Nine Lessons from the REAL WORLD

Everything I Wish I Learned in School

by Eric W. Jones, DMD, FAGD

Abstract

This course provides an overview of several relevant issues in restorative dentistry. The use of digital photography, occlusal instrumentation, bonding, all-ceramic restorations, matrix systems and patient communication are covered. The aim of this course is to offer the dentist several clinical pearls that can be implemented immediately, as well as provide a succinct but inclusive overview of several aspects of restorative dentistry.

Educational Objectives

At the end of this course, participants will be able to:

1. Understand the basic settings for dental digital photography.
2. Describe indications for the use of a semi- or fully adjustable articulator.
3. Differentiate the types of all-ceramics, and their indications.
4. Understand the bonding process to teeth and indirect restorations.
5. Indicate alternatives to the mandibular nerve block for restorative dentistry.
6. Know the indications for various matrix systems for direct restorations.

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As a not too distant graduate of the Medical University of South Carolina, dental school was a very enjoyable time. As many students, my goal was to lay low, get by and become a dentist. Then a funny thing happened after dental school, I found out that I loved dentistry. Here are nine of the most significant things I wish I learned in school.

1. Digital Photography

By far, the greatest driver of both cosmetic and general dentistry in my office is digital photography. DSLR cameras can show extreme detail as well as capture the entire arch in one picture. Anecdotally, patients in my practice tend to connect more to full-arch photos that can be zoomed rather than looking at an intra-oral picture. The photographic series is also an invaluable tool for diagnosis and treatment planning, patient education, lab communication and increasing the amount of elective or cosmetic dentistry you perform. DSLR cameras require no special software, and are completely portable from operatory to operatory.

A proper setup for digital photography consists of a DSLR camera (Canon and Nikon are the most popular) equipped with a 100mm macro lens and a ring flash. Starting at around $1,500, these systems can be purchased as a kit from dental photography retailers or pieced together from online retailers. There are some excellent courses that go into detail regarding digital photography. *[Editor's Note: Take "Picture Perfect – Clinical Photography Made Easy!" By Dr. Jason Olitsky. The course is available on Dentaltown.com.]*

For dental photography, the easiest way to shoot pictures is to select an "aperture priority" mode (abbreviated A or Av). This setting allows the user to choose the aperture, or amount of light the camera lets in. This aperture setting is commonly referred to as an "F-stop," with higher F-stops creating a higher depth of focus to allow all the teeth to be in focus. Nearly all shots will be taken using the same settings with the exception of the full-face shots. By shooting in aperture priority mode, the camera will automatically select the proper shutter speed (to allow just the right amount of light).

While incorporation of digital photography can at first seem daunting, the easiest path of integration is to choose a place to begin. In our office, all patients have four basic photos taken: a smile shot, a retracted shot with teeth apart, and a picture of the upper and lower arch (Fig. 1). For patients that have an interest in aesthetic changes, the entire AACD series is taken. All of these photos can be taken with one clinician and help from the patient. Without a doubt, using photography has impacted my practice more than anything else.

Digital Photography Cheat Sheet

The settings for the following shots are listed:

- Upper Arch, Lower Arch, Retracted and Smile Shots
  - F-Stop/Aperture: 22 (or higher)
  - ISO: 100 (or as low as possible)
  - White Balance: "Flash" or "Cloudy"
  - Flash Setting: ETTL (this means the flash is automatically metered through the camera)
- Full-face and Portrait Shots:
  - Change the F-stop to ~5.6-10
  - All other settings can remain the same

2. Articulators

I'll admit it, the day I completed dental school I sold my articulator back. Then, I became an occlusion nerd. Now I own multiple articulator systems. Sure, many dentists don't own articulators, but it becomes very difficult to do significant dentistry without one. While one crown on tooth #19 can be mounted to a disposable plastic hinge without much consequence, properly mounting certain cases can and will save you time in adjustments, allow you to properly treatment plan, and help prevent or mitigate the chances of broken porcelain. Due to the arc of closure, a disposable plastic hinge cannot accurately duplicate the pathways of the mouth. While plastic articulators do accurately reflect the inter-arch relationship at maximum intercuspation, only a case mounted on a proper semi- or fully-adjustable articulator can provide an accurate relationship during protrusive and excursions (also known as movements that fracture porcelain). And remember, without some sort of face-bow transfer the articulator is pretty much useless.

