Choosing and Using Permanent Luting Cements
By: Mark Konings, Ph.D., MBA and Daniel Krueger

Luting Agents: Agents that bond, seal, or cement particles or objects together.¹

Background – Fifty years ago dentists had a relatively simple time choosing permanent luting cements and indirect restorative materials—gold crowns and zinc phosphate cement! How complicated things have become in the intervening years. Dental manufacturers have responded to the demands of the market by providing more natural looking, esthetic, and metal-free restorative materials. Although zinc phosphate cements, used in dentistry for well over 100 years,² may have been adequate for luting mechanically retentive metal-based restorations, the low strength, poor esthetics, difficult mixing protocol, potential for sensitivity, limited adhesion, and high solubility³ makes them a poor choice for many modern clinical situations. To improve this a succession of new cement technologies were developed to satisfy the higher demands of these newer restorations. As a result, today’s clinician faces a myriad of combinations of restorative materials, luting cements, and clinical situations, some of which may be incompatible with each other. This article hopes to help practicing clinicians choose and use permanent cements reliably and easily.

Cement Types – At the highest level, all permanent cements can be put into one of two broad categories, luting cements and bonding cements (adhesive cements). Luting cements are those that achieve retention by filling in gaps between the restoration and the tooth and setting, i.e., turning into cement. Adhesion, if any, is a surface phenomenon comprised of wetting and micromechanical interlocking. Bonding cements differ from luting cements in two ways. First, they are stronger so for a given level of “gap filling” they will offer greater retention and superior support for weak restoration types. In the case of exposed margins, the increased strength leads to improved wear resistance, especially important when seating inlays or onlays.⁴ Second, they have much higher adhesion, extending beyond a surface phenomenon. For adhesion to tooth structure there may be penetration into the smear layer, if present, or into dentin tubules. Bonding to the restoration may be achieved by the aid of primers to allow for chemical adhesion to inorganic filler or metal oxides.

Luting cements, because they are used almost exclusively under metal-based restorations, are self-cured. Bonding cements may be self-cured, dual-cured, or light-cured.

Today there are four major classes of luting cements with a significant presence in the market—zinc phosphate, polycarboxylate, conventional glass ionomers, and resin-modified glass ionomers.⁵ There is only one type of bonding cement, composite resin cements (of which there are three subtypes). The main development trends in new cement products are very clear, stronger, less soluble, more adhesive, more esthetic, and easier to use. Table 1 lists the main advantages and disadvantages of the different types as well as the leading product brands⁶ in each class. Table 2 presents a list of recommended cements according to restoration type.

The oldest technologies, zinc phosphate, polycarboxylate, and conventional glass ionomers, share two advantages—a long, well-understood clinical history and low price. When used properly and where indicated, each can give excellent results. The list of disadvantages is much longer.
Table 1. Overview of Cements

