Evolution of Comprehensive Care, Part 3

Periodontal Treatment Continues to Evolve

Authored by Gregori M. Kurtzman, DDS, and Mary K. Hughes, RDH, BS

Upon successful completion of this CE activity, 3 CE credit hours may be awarded
Evolution of Comprehensive Care, Part 3

Periodontal Treatment Continues to Evolve

Effective Date: 05/01/2015  Expiration Date: 05/01/2018

About the Authors

Dr. Kurtzman is in private general practice in Silver Spring, Md. A former assistant clinical professor at University of Maryland, he has earned Fellowship in the AGD, American Academy of Implant Prosthodontics, American College of Dentists, International Congress of Oral Implantologists (ICOI), Pierre Fauchard Academy, Association of Dental Implantology; Masterships in the AGD and ICOI; and Diplomate status in the ICOI and American Dental Implant Association. He has lectured internationally on the topics of restorative dentistry, endodontics, implant surgery and prosthetics, removable and fixed prosthetics, and periodontics, and he has published more than 400 articles. He has been included in Dentistry Today’s Leaders in Continuing Education directory since 2006. He can be reached via email at the following address: dr_kurtzman@maryland-implants.com.

Disclosure: Dr. Kurtzman received honoraria from DenMat for writing this article.

Ms. Hughes is a clinical dental hygienist who graduated from the State University of New York with a bachelor’s degree in health science. She is the global training and education manager for DenMat and is an international lecturer on the concepts of periodontal treatment in the general practice setting. She is also certified as a professional selling skills trainer by Achieve Global—a widely recognized leader in consultative selling, training, and personnel development. She can be reached at (716) 462-9230 or via email at mhughes@denmat.com.

Disclosure: Ms. Hughes holds a salaried position as global education manager with DenMat.

ADJUNCTIVE IN-OFFICE LOCALIZED MEDICAMENTS

Localized medicaments are geared toward antibacterial activity. These are used either at specific sites in the quadrant when periodontitis is present or utilized for the entire quadrant following scaling and root planing procedures.

When only isolated sites are to be treated in the quadrant, recurrent sites are not healing as expected, periodontal abscesses have presented, or ailing implants are noted, 2 materials are presently available—Arestin (Orapharma) and Periochip (Dexcel Pharma Technologies).

Arestin, a sustained release minocycline hydrochloride powder, is supplied in single-site compules that are dispensed using a dedicated syringe into the pocket (Figure 1). Minocycline—a 2nd generation, semi-synthetic tetracycline that has been in therapeutic use for more than 30 years because of its antibiotic properties against both gram-positive and gram-negative bacteria—has shown good clinical application in treatment of periodontitis in localized, site-specific therapy. Evidence supports the adjunctive use of sustained release local antimicrobials following scaling in deep or recurrent periodontal sites to reduce pocket depth.1,2 A significant reduction of pocket depth and gain in attachment with dramatic improvement has been shown clinically.

The compule of Arestin is loaded into the syringe, the tip is introduced to the depth of the pocket to be treated, and the pocket is backfilled with the minocycline powder (Figure 2). Larger, deeper pockets may require more than one compule to fill the site. This medicament is designed for selective sites and cost can be a factor if multiple sites in the quadrant need to be addressed.

The Periochip is a solid chip containing chlorhexidine gluconate that is placed into the pocket and allowed to dissolve over a period of time, exerting its antibacterial effects throughout time. As with Arestin, it is designed for treatment of isolated pockets and not intended to treat multiple sites in a quadrant due to cost issues. Periochip is packaged with a single chip per package (Figure 3). At room temperature, the chip is flexible and may make placement difficult, so it is recommended these be stored in the refrigerator to stiffen them to aid in making placement easier. The chip is taken out of the refrigerator when it is ready to be placed and removed from the package. Utilizing cotton pliers, it is slipped in and positioned at the bottom of the pocket (Figure 4). The chip should be fully
Evolution of Comprehensive Care, Part 3

within the pocket with none of the chip exposed supragingivally; therefore, it is indicated for use in deeper pockets. Throughout time, the material dissolves and flows around the tooth's sulcus, so only one chip is indicated for each tooth being treated and no added benefit has been found using more than one chip per tooth.