Articulators Cheat Sheet

When the "wrist-u-lator" just won't cut it:

- Any changes to vertical dimension of occlusion

Standard photo series for all patients.

continued on page 58

 continued from page 57

- When establishing or changing anterior guidance (preparing multiple anterior teeth or cuspids)
- When treating an entire arch (dentures)
- Diagnosing and managing patients with wear

3. All-ceramics

IPS e.max, IPS Empress, BruxZir, Lava, Noritake… the list goes on. While today's all-ceramic options carry many names, all of these materials fall into only a few categories. Understanding the basic pros, cons and preparation designs of today's all-ceramic options allows the clinician to prescribe the appropriate material with confidence. Despite the abundance of names, all-ceramic crowns can be simplified into just a few categories.

Feldspathic Porcelain

Feldspathic, or powder-liquid porcelain has been around dentistry for a long time. Powder-liquid porcelain can be stacked without a core to create anterior crowns and veneers. These restorations demonstrate a very high level of aesthetics, and due to the layered nature, can allow for multiple opacities within the same restoration. This allows dark preparations or even tetracycline banding to be managed. Strength-wise, feldspathic porcelain is rather weak (~100mpa), and must be bonded to teeth and not conventionally cemented. Another limitation with feldspathic restorations is marginal integrity. Powder-liquid restorations are either built up on foil or processed using refractory dies. Both of these methods tend to result in minor chipping and irregularities at the margins.

Reinforced Glass-based Ceramics – IPS Empress

IPS Empress porcelain is leucite-reinforced ceramic that has twice the flexural strength of traditional feldspathic porcelain (~200mpa). IPS Empress has a long track record of success, and comes in many ingots choices offering different translucencies. IPS Empress offers a high level of aesthetics (Fig. 2), but like feldspathic porcelain must be bonded, and shows much greater success in the anterior region. In the posterior, it is important that 2mm of occlusal reduction be achieved, with adequate marginal thickness of approximately 1mm. Compared to feldspathic porcelain, IPS Empress offers a higher strength alternative with greater marginal integrity due to its lost-wax fabrication of pressing melted ceramic into an investment. Additionally, while the high translucency of IPS Empress allows for superior aesthetics, dark preparations should be avoided with IPS Empress to prevent show-through.

Reinforced Glass-based Ceramics – IPS e.max

IPS e.max is a glass-ceramic reinforced with lithium disilicate. IPS e.max is nearly twice as strong as IPS Empress (~400mpa), and is the first cementable all-ceramic. While IPS e.max can be cemented at 2.0mm thickness, studies show that anything thinner than this should be bonded to retain optimum strength. IPS e.max offers ingots in several translucencies, and combines a high level of aesthetics (Fig. 3) with a ceramic strong enough to be used anywhere in the mouth. Additionally, IPS e.max can be used in short span bridges in the posterior, but is not recommended for molar replacement. IPS e.max can be fabricated via pressable technique like IPS Empress, or is also commonly milled. The strength difference between pressable and milled IPS e.max is minimal (~40mpa), however pressable fabrication often allows for much thinner margins, less cervical reduction and more precise fit.[1] IPS e.max offers several translucencies, and a stump-shade photo will allow the laboratory to select the best option.

Zirconia-based All-ceramics

Zirconia-based restorations offer a very strong all-ceramic (~1100 mpa), that is also much more aesthetic than it's metal-based counterparts. Zirconia-based crowns are a more aesthetic option for metal frameworks, but less aesthetic than glass-based ceramics. Unlike other all-ceramics, zirconia can be used in pos-

1. *Aboushelib MN, Elmahy WA, Ghazy MH. Internal adaptation, marginal accuracy and microleakage of a pressable versus a machinable ceramic laminate veneers. J Dent. 2012 Aug;40(8):670-7.*


Fig. 2

IPS Empress Minimal Prep Veneers


Fig. 3

IPS e.max Minimal Prep Veneers

terior bridges, and in longer span anterior bridges approaching 100mm. Today's zirconia systems are available in multiple translucencies, and allow for the block-out of dark preparations. In addition, monolithic zirconia crowns allow for preparation much more similar to gold than that of other all-ceramics, with 1mm occlusal reduction and light chamfer margins possible.