<table>
<thead>
<tr>
<th>Cement Type</th>
<th>Leading Brand Names</th>
<th>Primary Strengths</th>
<th>Primary Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Phosphate</td>
<td>Fleck’s™</td>
<td>-Long clinical experience</td>
<td>-Occasional postoperative sensitivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-High solubility</td>
<td>-Low hardness</td>
</tr>
<tr>
<td>Polycarboxylate</td>
<td>Durelon™</td>
<td>-Low fluoride ion release</td>
<td>-High solubility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Low postoperative sensitivity</td>
<td>-Low adhesion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Low hardness</td>
<td>-Low hardness</td>
</tr>
<tr>
<td>Conventional Glass Ionomer</td>
<td>Ketac® Cem</td>
<td>-Fluoride ion release</td>
<td>-Occasional postoperative sensitivity</td>
</tr>
<tr>
<td></td>
<td>Fuji 1®</td>
<td>-Adhesion to tooth and metal</td>
<td>-Some moisture sensitivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Ease of use</td>
<td>-Marginal solubility</td>
</tr>
<tr>
<td></td>
<td>RelyX® Luting Cement</td>
<td>-Low or no marginal solubility</td>
<td>-Swelling or linear expansion</td>
</tr>
<tr>
<td></td>
<td>Fuji PLUS®</td>
<td>-Ease of use</td>
<td>-Moisture sensitive powder</td>
</tr>
<tr>
<td></td>
<td>FujiCEM™</td>
<td>-Low postoperative sensitivity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Good routine cement</td>
<td></td>
</tr>
<tr>
<td>Resin-Modified Glass Ionomer</td>
<td>RelyX® Luting Cement</td>
<td>-Fluoride ion release</td>
<td>-Swelling or linear expansion</td>
</tr>
<tr>
<td></td>
<td>RelyX® Luting Plus Cement</td>
<td>-Adhesion to tooth and metal</td>
<td>-Moisture sensitive powder</td>
</tr>
<tr>
<td></td>
<td>Fuji PLUS®</td>
<td>-Low or no marginal solubility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FujiCEM™</td>
<td>-Ease of use</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Low postoperative sensitivity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Good routine cement</td>
<td></td>
</tr>
<tr>
<td>Composite-Resin</td>
<td>Variolink® II</td>
<td>-High strength</td>
<td>-Technique sensitive</td>
</tr>
<tr>
<td>-Total Etch Cement Systems</td>
<td>Calibra®</td>
<td>-Esthetics</td>
<td>-Requires use of separate etchant and/or primer and adhesives.</td>
</tr>
<tr>
<td></td>
<td>C&amp;B Metabond®</td>
<td>-Low solubility</td>
<td>-Potential for postoperative sensitivity</td>
</tr>
<tr>
<td></td>
<td>RelyX® Veneer Cement</td>
<td>-High adhesion</td>
<td>-Difficult cleanup</td>
</tr>
<tr>
<td>-Self-Etching Primer Cement Systems</td>
<td>Panavia™ F</td>
<td>-High strength</td>
<td>-Difficult cleanup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Low solubility</td>
<td>-Separate primer required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-High adhesion</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-No etching required on dentin</td>
<td></td>
</tr>
<tr>
<td>-Self-Adhesive Cement Systems</td>
<td>RelyX® Unicem Cement</td>
<td>-High strength</td>
<td>-Limited clinical history</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-High adhesion</td>
<td>-Available only in capsule delivery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Esthetics</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>-Ease of use</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Low postoperative sensitivity</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>-Low solubility</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Easy clean up</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Indications Chart – Cement Recommendations

<table>
<thead>
<tr>
<th>Cement Type</th>
<th>Metal/ PFM crowns/bridges inlays/onlays</th>
<th>Composite crowns/ inlays/onlays</th>
<th>All-zirconia or all-alumina strengthened-core ceramic crowns/bridges</th>
<th>Traditional feldspathic or pressed ceramic crowns/inlays/onlays</th>
<th>Composite or ceramic veneers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Phosphate</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Polycarboxylate</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Glass Ionomer</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Resin-Modified Glass Ionomer</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Composite-Resin</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

1 For nonretentive preps or for Maryland bridges, composite-resin cements should be used to improve retention.

2 For these restorations, esthetic and wear resistance needs must be assessed to determine if the GI-based cements will be sufficient and complement the restoration. If not, composite-resin cement should be used. Also, if enough mechanical retention is not available, composite-resin cement should be used.

3 For most composite-resin cements, with the exception of some self-etching-based systems (i.e., RelyX Unicem), this is typically more work and effort than is needed for metal-based restorations that have sufficient built in retention. It also may increase the potential for patient sensitivity and difficulty in cleanup.

4 Light-cure only systems are preferred to maximize potential for color stability. Self-cure systems or light-curable “base” components from dual-cure systems have greater potential for color change over time.
including high solubility, low strength, hand-mixing powders and liquids (although some are available in unit-dose capsules), poor esthetics, and low or no adhesion to tooth structure. Their main applications are for metal or metal-supported restorations with mechanically retentive preps. Because of their low strength and low adhesion, they are contraindicated for most ceramic-based and all composite-based restorations. Polycarboxylate cements were state of the art when they were introduced about 40 years ago, but now find significant use as long-term provisional cements. Reality categorizes polycarboxylate cements under provisional cements. Cements of these three types comprise about one-third of applications, and are seeing consistently eroding market shares.