When multiple sites are requiring treatment either in the quadrant or half-mouth, Atridox (DenMat), a doxycycline hydrochloride, is the preferred antibacterial adjunctive material to be utilized. Atridox has been proven in the literature to achieve reduction in pocket depth, reduction in bleeding upon probing, and an increase in attachment gain. This has also been reported as a good adjunct when treating ailing implants.

Atridox is supplied as 2 separate syringes, one containing the doxycycline powder (syringe A) and the other containing a liquid polymer (syringe B). When ready to use, the 2 syringes are locked together and held vertically, then mixed by forcing the material from one syringe to the other several times until fully mixed and finally leaving the contents in syringe A when complete. The syringes are uncoupled and a blunt cannula is attached, which is curved to aid in easier use intraorally. The syringe and cannula are taken to the mouth following completion of scaling and starting at the most distal tooth on the buccal in the quadrant. The tip is placed to the bottom of the pocket and the polymer is expressed to completely fill the pocket. As the syringe tip is removed, the tip is pressed to the tooth's surface to separate the material and not pull out the material expressed into the pocket. Alternatively, a wet instrument is used to cut the polymer before removing the tip from the tooth. This process is repeated for each tooth in the quadrant, moving mesially, and then is repeated lingually for each tooth. There is sufficient material in the syringe in the sulcus to treat an entire quadrant and is more cost-effective when treating multiple sites than Arestin or the Periochip.

**Figure 2. Arestin being placed into the pocket to be treated.**

**Figure 3. Periochip (Dexcel Pharma Technologies) being removed from its individual package ready for placement.**

**Figure 4. Placement of the Periochip into the sulcus at site to be treated.**

NATURAL TEETH VERSUS IMPLANTS: IS THERE A DIFFERENCE?

It is important to understand the periodontal relationship between the gingiva and the structure it attaches to, be it a natural tooth or an implant. The fiber orientation of the gingival cuff around a natural tooth attaches perpendicularly to the long axis of the tooth. This acts as a barrier when inserting a periodontal probe within the sulcus. The probe tip advances apically until the tip contacts the perpendicular fibers and is halted. This orientation is not seen around implants. With an implant, the gingival fiber orientation is parallel to the implant's long axis. When a periodontal probe is inserted into the sulcus around an implant, the probe tip advances, passing between the fibers of the gingival cuff until the crestal bone prevents it from further advancement.

The peri-implant mucosal seal is a less effective barrier to bacterial apical movement than the periodontium around the tissue attachment associated with natural teeth. This relates to less vasculature in the gingival tissue surrounding dental implants compared to natural teeth. The reduced vascularity and parallel-oriented collagen fibers adjacent to the body of any dental implant result in increased vulnerability to bacterial insult. At recare appointments, probing of peri-implant periodontal tissue should be performed only when signs of infection are noted, such as exudate, swelling, bleeding from the sulcus, inflamed peri-implant soft tissue, and/or radiographic evidence of peri-implant alveolar bone loss. It has been recommended that routine periodontal probing of implants should not be performed, because this can damage the weak epithelial attachment around the implants, inoculating the tissue and possibly creating a pathway for the ingress of periodontal pathogens.

Commercially available plastic probes (ProDenRx Probe [DenMat]) should be used when investigating the crevicular depth around implants and can be utilized around natural teeth as well. The probing depth around dental implants may be related closely to the thickness and type of mucosa surrounding the implant. A healthy peri-implant sulcus has been reported to range from 1.3 to 3.8 mm, which is greater than those depths reported for natural teeth.

