The ADA recognized pediatric dentistry as a specialty in what year?
   a. 1927  
   b. 1935  
   c. 1948  
   d. 1955

3. Some of GV Black's steps of cavity preparation include
   a. Outline form  
   b. Resistance form  
   c. Retention form  
   d. All of the above

4. Extension for prevention refers to
   a. Preventing recurrence of caries at the margins of the tooth  
   b. The minimally invasive model  
   c. a and b  
   d. None of the above

5. Later generation adhesive dentistry has become
   a. More difficult to handle  
   b. More conservative  
   c. More attractive than amalgam  
   d. b and c

6. Minimally Invasive Dentistry is also known as
   a. Conservative prep form  
   b. Microdentistry  
   c. MID  
   d. b and c

7. The objective of MID is to
   a. Manufacture smaller instruments  
   b. Diagnose and treat dental decay at a much earlier stage  
   c. Improve patient care with the use of new medications and equipment  
   d. Both b and c

8. The World Congress of Minimally Invasive Dentistry was formed in
   a. 1986  
   b. 1997  
   c. 1999  
   d. 2004

9. The unwritten philosophy of the World Congress of Minimally Invasive Dentistry is
   a. The smaller, the better  
   b. The best restoration is no restoration at all  
   c. Maximum results with minimal care  
   d. None of the above

10. The World Congress of Minimally Invasive Dentistry has now shifted efforts toward
    a. Dental care for children only  
    b. Accurate diagnosis and prevention  
    c. Late stage treatment  
    d. All of the above

11. The CAMBRA model
    a. Diagnoses disease risks  
    b. Manages disease risks  
    c. Both a and b  
    d. None of the above

12. The primary microorganism responsible for the cause of dental decay is
    a. Streptococcus mutans  
    b. Staphylococcus aureus  
    c. Lactobacillus acidophilus  
    d. None of the above

13. There are how many forms of bacteria in the oral cavity?
    a. Too many to count accurately  
    b. Numbers vary among different population groups  
    c. Nearly 300  
    d. All of the above

14. The Bacterial Model is helpful in
    a. Diagnosing the amount and variety of bacteria present in the oral cavity  
    b. An in depth evidence-based approach of where and how caries grows  
    c. Being divided into a variety of categories  
    d. All of the above

15. Recaldent
    a. Is a milk derived protein  
    b. Releases calcium and phosphate ions  
    c. Can remineralize early breakdown of tooth structure  
    d. All of the above

16. The Diagnodent
    a. Is a laser-based caries detection system  
    b. Can diagnose caries through any type of restoration  
    c. Is a transillumination system  
    d. a and b

17. Slot preparations require
    a. Tooth reduction of approximately 1.5 mm of tooth structure  
    b. Undercuts  
    c. Extension into pits and grooves  
    d. None of the above

18. The term for vibration of the bur is
    a. Chop  
    b. Wash  
    c. Chatter  
    d. None of the above

19. Originally lasers were tested in dentistry using
    a. Er:YAG  
    b. Ruby  
    c. ytterbium  
    d. None of the above

20. The Er:YAG laser was approved for use by the FDA in
    a. 1978  
    b. 1997  
    c. 2001  
    d. 2010

21. What percentage of children feel dental anxiety?
    a. 10%  
    b. 20%  
    c. 40%  
    d. 60%

22. The method for guiding patient behavior as described by Addleston in 1959 was
    a. See one, teach one  
    b. Tell, show, do  
    c. Eeny, meeny, miney, mo  
    d. None of the above

23. The CAMBRA Coalition is not
    a. A study club of dentists in Australia  
    b. A group of dentists in the US teaching the aspects of MID to dentists  
    c. A group of dentists incorporating MID into dental school curricula  
    d. None of the above

24. Goals of remineralization include
    a. Balancing pH levels  
    b. Reducing the acidity in the mouth  
    c. Providing enhanced fluoride for dental caries protection  
    d. All of the above

25. Sodium fluoride 1.1% products can be helpful for patients with
    a. Tooth sensitivity  
    b. Acid erosion  
    c. A high incidence of dental decay  
    d. All of the above

26. The first air abrasion units were marketed in
    a. 1940  
    b. 1951  
    c. 1984  
    d. 2006

27. The Er:YAG laser was approved for use
    a. To cut into soft tissue  
    b. To remove tooth decay  
    c. To cut into bone  
    d. Both a and c

28. Dentist and staff members must develop a rapport
    a. With the patient  
    b. With each other  
    c. With the parent  
    d. All of the above

29. Decay is usually diagnosed
    a. When the patient presents in pain  
    b. By the parent  
    c. During the routine hygiene visit  
    d. None of the above

30. The laser handpiece utilizes
    a. Air for cooling  
    b. Water for cooling  
    c. a and b  
    d. Neither a nor b
Minimally Invasive Dentistry for the Pediatric Patient

Educational Objectives
1. Recognize the historical principles and philosophies of pediatric dentistry.
2. Describe early caries assessment and diagnostics.
3. Identify characteristics of minimally invasive dentistry vs. traditional restorative care.
4. Recognize psychological methods and techniques for enhanced patient comfort and anxiety reduction.