The fourth and most dominant luting cement type, the resin-modified glass ionomers, were commercialized in 1994 with the introduction of Vitremer™ Luting Cement from 3M ESPE (renamed RelyX™ Luting Cement in 1999). Other products soon followed. As the description implies, from a technological perspective these cements were formulated by adding methacrylate monomers and cure initiators to traditional glass ionomer cements. In some cases, the polyacrylic acids are modified to include curable methacrylate groups. These modifications brought significant improvements to luting cements, including easy cleanup, improved adhesion to tooth structure to aid in retention, higher strength (also to aid retention), very low solubility to virtually eliminate washout from margins, and very low rates of postoperative sensitivity while maintaining high levels of fluoride release. Anecdotal reports based on clinical observations have linked resin-modified glass ionomer luting cements with post-cementation fracture of all-ceramic crowns. However, with the exception of one product, since discontinued, this problem may not be significant. Recent improvements, focused on improving ease of use and reliability, lead to the introduction of paste/paste technologies, and these products are seeing the strongest growth.

Although the strength and adhesion is improved compared to the other luting cements, from a clinical perspective these improvements are not significant and resin-modified glass ionomers do not expand the indications over other luting cements. Although some manufacturers indicate them for use with porcelain and composite inlays, the conservative clinician will limit their use to metal, metal-based, and core-strengthened, glass-free ceramic restorations with retentive preps. Composite Resin Cements – As their name suggests, these cements are modified composite restorative materials and have the advantages of high strength, high adhesion, low solubility, and esthetics. This allows them to be used with weak, esthetic restoration types such as glass-ceramics and indirect composite or in cases where there are concerns about retention. Although two-part, paste/paste, dual-cured formulations are most common, they may be self-cured, dual-cured, or light-cured and hand-mixed, auto-mixed, or capsule mixed. Like direct-composite restorative materials, most need to be used with bonding systems. There are three subtypes—total-etch systems, self-etching primer systems, and self-adhesive systems.

The total-etch systems have three main steps. First, an acid etch is applied to the tooth and then rinsed and lightly dried (overdrying can lead to sensitivity). Next, a bonding agent is applied, frequently in several coats, and then cured. The bonding agent may be light-cured or a two-part, self-cured system. Finally, the cement is mixed (for self-cured and dual-cured), applied to the restoration, seated, cleaned up, and cured. Most total-etch systems are dual-cured or light-cured. Some are only indicated under all-ceramic or composite restorations. In the self-etching primer systems, the acid etching and bonding steps are replaced with a self-etching primer, typically a two-part system that needs mixing. There are enough differences in protocol between the different cements brands that reading product instructions thoroughly is important as well as using the adhesive or primer and cement from the same manufacturer.

The total-etch and self-etching primer cements have been technique sensitive. These systems are hydrophobic and lack moisture tolerance. The introduction of water or oral fluids at any point during the multistep bonding procedure can lead to lower bond strengths, introduces the potential for postoperative sensitivity, and limits their clinical use. These cements are not indicated in clinical situations where rigorous moisture control cannot be achieved. For most clinical situations, the use of retraction cords and a rubber dam is recommended. These technique issues are not experienced in laboratory testing where the cements prove to be very reliable. By contrast, most luting cement formulations contain water and are tolerant of moisture.

The self-adhesive cements are the newest and most popular type of composite resin cement. The first product, RelyX™ Unicem Self-Adhesive Universal Resin Cement from 3M ESPE, was introduced in 2002 and already is the #1 cement in the U.S. market. This capsule dispensed, dual-cure cement eliminates the separate etching and bonding steps needed with the other composite resin cement systems leading to a simplified procedure. Unlike other resin cement types, RelyX Unicem has unique, moisture-tolerant chemistry with a low risk of postoperative sensitivity. Independent studies indicate a rate of postoperative sensitivity less than 0.5%. With a broad range of indications, a simplified procedure, and moisture tolerant chemistry the self-adhesive cements can be considered the first true universal indication cements. A second self-adhesive cement was introduced recently and abstracts presented at scientific meetings indicate additional products will be introduced in the future.