Metallic instruments, such as stainless steel, should be limited to use on natural teeth and not to be used to probe or scale around dental implants. The rationale for this well-documented conclusion is that this metal is harder than the titanium alloy of the implant so it can scratch, contaminate, or cause a galvanic
reaction at the implant-abutment interface.  

Ideally, periodontal scalers used by hand for cleaning dental implants can be plastic, Teflon, gold-plated, titanium, or graphite. It is recommended by the manufacturers that gold-plated curettes not be sharpened, as the gold surface could be chipped, exposing the hard metal underneath this coating. Stainless steel scaling instruments will abrade the softer implant surface, stripping off any surface treatment such as hydroxyapatite as the instrument’s hardness is greater than the titanium alloy from which the implant is fabricated (Titanium implant scalers [G. Hartzell & Son]) (Figure 10). Plastic and graphite instruments are unable to alter the implant’s surface (Figure 11) and calculus is not as adherent to the implant as to natural teeth (Graphite implant scalers [Premier Dental Products]) (Figure 12).  

Ultrasonic and piezo scaler tips are fabricated from stainless steel and may mar the implant’s surface, leading to microroughness and plaque accumulation. The stainless steel tip may also lead to gouging of the surfacrestal implant surface (Figure 13). Some clinicians advocate using an ultrasonic instrument with a plastic sleeve over the tip for scaling dental implants.  

Other cleaning armamentaria contraindicated for use with implants are air powder abrasive units. Air powder polishing units may also damage the implant surface and should be avoided during hygiene appointments (Figure 14). Even the use of baking soda in these units may strip off any surface coating on the implant. Additionally, the air pressure may detach the soft-tissue connection with the coronal of the implant, leading to emphysema. They can be a useful adjunct when treating an ailing implant where bone loss has occurred and the practitioner is cleaning the exposed threads of granulation tissue and bacterial debris. But they should be used only with an open-flap technique to avoid forcing the air stream and powder into the tissue, leading to air emphysema. This also allows complete flushing of the residual powder from the surgical site.  

The implant’s titanium or titanium alloy surfaces can be polished using a rubber cup along with a nonabrasive polishing paste. The hygiene armamentarium is important in the office as well as the home care techniques used to maintain endosseous dental implants. Site-specific electric toothbrushes (such as Rotadent [DenMat]) are beneficial as the small, pointed head allows better access into the interproximal areas and the sulcus to prevent biofilm buildup and are more efficient than manual toothbrushes (Figures 15 and 16). Intradental brushes should be recommended to implant patients, and they need to be educated on proper use of these devices. The plastic-coated wire brushes are the only type that should be used with dental implants, as these will clean and not scratch the implant surface.  

PERIODONTAL DISEASE AND ITS SYSTEMIC LINK  
It has been well recognized that systemic health is connected to the periodontal condition. The mouth is a major entry point to the body for invading pathogens. When the integrity of oral tissues is breached through periodontal disease, the mouth can become a source of disease affecting other parts of the body. With more than 700 strains of bacteria identified in the oral cavity, bacteria have been found to migrate from the mouth to
the lungs, heart, and other organs. Research has identified associations between chronic oral infections and heart and lung diseases, stroke, low-birthweight and premature births. As periodontal disease is the most common chronic infection found in humans, affecting 3 out of 4 people at some point in their life, dental health can affect quality of life when not treated.

But, the mouth can provide clues to illnesses located in other areas of the system, and the dentist and hygienist may be the first to identify those signs before illness progresses and the patient seeks medical attention. More than 120 medical conditions can be detected by observing signs and symptoms found in/near the mouth/oral cavity. These include mumps (painful swelling of the salivary glands), tuberculosis (secondary oral ulcerations with cervical lymphadenopathy), HIV (Kaposi’s Sarcoma), malignant melanoma (multiple osteolytic lesions observed radiographically), Parkinson's disease (degenerative disorder that affects the central nervous system and often impairs the motor skills and speech), mononucleosis (fever, swollen lymph nodes, sore throat, muscle weakness), Addison's Disease (hyperpigmentation of the mucous membrane and skin), cystic fibrosis (thick mucus production), vitamin deficiencies, and alcoholic cirrhosis.