While zirconia restorations offer improved aesthetics and tremendous strength, there are possible wear, bondability and layering-porcelain issues. Many early zirconia crowns exhibited failure by fracture of layering porcelain.[2] While much of this failure has been corrected with better lab techniques, the weakest link of any restoration is still the layering porcelain. In the case of full-contour zirconia options like BruxZir, several studies have indicated potential wear issues against the antagonist tooth after adjustment or intra-oral wear of the glaze.[3]

The Monolithic Revolution

The past several years have seen a huge shift toward monolithic materials. These monolithic materials are full-contour, with no layering porcelain. IPS e.max and solid zirconia are often considered aesthetic enough to be used in monolithic form. This monolithic form allows for the full thickness of the restoration to be in the core material providing maximum strength, however aesthetics are compromised. As previously mentioned, wear issues are a major concern for monolithic zirconia being abrasive to the opposing dentition. Also, surface stains and glazes degrade over time, leading to a less-than-ideal shade and color match. As a personal guideline, I typically place all monolithic units in the posterior, with anterior units being cut back and layered facially and incisally to provide the best blend of aesthetics and strength. In cases that strength and aesthetics are a concern, it is also possible to only cut back a small portion of the facial of these materials, and leave the incisal edge of anterior teeth in monolithic form to combine increased aesthetics with maximum strength.

All-ceramic Cheat Sheet

- Feldspathic porcelain is highly aesthetic, but the weakest
- IPS Empress provides a higher strength alternative to Feldspathic, but must be bonded and should not be used with dark preparations
- IPS e.max provides a very high-strength and aesthetic material, that can be used anywhere and even cemented (but bonded is much stronger)
- Zirconia can serve as a more aesthetic replacement to metal based crowns
- Monolithic restorations are stronger, but less aesthetic.

4. Bonding

Open any product magazine, and you are bound to find ads for the latest "29th-generation" bonding agent that does it all in one bottle (there is no such designation of generational bonding agents, yet!). Today's bonding can be confusing for any dentist, and combining respected literature as well as clinical observations to choose a bonding agent can be daunting.

Nearly all of the bonding encountered in daily practice involves two steps: 1) bonding restorative material or cement to the tooth, and 2) bonding cement to the indirect restoration.

Bonding to Enamel and Dentin – Direct Restorations

In general, I think of bonding agents as falling into two basic categories: total-etch and self-etch.

Total-etch (TE) bonding agents are still considered to be the "gold standard" with bonding, and consist of an etch and rinse approach. In total-etch techniques, the enamel and dentin are etched with phosphoric acid and rinsed. Once that is performed, the dentin and enamel can be dried the prescribed amount, and the dentin can be primed and bonded. Original fourth-generation agents (such as Optibond FL or All-Bond 2) require a separate primer to first be applied, followed by unfilled resin. Fifth-generation bonding agents were invented with the goal of streamlining this process by combining the primers and the unfilled resin bond into one bottle.

Self-etch (SE) bonding agents do not require the use of phosphoric acid as an etchant. Instead, acidic primers are used to etch the enamel and dentin surfaces. Sixth-generation SE bonding agents require the use of two components or bottles, as the first bottle contains the acidic primer, followed by the unfilled bonding resin. Recent seventh-generation bonding agents have attempted to combine the acidic etching primer with the bonding resin into one bottle; however, this appears to be at the expense of bond strength.[4]

Bonding to Enamel and Dentin – Crowns and Onlays

Although often used interchangeably, seating crowns and onlays can be done through luting, bonding or cementation. Luting agents or cements act solely as "space fillers" and do not form a chemical bond between the tooth and crown of significance. This method of crown or onlay delivery requires all retention of the indirect restoration to be from retention and resistance form, as well as the engagement of any undercuts between the preparation and intaglio surface of the crown. Examples of luting agents include polycarboxylate cements and zinc phosphate cements, and are best used with gold and PFM crowns.