Restoration Material Types – The choice of indirect material limits the choice of clinically recommended cements. The most critical factor is the strength of the restoration. Weak restorations, e.g., all-porcelain or all-composite crowns, inlays, onlays, and veneers, must be adhesively bonded with strong cements. If a weak material is not supported by a strong cement, the probability of restoration fracture increases. A strong, adhesively bonded cement allows the forces applied to the restoration to be dissipated away from the point of contact while weak, nonbonded cements keep the applied forces concentrated at the point of contact. To enhance the bond strength between the cement and porcelain or glass ceramics, silane coupling agents should be used. Metal or metal-based restorations, on the other hand, have sufficient strength to allow the use of any cement type.

Not surprisingly, according to one recent poll, most porcelain-fused-to metal crowns are cemented with traditional luting cements with over half of all clinicians choosing resin-modified glass ionomers. The advent of newer, strengthened-core ceramic systems such as Procera™ (Nobel Biocare), Lava™ All-Ceramic System (3M ESPE), and Cercon® (Dentsply), has opened the door to a broader range of metal-free, esthetic restorations, including metal-free posterior bridges up to four units. In addition, these core-strengthened systems can be cemented with conventional luting agents. In some cases, esthetic considerations may suggest using composite resin...
cements. Table 3 presents a list of material types and associated brand names.

Clinical Situation – Although there is a close interplay of decisions on clinical situation, restoration type, and cement type, the determination of cement type begins with the clinical situation and not vice versa. Clearly clinicians do not decide what cement they want to use and then determine the restoration type and then location of the margin! The key clinical factors that determine restoration and cement type include esthetic demands, ability to maintain a dry field, chewing forces (anterior/posterior, male/female, bruxer/nonbruxer), tooth structure remaining, preparation design (retentive/nonretentive), and location of margin (occlusal/nonocclusal). These must all be taken into consideration during the treatment-planning phase to ensure a successful restoration.

Summary – Although there are many choices today, choosing and using the proper cement is not that difficult. The primary rule to remember is that strong restorations with retention can be luted with any cement whereas weak restorations or those with little retention must be bonded with strong cements, i.e., composite resin. Except for the new self-adhesive cements, the composite resin cements can be technique sensitive and require excellent fluid/moisture control. The newest restorative systems, the ytria-stabilized zirconias such as Lava™ and Cercon®, combine high strength and excellent esthetics and allow for standardization of material for a broad range of full coverage restorations. In some ways we have come full circle from the days of gold crowns and zinc phosphate cement. Today’s clinician could choose a single restoration type, for example, Lava™ in combination with RelyX™ Unicem cement for nearly all their full coverage crowns and bridges.

Glossary of Terms

1. Cementation: Attachment of an appliance or a restoration to natural teeth or attachment of parts by means of a cement.
2. Luting Cement: Luting cements achieve retention by filling in gaps between the restoration and the tooth and setting, i.e., turning into cement. Retention is by mechanical means.
3. Bonding/Adhesive Cementation: Cementation that is achieved by the use of a separate adhesive or primer that allows for the bonding or adhesion of the cement to the tooth structure or the restoration.
4. Light-Cured Cement: A cement that contains a photoinitiator that is only polymerized by exposure to light. These cements do not contain components that allow the cement to polymerize in the absence of light. This allows for greater working time, fast setting time and potentially greater color stability. These cements are particularly effective for ceramic or composite veneers.
5. Self-Cured Cement: A cement that consists of two components, typically a base and a catalyst. The mixture of the base and catalyst results in the polymerization of the cement in the absence of light. This allows for the cementation of metallic-based restorations or thicker and more opaque ceramic restorations. These cements may not be as color stable as a light-cured only cement.