Vitamin deficiencies will also present with oral clinical signs. These may include the following:

- **Angular cheilitis**—painful inflammation and cracking in the corners of the mouth. May also have a fungal component at the affected area.
- **Recurrent apthous stomatitis**—(recurring canker sores). Anemia, related to vitamin B deficiency, can increase risk of these sores.
- **Chronic oral mucosal candidiasis**—*Candida albicans* fungus is naturally found in the mouth. Normally not causing problems, but in the presence of poor nutrition or poor absorption of vitamins, susceptibility increases.
- **Atrophic glossitis**—painful fissuring of the tongue with possible denuded areas.

The effects of iron deficiency are similar to those of vitamin B deficiency and can present as a burning sensation in the mouth and tongue, fungal infections in the mouth, tongue redness and swelling, and sores and pale tissue in the mouth.

Vitamin C (also called ascorbic acid) is a vitamin needed to make collagen, the main building block for many tissues. A deficiency in this critical vitamin may lead to gingiva that bleeds easily. Gingivitis may be the earliest sign of deficiency in this vitamin and can also cause gingiva to bleed easily. Vitamin C deficiency may also present as fatigue and easy bruising.

Vitamin D works with calcium to maintain bone quality and strength. Deficiencies of vitamin D can lead to brittle bones. Intraorally, vitamin D deficiency increases the risks of periodontal disease and jaw fracture. A deficiency early in life could affect the formation of teeth. Sometimes patients with kidney disease also have vitamin D deficiency due to absorption issues. Vitamin D deficiency has been associated with a substantially increased risk of dementia and Alzheimer's disease. Additionally, vitamin D deficiency has been associated with both a higher morbidity in the general population and an increase in fragility. It has been reported that the overall prevalence rate of vitamin D deficiency was 41.6% in the US population, with the highest rate seen in blacks (82.1%), followed
Evolution of Comprehensive Care, Part 3

by Hispanics (69.2%). It has also been reported that “vitamin D deficiency was significantly more common among those who had no college education, were obese, with a poor health status, hypertension, low high-density lipoprotein cholesterol level, or not consuming milk daily.”

Vitamin K is needed for absorption of vitamin D and is made by bacteria in the intestines, so patients with gastrointestinal disorders and those with liver disease may be deficient in this critical vitamin. A vitamin K deficiency may also be caused by long-term antibiotic use due to killing of the bacteria in the gastrointestinal tract. Poor diet is seldom the cause for vitamin K deficiency. Vitamin K makes proteins that are involved in the clotting process. Thus, patients deficient in this vitamin may demonstrate easy bruising, slow healing, and gingival bleeding in the absence of gingivitis or significant probing. These patients may have excessive bleeding after a tooth extraction, or even after a scaling during a routine prophylaxis.

Osteoporosis
Periodontal bone loss will progress more rapidly in patients with osteoporosis. Evidence has established a correlation between periodontitis and bone metabolism. Early diagnosis of reduced bone mineral density, prior to the establishment of a significant negative impact on the periodontal tissues, might be important. Smoking and menopausal status were reported to not alter these associations.

Periodontitis and osteoporosis are 2 diseases of increasing intensity with age. Findings suggest that periodontal changes can be associated with osteoporosis in postmenopausal women with osteoporosis, so both conditions may increase as the patient ages. Periodontitis is associated with resorption of the alveolar bone, and osteoporosis is characterized by bone loss leading to structural bone transformation. A definite relationship has been established between osteoporosis and periodontitis based on pocket depth and clinical attachment loss.

Medications taken by patients with osteoporosis should be considered before any operative procedures. Intravenous bisphosphonates create a greater risk for the patient than oral bisphosphonates for bone issues and the potential of osteonecrosis of the jaw (ONJ) due to lower vascularity of the jawbone. Sites with increased bone turnover, such as extraction sites or areas of periodontal inflammation, are exposed to higher bisphosphonate doses than the remaining alveolar ridge and may explain greater the susceptibility of such areas to ONJ.