2. *Belli R, Petschelt A, Lohbauer U. Thermal-induced residual stresses affect the fractographic patterns of zirconia-veneer dental prostheses. J Mech Behav Biomed Mater. 2013 May;21:167-77.*
3. *Janyavula S, Lawson N, Cakir D, Beck P, Ramp LC, Burgess JO. The wear of polished and glazed zirconia against enamel. J Prosthet Dent. 2013 Jan;109(1):22-9.*
4. *Knobloch LA, Gailey D, Azer S, Johnston WM, Clelland N, Kerby RE. Bond strengths of one- and two-step self-etch adhesive systems. J Prosthet Dent. 2007 Apr;97(4):216-22.*

continued on page 60

 continued from page 59

Cementation, while used generically, often refers to delivering crowns using such a medium that bonds to the enamel and dentin of the tooth. Cements used in cementation etch the tooth using weak acids within the cement itself, with resin-modified glass ionomer cements and self-adhesive resin cements being the most popular. These cements offer increased bond strength to the tooth, adding additional retention.

Bonding of crowns, onlays and veneers involves two steps. First, the enamel and dentin of the tooth must be prepared with a bonding agent similar and light activated, followed by treatment of the intaglio surface of the restoration to bond to the cement. Cements used for bonding consist of resin, and may be self-cure, dual-cure or light-cure only. Care should be taken to ensure that the bonding agent and cement are compatible, and the proper cement is selected. Light-cure cements should not be used under metal-based crowns, and self or dual-cure cements should not be used with translucent all-ceramic anterior crowns due to darkening over time.[5]

Bonding Cement to the Indirect Restoration

Properly chemically bonding the cement to the crown, veneer or onlay is as important as bonding to the enamel and dentin for retention. For the intaglio surface of the crown to bond to the cement, it must first be chemically prepared. Glass-based ceramics (such as IPS e.max, IPS Empress and feldspathic porcelain) can achieve an incredibly strong bond to resin cements if first etched with HF acid, and then silanated. Most crowns are HF etched in the laboratory, but must still be properly cleaned after try-in to remove any contaminants prior to bonding. Several products exist for this purpose. Once the etched surface is ready, silane can be applied and dried, forming a chemical bond to glass based ceramics. The prepared surface can then be coated with unfilled resin, light activated and bonded. Care must be taken to use fresh silane, or alternative systems such as Interface by Apex Dental Materials.

Recent primers have been developed that also allow for bonding to zirconium-based crowns. Due to the zirconia structure containing no silica glasses, silane primers have no effect on zirconia. Recent primers such as Bisco's Z-Prime appear to offer high initial bond strengths to resin cement, but do degrade over storage in the oral environment.[6] While this research appears promising, it should be noted there is no long-term data at this point.

Metallic primers also exist to allow adhesion of metal-based restorations to cement. These primers might be useful in aiding retention in over-tapered or short clinical crown preparations. However, the primary retentive feature for any metal-based restoration should be proper preparation form.

Bonding Cheat Sheet

- Higher generations of bonding agents don't mean a better bond (just less steps).
- Total-etch bond strengths are generally higher, while self-etch may have less sensitivity.
- Isolation, isolation, isolation!
- To bond to ceramic, make sure the surface is properly etched and silanated!
- Many dual- and self-cure resin cements may darken over time, careful in the anterior!
- New primers appear to allow bonding to zirconia, but don't rely on adhesion alone.
- Always follow the directions!

5. Painless Anesthesia

Nothing builds a practice like not hurting people, and mastering painless anesthesia does just that.

For maxillary injections, adequate exposure to topical anesthetic allows for painless penetration of the tissue. Slow injection of any anesthetic has been found to decrease pain. Recently, buffering systems for dental carpules such as the Onset system have entered the market to aid in minimizing the discomfort associated with the low pH of dental anesthetics.[7]

X-Tip System (Note use of no vasoconstrictor)

Interseptal Anesthesia Administration

5. *Kilinc E, Antonson SA, Hardigan PC, Kesercioglu A. Resin cement color stability and its influence on the final shade of all-ceramics. J Dent. 2011 Jul;39 Suppl 1:e30-6.*
6. *Perdigão J, Fernandes SD, Pinto AM, Oliveira FA. Effect of artificial aging and surface treatment on bond strengths to dental zirconia. Oper Dent. 2013 Mar-Apr;38(2):168-76.*
7. *Christoph RA, Buchanan L, Begalla K, Schwartz S. Ann. Pain reduction in local anesthetic administration through pH buffering. Emerg Med. 1988 Feb;17(2):117-20.*

Mandibular blocks can be much more comfortable using the same principles as described above. However, oftentimes the most comfortable method of mandibular anesthesia may be to avoid blocks altogether.