Table 3. Restoration Material Classifications

| 1. Metal and Metal-based                        |
| - Nonprecious                                   |
| - Semiprecious                                  |
| - Precious                                      |
| 2. Composite Resins                             |
|   a. Laboratory Fabricated                      |
|     i. Sinfony™                                  |
|     ii. Concept® HP                             |
|     iii. Sculpture®                             |
|   b. Operatory Fabricated                       |
|     (CEREC®-based materials)                    |
|     i. Paradigm™ MZ100                          |
| 3. Ceramic-based Systems                        |
|   a. Traditional Feldspathic and Pressable       |
|     glass-creamic systems (lower flexural strength) |
|     i. Laboratory Fabricated                    |
|       1. Finesse® All-Ceramic                   |
|       2. Fortress® Porcelain                     |
|       3. IPS Empress® Estheti                    |
|       4. Authentic®                              |
|     ii. Operatory Fabricated                    |
|     (CEREC®-based materials)                    |
|       1. Vitablocs® Mark I                      |
|       2. ProCAD® Blocks                         |
|   b. Strengthened Core Ceramic Systems          |
|     i. Laboratory Fabricated                    |
|       1. Glass Infiltrated alumina               |
|       a. In-Ceram® Alumina                      |
|       2. Glass Infiltrated Zirconia              |
|       a. In-Ceram® Zirconia                      |
|       3. All-Alumina systems (glass free)        |
|       a. Procera® Allceram                      |
|       4. All-Zirconia systems (glass free)       |
|       a. Lava™ All Ceramic System                |
|       b. Cercon® Zirconia                       |
6. Dual-Cured Cement: A cement that consists of two components, typically a base and catalyst. The cement is versatile because it contains both the photoinitiator for light-curing and the chemicals for self-curing. Once mixed, the cement can be polymerized by light exposure or allowed to set on its own via the self-curing mechanism. This allows for versatility of use with the cement, however, these cements may not be as color stable as a light-cured only cement.

7. Ceramic Primer: A primer comprised of a silane coupling agent that allows the acrylate components of a cement to chemically bond to the glass components of a ceramic material.

8. Metal Primer: A primer that allows the acrylate components of a cement to chemically bond to a metal surface.

9. Hydrofluoric Acid: A strong acid that will etch or dissolve the glass components on the surface of a ceramic leaving a microporous surface for the cement to flow into resulting in a micromechanical bond between the cement and the ceramic.

10. Phosphoric Acid: An acid that is typically used on the tooth to demineralize the dentin. It is not strong enough to etch the glass ceramic materials. It is, however, a good material to use for cleaning the bonding surfaces of the restoration after try-in to remove any contaminants such as blood, saliva, and oils.

11. Self-Etching Primer: An acidic-based primer that allows a standard composite-resin cement to adhere to tooth structure. The self-etching primers avoid the use of etchants and adhesives and provide for a faster procedure with reduced potential for sensitivity. These primers are available in products such as Panavia™ F (Kuraray) and MultiLink® (Ivoclar).

12. Self-Adhesive Cement: A cement that contains an acidified methacrylate that allows for self-adhesion or self-etching of the cement to tooth structure without the use of an etchant and adhesive or a self-etching primer. This allows for a faster procedure with reduced potential for sensitivity. RelyX™ Unicem (3M ESPE) is an example of a self-etching cement system.

References
5. Compomer cements, introduced with much promise in the mid-1990s, never achieved market shares above about 2%–3%, and currently have market shares less than 1%.
6. Strategic Dental Marketing.
10. Materials of this type include Lava™, Cercon™, Procera™.
14. RelyX™ Unicem cement is indicated for virtually all indirect restorations except veneers.
15. Nguyen TT, Qian X, Tobia D “Mechanical properties of self-adhesive cements” IADR Abstract #0514.
16. Silane coupling agents can react chemically with residual SiO groups in glassy materials and some ceramic filled composite restorations. They do not increase adhesion in glass-free materials such as Procera or Lava.
RelyX™ Unicem Cement can take you just about anywhere.

RelyX™ Unicem Self-Adhesive Universal Resin Cement from 3M ESPE has made the road a lot smoother and easier for you. There’s no need to stock a number of different permanent cements because RelyX Unicem self-adhesive universal resin cement does virtually everything.

- Ideal for virtually ALL metal and nonmetal restorations except for veneers; for veneers, use RelyX™ Veneer Cement.
- Combines the advantages of both conventional luting cements (ease of use) and resin cements (strength and esthetics).
- It's self-adhesive — no need for separate etching, priming, or bonding steps.