Diabetes: A Growing Problem
Diabetes is a significant health factor affecting 9.3% of the US population (29.1 million patients) with 8.1 million (27.8%) of patients with diabetes going undiagnosed. So the dental practitioner may be the first to see the warning signs that the patient is diabetic. Type 2 diabetes is increasing in incidence, especially among younger individuals, and may be associated with the high-sugar diets that these individuals consume. The US Centers for Disease Control and Prevention (CDC) reports diabetes diagnoses have increased by more than 3 million in almost 2 years. We also know that periodontal disease is more common in patients with diabetes. Those young adults with diabetes have twice the risk of periodontal disease as compared to adults without diabetes. Periodontal disease is more prevalent and progresses more rapidly, with greater severity in those with both type 1 and type 2 diabetes. The sixth greatest complication of diabetes is periodontal disease.

Those patients with periodontal infections had worse glycemic control over time. This may be a result of cytokines
secreted because of chronic inflammation. Cytokines are also associated with insulin resistance. But, treatment of periodontitis has improved glycemic control. Some of the mechanisms that explain the increased pathology seen in diabetic patients as a result of periodontal infection are altered vascular physiology, reduced immune response, particularly protective response by neutrophils, and reduced ability for tissues to heal (Table).

**Pulmonary Disease**

Frequently, lower airway infections result from bacteria in the oral cavity, acting as a reservoir for these infections. Bacterial biofilms in the mouth can inoculate the respiratory tract with oral bacteria aspirated by the patient. The pathogenicity is dictated by the severity of the oral disease and is correlated with the bacteria in the oral biofilm. Significant risk factors for aspiration pneumonia relate to the presence of cariogenic bacteria plus periodontal pathogens.

Individuals with the highest risk for respiratory infection (pneumonia and bronchitis) are institutionalized patients or medically compromised patients with or without respiratory disease who are unable to perform oral home care.

Also at risk are hospitalized elderly patients. But there is strong evidence that all elderly patients may be at increased risk of pulmonary issues related to periodontal disease, especially as they pass the seventh decade of life and general health and ability to render home care diminishes. One author, following evaluation of 328 articles published from 1996 to 2007, which discussed the results of clinical studies linking oral hygiene to healthcare-associated pneumonia or respiratory tract infection in elderly people, reported, “There is good evidence that mechanical oral hygiene practices reduce the progression or occurrence of respiratory diseases in high-risk elderly people in nursing homes or hospitals. Mechanical oral hygiene practices may prevent the death of about one in 10 elderly residents of nursing homes from healthcare-associated pneumonia.”

How can this be minimized? Frequent and meticulous oral care is critical in preventing these oral infections so that they do not spread to the pulmonary system. One author reported,
“Oral hygiene intervention significantly reduced occurrence of pneumonia in institutionalized subjects.” Additionally, frequent tooth brushing and preoperative use of 0.12% chlorhexidine mouthrinse or gel reduced nosocomial respiratory tract infections. So it may be of general benefit that all elderly patients be placed on chlorhexidine daily rinses as a preventative.

**Cardiovascular Disease**

An association has been reported between C-reactive protein and fibrinogen production with an increased response to oral inflammation. C-reactive protein increases clotting and is a marker for heart disease. Risk is increased for diabetic patients and synergistically increased if the patient is a smoker.

A relationship between periodontal disease and atherosclerotic diseases, including heart disease and stroke, has been well established. A 14-year study found patients with periodontal disease were 25% more likely to develop coronary heart disease (CHD) than their healthy counterparts, with men younger than 50 with periodontal disease being 72% more likely to develop CHD and periodontal disease, increasing risk for both fatal and non-fatal strokes twofold.