Mandibular premolars and any anterior teeth can often be anaesthetized by infiltration, especially with articaine. The increased bone penetration of articaine allows for more profound anesthesia without the need for a traditional mandibular block. Mandibular molars can often also be anaesthetized without the need for a block by intra-osseous injections through systems like the x-tip (Fig. 4), or injecting through the gingival col with backpressure (Fig. 5). Studies have shown intraosseous injection techniques to be successful in 93-95 percent of mandibular first and second molars.[8] Interseptal anesthesia (ISA) through the gingival col can often be performed with little to no discomfort in more than 80 percent of patients, with 87 percent of patients reporting either no or very minor discomfort during the restorative procedure following the use of ISA.[9] Compared to the PDL injection, the ISA technique has also demonstrated more profound anesthesia, and is believed to be a safe alternative to inferior alveolar blocks for primary anesthesia of the mandibular posterior teeth.[10] Clinically, this injection can be performed quite comfortably by first infiltrating apical to the site with articaine, followed by penetration of the col at a 45-degree angle, delivering anesthetic with pressure over at least 20 seconds using a back pressure syringe. The x-tip and gingival ISA injection provide adequate anesthesia many times to perform most restorative procedures, however special equipment is required. It is also worth mentioning that no anesthesia is not without risk, including possible tissue necrosis, and possibly bony damage in the case of the x-tip.

Typical emergence profile of interproximal composite restorations using a Toffelmier matrix (a), and a sectional matrix system (b).

Anesthesia Cheat Sheet

- Buffered anesthetics may provide greater comfort and onset for infiltrations and blocks using lidocaine.
- Articaine often allows for the successful infiltration of mandibular premolar and anterior teeth.
- ISA injection techniques have been shown to be a comfortable and effective replacement for inferior alveolar nerve blocks for restorative procedures.

6. Matrices

In 1946, Dr. Joseph Benjamin Franklin Tofflemire invented his famous Tofflemire matrix band and holder. With 63 percent of dental schools today no longer teaching amalgam as the preferred posterior restorative material, is it time to upgrade your matrix technology.[11]

The traditional Tofflemire matrix band was of course designed for the use of amalgam restorations. While the Tofflemire offers some distinct advantages, such as the ability to create a tight gingival seal, newer sectional matrices designed for composite can offer broader, tighter contacts.[12]

The most recent examples of sectional matrices include the V3 ring system by Triodent, the Palodent Plus by Kerr, and the Composi-Tight 3D by Garrison Dental. Clinically, use of these systems yields restorations with a much more anatomical emergence and contour (Fig. 6). In addition, having the height of contour closer to the middle third of the tooth creates a much tighter and broader contact, in less time than traditional Tofflemire systems. While the entry costs of these systems may be higher, the increase in efficiency and consistently tight contacts offers a strong argument to consider the plunge.

Advancements have also been made to the original Tofflemire system. The Greater Curve Tofflemire Band combines some of the advantages of both traditional Tofflemire band matrices and newer sectional matrices. Due to the unique curve of the Great Curve bands, also known as banana bands, contacts are much broader and similar in emergence to that of sectional matrices. Since the Greater Curve is a circumferential matrix, an excellent marginal seal is also accomplished similar to a conventional Tofflemire band. Other distinct advantages of the Greater Curve bands are cost and convenience. Without the need for

8. *Gallatin J, Reader A, Nusstein J, Beck M, Weaver J. A comparison of two intraosseous anesthetic techniques in mandibular posterior teeth. J Am Dent Assoc. 2003 Nov;134(11):1476-84.*
9. *Doman SM. An audit of the use of intra-septal local anaesthesia in a dental practice in the South of England. Prim Dent Care. 2011 Apr;18(2):67-71.*
10. *Biocanin V, Brkovic B, Milicic B, Stojic D. Efficacy and safety of intraseptal and periodontal ligament anesthesia achieved by computer-controlled articaine + epinephrine delivery: a dose-finding study. Clin Oral Investig. 2013 Mar;17(2):525-33.*
11. *Liew Z, Nguyen E, Stella R, Thong I, Yip N, Zhang F, Burrow MF, Tyas MJ. Survey on the teaching and use in dental schools of resin-based materials for restoring posterior teeth. Int Dent J. 2011 Feb;61(1):12-8.*
12. *Wirsching E, Loomans BA, Klaiber B, Dörfer CE. Influence of matrix systems on proximal contact tightness of 2- and 3-surface posterior composite restorations in vivo. J Dent. 2011 May;39(5):386-90.*

continued on page 62

 continued from page 61

special equipment, these bands offer a nice solution with a minimal cost, and total portability for the associate working in different locations.