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†Source: Strategic Dental Marketing, Inc.
1. What is the main advantage of zinc phosphate cements?
   a. Ease of mixing
   b. Esthetics
   c. Long clinical history
   d. Wide range of clinical indications

2. Resin-modified glass ionomers cements have a broader range of indications compared to other traditional luting cements?
   a. True
   b. False

3. Which cement type is used most often to cement porcelain fused to metal crowns?
   a. Zinc phosphate
   b. Polycarboxylate
   c. Conventional glass ionomers
   d. Resin-modified glass ionomers
   e. Composite resin

4. Why do all-porcelain restorations need to be adhesively bonded?
   a. To achieve required esthetics
   b. Because they are weak
   c. Because the procedure is easier

5. Which cement type is indicated for an indirect composite inlay?
   a. Zinc phosphate
   b. Polycarboxylate
   c. Conventional glass ionomers
   d. Resin-modified glass ionomers
   e. Composite resin

6. Which cement type is indicated for a gold crown?
   a. Zinc phosphate
   b. Polycarboxylate
   c. Conventional glass ionomers
   d. Resin-modified glass ionomers
   e. Composite resin
   f. All of the above

7. What is a common reason for postoperative sensitivity when using composite resin cements?
   a. Inadequate light-curing of the cement
   b. Overdrying the tooth
   c. Failure to achieve proper moisture control
   d. Failure to use retraction cords and a rubber dam
   e. Difficult to follow, multistep procedure
   f. All of the above

8. What is the primary mechanism by which luting cements achieve retention?
   a. Gap-filling and setting
   b. Chemical adhesion to tooth structure
   c. Chemical adhesion to the restoration
   d. All of the above

9. Which composite resin cement subtype has the simplest procedure?
   a. Total etch
   b. Self-etching primer
   c. Self-adhesive

10. Glass ceramic restorations need to be etched with what type of acid?
    a. Hydrofluoric acid
    b. Phosphoric acid
    c. Citric acid

11. Which of the following brands of restorative materials should be treated with a ceramic primer?
    a. Procera
    b. Empress
    c. Lava
    d. Cercon

12. Which cement type is preferred for bonding porcelain veneers?
    a. Self-adhesive composite resin
    b. Light-cure total etch composite resin
    c. Resin-modified glass ionomers
    d. Polycarboxylate

13. Why are total etch resin cements typically not used in metal-based restorations?
    a. Difficult procedure
    b. Potential for post-operative sensitivity
    c. Cost
    d. Time
    e. All of the above

14. A phosphoric acid etch is indicated for use with a self-adhesive composite resin cement?
    a. True
    b. False
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1. Completely fill in information and payment section. (Enclose payment.)
2. Answer sheet must be completed in pen.
3. All test questions have only one answer.
4. After completing test, mail to: Sullivan-Schein, Attn: CEHP, 26600 Haggerty Road, Farmington Hills, MI 48331.

☐ If you wish to receive your score with your certificate, please check this box.

Please direct all questions or requests for more information pertaining to this course to: Sullivan-Schein 1-800-686-4200, x3608.

Participants will receive confirmation of passing by receipt of a certificate.

Course Evaluation

Please evaluate this course by responding to the following statements, using a scale of Excellent=4 to Poor=0.

1. The content was valuable:
   4  3  2  1  0

2. The questions were relevant:
   4  3  2  1  0

3. The course gave you a better understanding of the topic:
   4  3  2  1  0

4. Rate the overall value to you:
   4  3  2  1  0

5. Would you participate in a program similar to this one in the future on a different topic of interest?
   _____ Yes _____ No

Any additional comments:

________________________________________________________________________

________________________________________________________________________

ANSWER SHEET

1. A B C D  8. A B C D
   2. A B
   3. A B C D E
   4. A B C
   5. A B C D E
   6. A B C D E F
   7. A B C D E F
   9. A B C
   10. A B C
   11. A B C D
   12. A B C D
   13. A B C D E
   14. A B