An association exists between gum disease and cardiovascular disease, but it is unknown whether this is a causal relationship. Coronary artery disease is characterized by the thickening of the walls of the coronary arteries due to a buildup of fatty proteins. Blood clots can obstruct the normal blood flow, restricting the amount of nutrients and oxygen required for the heart to function properly, which may lead to heart attacks. Periodontal bacteria have been found in samples of plaque removed from carotid arteries (in the heart) during surgery and bacteria in plaque near diseased gingiva appears to induce clumping of blood platelets, which can then cause the clotting and blockages that can lead to heart attacks or strokes.

So periodontal disease can exacerbate existing heart conditions. Patients at risk for infective endocarditis may require antibiotics prior to dental procedures, including prosthetic cardiac valves, previous endocarditis history, some types of congenital heart disease, and cardiac transplantation recipients with cardiac valvular disease. Premedication, according to the American Heart Association, is recommended in these patients to avoid the...
Evolution of Comprehensive Care, Part 3

Potential or bacterial seeding of the blood during dental treatment that could affect heart irregularities.

Periodontal infections have emerged as a potential risk factor for cardiovascular disease leading to a convergence in dental and medical care that will benefit patients. Evidence continues to support an association among periodontal infections, atherosclerosis, and vascular disease.

The proper management of oral health may very well be key to a healthy heart, and more frequent prophylaxis may be indicated in those patients who have gingival issues combined with a history of cardiac disease.

Three biological mechanisms have been proposed explaining the association between periodontal disease and cardiovascular disease. Bacteria from the periodontal infection may enter the circulation, invading the heart and vascular tissue, causing harmful effects. The body’s response to the periodontal infection is the production of inflammatory mediators that travel through the circulatory system and cause harmful effects on the heart and blood vessels. And bacterial products such as lipopolysaccharides enter the bloodstream and cause harmful effects on the heart and blood vessels.

Recent evidence of these biological mechanisms show that people with higher levels of bacteria in their mouth also tended to have thicker carotid arteries, which is an indicator of cardiovascular disease. In another systemic study, it was reported that antibody response to periodontal bacteria was associated with coronary heart disease. Evidence shows that periodontal microorganisms are found in the plaque buildup in the arteries, supporting a link between periodontal disease and cardiovascular disease.

Other findings show that inflammatory mediators (lipoprotein and triglycerides) are significantly higher in subjects with periodontitis than found in control groups. Additionally, increased levels of C-reactive protein were associated with periodontitis, which is considered a biomarker for inflammation and is associated with elevated risk of heart disease.

Prostate Disease

The US CDC reports that 27,970 men in the United States died from prostate cancer in 2014, which has been consistent with prior year studies. Established risk factors for pancreatic cancer are cigarette smoking and chronic pancreatitis, but the role of inflammation from gum disease may promote the cancer. Researchers at the Harvard School of Public Health and Dana-Farber Cancer Institute found that gum disease may be associated with an increased risk of cancer of the pancreas. Additionally, research shows men with periodontal disease had a 63% higher risk of developing pancreatic cancer compared to those reporting no periodontal disease.

Preterm Pregnancy Issues

Dr. John Novak stated, “Enough evidence exists to show there is an association between the presence of periodontitis and preterm delivery and low-birthweight infants; however, the exact nature of that association is still unclear.” It is believed that inflammatory molecules from the mouth can enter the circulatory system, which may then reach the fetal membranes and cause preterm delivery. Oral bacteria have been found in fetal membranes.

Periodontal disease’s influence related to preterm low-birthweight babies has the following 3 mechanisms that have been suggested: (1) cell wall lipopolysaccharides of periodontal pathogens trigger the production of prostaglandins, (2) the periodontal infection causes circulatory system release of prostaglandins, and (3) translocation of the periodontal bacteria to the fetus is via the placenta, stimulating the release of prostaglandins. These prostaglandins stimulate oxytocin production, which can initiate preterm labor and result in lower-birthweight babies.