With the right tool for the right job, you will find your interproximal restorations to demonstrate a higher level of consistency, in less time with less stress.

7. Communication

In a groundbreaking 1997 study, Levenson et al. found that surgeons that were least sued were not necessarily the ones that performed the simplest surgeries, or who had the most extensive credentials. Instead, the doctors who were sued the least spent on average three more minutes in consultation with patients, educated patients about expectations of outcomes, used humor, laughed more and engaged patients throughout the process.[13]

Next time you're performing a procedure with more risks or potentially less than ideal outcomes, remember this study. The time to discuss a deep filling is before post-operative sensitivity or pulpitis. The possibility and management of a sinus exposure is easiest explained before taking out #14. Spend more time with patients, inform of the risks and benefits of treatment, including no treatment, and use words patients can understand. If a filling is deeper than anticipated, let the patient know the decay was close to the nerve, and say you're going to let the tooth decide if it needs further treatment. In the event of a sinus exposure, tell patients that most heal uneventfully if sinus precautions are followed (after proper surgical management of course), but if it does not heal, another procedure will need to be done. Be informative, confident, and most of all, caring. Remember, patients seldom sue people they like!

8. IV Sedation for the Fearful Patient

Depending upon the study, severe dental phobia is estimated to affect more than 25 percent of the population.[14] This represents a tremendous amount of patients who avoid dental care due to fear of pain or judgment. While the level of anxiety and stimuli varies from patient to patient, this population can be very rewarding to treat. Conscious sedation allows many fearful patients to receive desired care while under the influence of anxiolytic medications. For the dentist not trained in sedation by a residency, an extensive selection of both oral and IV conscious sedation courses are offered that meet both state and national guidelines. Personally, offering IV conscious sedation has been one of the most rewarding additions to my practice, as well as tremendous practice builder.

While not every patient will need or desire moderate conscious sedation, all dentists should learn how to properly administer a single anxiolytic agent prior to a dental appointment for the anxious patient. A single, lose dose of benzodiazepines such as Triazolam will allow many patients to comfortably endure most shorter operative procedures, often with little to no memory of the procedure or discomfort, while remaining completely lucid and responsive.

The Fearful Patient Cheat Sheet

- Receive the training you need to safely manage these patients, and know your state guidelines regarding permits, training and monitoring.
- Know your limits, and which patients might be better treated under a higher level of sedation that you can provide.
- Always cover medical history, consents, financial arrangements, and ensure a responsible adult to drive and look after the patient before treatment day!

9. Learning

Never stop being a student! I once had a mentor tell me to be weary of the dentist who (thinks he) has it all figured out. As I continue to strive to become a true physician of the masticatory system, the more I discover I need to learn! Never stop asking questions, and always be curious. For the new graduate, remember that your diploma should not be the final goal, but your starting point in a lifetime of learning. Pursue continuing education in any areas that you are passionate about, feel uncertain of, or want to know more. Good continuing education can stimulate the mind, re-energize the body and profoundly impact professional satisfaction. ■

13. *Levinson W, Roter DL, Mullooly JP, Dull VT, Frankel RM. Physician-patient communication. The relationship with malpractice claims among primary care physicians and surgeons. JAMA. 1997 Feb 19;277(7):553-9.*
14. *Grimshaw GP, Boyle CA, Newton T. Dental anxiety levels in British servicemen and women. Community Dent Health. 2012 Sep;29(3):239-42.*

Author's Bio

Dr. Eric Jones maintains a full-time private practice outside of Atlanta, Georgia, focusing on aesthetic and restorative dentistry. Dr. Jones holds professional memberships in the ADA, GDA, AGD, Dawson Academy Alumni Association and the Hinman Dental Society. In addition, Dr. Jones holds a fellowship from the Academy of General Dentistry.