Course Evaluation
1. Were the individual course objectives met?
   Objective #1: Yes No Objective #2: Yes No
   Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.
   2. To what extent were the course objectives accomplished overall? 5 4 3 2 1 0
   3. Please rate your personal mastery of the course objectives. 5 4 3 2 1 0
   4. How would you rate the objectives and educational methods? 5 4 3 2 1 0
   5. How do you rate the author's grasp of the topic? 5 4 3 2 1 0
   6. Please rate the instructor's effectiveness. 5 4 3 2 1 0
   7. Was the overall administration of the course effective? 5 4 3 2 1 0
   8. Please rate the usefulness and clinical applicability of this course. 5 4 3 2 1 0
   9. Please rate the usefulness of the supplemental weblography. 5 4 3 2 1 0
   10. Do you feel that the references were adequate? Yes No
   11. Would you participate in a similar program on a different topic? Yes No
   12. If any of the continuing education questions were unclear or ambiguous, please list them.

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

13. Was there any subject matter you found confusing? Please describe.

_________________________________________________________________

14. How long did it take you to complete this course?

_________________________________________________________________

15. What additional continuing dental education topics would you like to see?

_________________________________________________________________

For Questions Call 800-633-1681

If not taking online, mail completed answer sheet to
PennWell Corp.
Attn: Dental Division,
1421 S. Sheridan Rd., Tulsa, OK, 74112
or fax to: 918-831-9804

For IMMEDIATE results, go to www.DentalAcademyOffice.com to take tests online.
Answer sheets can be faxed with credit card payment to 918-831-9804.

☐ Payment of $59.00 is enclosed. (Checks and credit cards are accepted.)

If paying by credit card, please complete the following:
☐ MC ☐ Visa ☐ AmEx ☐ Discover
Acct. Number: ____________________________ Expiration Date: __________

Charges on your statement will show up as PennWell

1. ☐ ☐ ☐ ☐ ☐ 16. ☐ ☐ ☐ ☐ ☐
2. ☐ ☐ ☐ ☐ ☐ 17. ☐ ☐ ☐ ☐ ☐
3. ☐ ☐ ☐ ☐ ☐ 18. ☐ ☐ ☐ ☐ ☐
4. ☐ ☐ ☐ ☐ ☐ 19. ☐ ☐ ☐ ☐ ☐
5. ☐ ☐ ☐ ☐ ☐ 20. ☐ ☐ ☐ ☐ ☐
6. ☐ ☐ ☐ ☐ ☐ 21. ☐ ☐ ☐ ☐ ☐
7. ☐ ☐ ☐ ☐ ☐ 22. ☐ ☐ ☐ ☐ ☐
8. ☐ ☐ ☐ ☐ ☐ 23. ☐ ☐ ☐ ☐ ☐
10. ☐ ☐ ☐ ☐ ☐ 25. ☐ ☐ ☐ ☐ ☐
12. ☐ ☐ ☐ ☐ ☐ 27. ☐ ☐ ☐ ☐ ☐
13. ☐ ☐ ☐ ☐ ☐ 28. ☐ ☐ ☐ ☐ ☐
14. ☐ ☐ ☐ ☐ ☐ 29. ☐ ☐ ☐ ☐ ☐
15. ☐ ☐ ☐ ☐ ☐ 30. ☐ ☐ ☐ ☐ ☐

AGD Code 434

PEOPLE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

We encourage participant feedback pertaining to all courses. Please be sure to complete the survey included with the course. Please e-mail all questions to hhodges@pennwell.com.

INSTRUCTIONS
All questions should have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form. Notification of Participation results will be mailed within two weeks after taking an examination.

CANCELLATION/REFUND POLICY
All participants scoring at least 70% on the examination will receive a verification form verifying 3 CE credits. If not taking online, mail completed answer sheet to PennWell Corp. Attn: Dental Division, 1421 S. Sheridan Rd., Tulsa, OK, 74112 or fax to: 918-831-9804.

PennWell maintains records of your successful completion of any course for a minimum of six years. Please contact PennWell at 800-633-1681 for a copy of your continuing education credits report. The report, which will list all credits earned to date, will be generated and mailed to you within fifteen business days of receipt. Completing a single continuing education course does not provide enough information to give the participant the feeling that she is an expert in the field related to the course topic. It is a combination of many educational sessions and clinical experience that allows the participant to develop skills and expertise in the field of dentistry.

Concerns or complaints about a CE Provider may be directed to the provider or to ADA CERP at www.ada.org/cerp/

Customer Service 800-633-1681

© 2016 by the Academy of Dental Therapeutics and Stomatology, a division of PennWell Corporation