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1. The correct F-Stop/aperture setting the majority of dental photos is:
   a. 1
   b. 5
   c. 9
   d. 22

2. Disposable plastic hinge articulators provide enough accuracy for all restorative situations:
   a. True
   b. False

3. All-ceramic restorations can be ordered from lowest to highest strength as:
   a. IPS Empress, IPS e.max, Feldspathic Porcelain, Zirconia
   b. Feldspathic Porcelain, IPS e.max, IPS Empress, Zirconia
   c. Zirconia, IPS e.max, IPS Empress, Feldspathic Porcelain
   d. Feldspathic Porcelain, IPS Empress, IPS e.max, Zirconia

4. Compared to layered restorations, monolithic crowns:
   a. are weaker than layered crowns.
   b. demonstrate superior aesthetics to layered crowns.
   c. are stronger than layered crowns.
   d. have less clinical indications than layered crowns.

5. Higher generation bonding agents were produced with the goal of:
   a. having much higher bond strengths to enamel and dentin.
   b. simplifying the number of bottles and steps needed to bond.
   c. offering a lower cost bonding agent.
   d. demonstrating greater contamination tolerance.

6. Which of the following cementation protocols should be used:
   a. The use of light-cure resin cements to seat a PFM
   b. The use of dual-cure resin cements to bond an all-ceramic central incisor
   c. Etching an IPS e.max crown with phosphoric acid to bond to cement
   d. Preparing an Empress veneer with HF etch, silane and unfilled resin

7. Interseptal anesthesia:
   a. does not provide adequate numbing for posterior mandibular crowns.
   b. has been shown to have dangerous side effects.
   c. can be performed with a standard aspirating syringe.
   d. has been shown to be a practical alternative to mandibular nerve blocks.

8. A study involving surgeons involved in the most lawsuits found that:
   a. the most recognized and accredited surgeons were involved in less lawsuits.
   b. surgeons performing more complex procedures were involved in more suits.
   c. surgeons who spent more time in consult with patients were sued significantly less.
   d. less experienced surgeons were involved in more suits.

9. Compared to circumferential matrix bands, sectional systems:
   a. produce tighter, more anatomical contacts.
   b. provide a superior seal in subgingival restorations.
   c. require no special armamentarium.
   d. are intended for use with amalgam.

10. A significant portion of the general population has severe dental anxiety or phobia.
    a. True
    b. False

continued on page 64

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❑ Credit Card (please complete the information below and sign; we accept Visa, MasterCard and American Express.)

Card Number _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Expiration Date – Month / Year _____ _____ / _____ _____ _____ _____

Signature _____ Date _____

CE Post-test

Please circle your answers.

1.	a	b	c	d
2.	a	b		
3.	a	b	c	d
4.	a	b	c	d
5.	a	b	c	d
6.	a	b	c	d
7.	a	b	c	d
8.	a	b	c	d
9.	a	b	c	d
10.	a	b		

Program Evaluation (required)

Please evaluate this program by circling the corresponding numbers: (5 = Strongly Agree to 1 = Strongly Disagree)

1. Course administration was efficient and friendly	5	4	3	2	1
2. Course objectives were consistent with the course as advertised	5	4	3	2	1
3. COURSE OBJECTIVE #1 was adequately addressed and achieved	5	4	3	2	1
4. COURSE OBJECTIVE #2 was adequately addressed and achieved	5	4	3	2	1
5. COURSE OBJECTIVE #3 was adequately addressed and achieved	5	4	3	2	1
6. COURSE OBJECTIVE #4 was adequately addressed and achieved	5	4	3	2	1
7. COURSE OBJECTIVE #5 was adequately addressed and achieved	5	4	3	2	1
8. Course material was up-to-date, well-organized, and presented in sufficient depth	5	4	3	2	1
9. Instructor demonstrated a comprehensive knowledge of the subject	5	4	3	2	1
10. Instructor appeared to be interested and enthusiastic about the subject	5	4	3	2	1
11. Audio-visual materials used were relevant and of high quality	5	4	3	2	1
12. Handout materials enhanced course content	5	4	3	2	1
13. Overall, I would rate this course:	5	4	3	2	1
14. Overall, I would rate this instructor:	5	4	3	2	1
15. Overall, this course met my expectations	5	4	3	2	1

Comments (positive or negative): _____

For questions, contact Director of Continuing Education Howard Goldstein at hogo@dentaltown.com