Chronic Kidney Diseases

Chronic renal disease is a progressive loss in renal function throughout time. The symptoms of worsening kidney function are unspecific and might include feeling generally unwell and experiencing a reduced appetite. Often, the disease is diagnosed as a result of screening people known to be at risk of kidney problems, such as those with hypertension and diabetes. Chronic kidney disease is identified by a blood test for creatinine. Higher levels of creatinine indicate a falling glomerular filtration rate and as a result, decreased capability of the kidneys to excrete waste products. The most common causes of chronic kidney disease are diabetes mellitus, hypertension, and glomerulonephritis. Together, they cause approximately 75% of all adult cases.

Evidence of the prevalence of periodontitis in chronic kidney disease patients is conflicting. Findings suggest that there is an association between periodontitis and renal diseases while other results suggest no association. Chronic kidney disease subjects are characterized by some well-established risk factors of periodontal disease such as poor oral hygiene and diabetes. There appears to be a strong correlation between patients on dialysis and a high number of patients suffering from gingivitis (46%), severe periodontitis (35%), and cavities due to caries (37%).

In Summary

Perio treatment has evolved beyond simple scaling with hand instruments. Ultrasonics and diode lasers have improved both the efficiency of treatment as well as treatment prognosis to arresting the disease process and gaining clinical attachment.
and decreasing pocket depth. Add to this the benefits of adjunct medicaments both at time of treatment via site placement and during routine home care by the patient, and we are able to tip treatment outcome in a more favorable direction.

Periodontology has been closely linked to systemic health both as a causative agent to health issues and as a secondary site for some medical conditions. Dentistry has truly—and finally—become a part of total healthcare.

Next: Evolution of Comprehensive Care, Part 4: Direct Restorative

References
27. Rosenblum R Jr. Oral hygiene can reduce the incidence of and death resulting from pneumonia and respiratory tract...
Evolution of Comprehensive Care, Part 3


Evolution of Comprehensive Care, Part 3

POST EXAMINATION INFORMATION

To receive continuing education credit for participation in this educational activity you must complete the program post examination and receive a score of 70% or better.

Traditional Completion Option:
You may fax or mail your answers with payment to Dentistry Today (see Traditional Completion Information on following page). All information requested must be provided in order to process the program for credit. Be sure to complete your “Payment,” “Personal Certification Information,” “Answers,” and “Evaluation” forms. Your exam will be graded within 72 hours of receipt. Upon successful completion of the post-exam (70% or higher), a letter of completion will be mailed to the address provided.

Online Completion Option:
Use this page to review the questions and mark your answers. Return to dentalcetoday.com and sign in. If you have not previously purchased the program, select it from the “Online Courses” listing and complete the online purchase process. Once purchased the program will be added to your User History page where a Take Exam link will be provided directly across from the program title. Select the Take Exam link, complete all the program questions and Submit your answers. An immediate grade report will be provided. Upon receiving a passing grade, complete the online evaluation form. Upon submitting the form, your Letter of Completion will be provided immediately for printing.

General Program Information:
Online users may log in to dentalcetoday.com any time in the future to access previously purchased programs and view or print letters of completion and results.

This CE activity was not developed in accordance with AGD PACE or ADA CERP standards, CEUs for this activity will not be accepted by the AGD for MAGD/FAGD credit.

POST EXAMINATION QUESTIONS

1. Evidence supports the adjunctive use of sustained release local antimicrobials following scaling in deep or recurrent periodontal sites to reduce pocket depth.
   a. True  b. False

2. Atridox has been proven in the literature to achieve pocket reduction in pocket depth, reduction in bleeding upon probing, and an increase in attachment gain. This has also been reported as a good adjunct when treating ailing implants.
   a. True  b. False

3. The peri-implant mucosal seal is a more effective barrier-to-bacterial apical movement than the periodontium around the tissue attachment associated with natural teeth.
   a. True  b. False

4. It has been recommended that routine periodontal probing of dental implants should be performed.
   a. True  b. False

5. Metallic instruments, such as stainless steel, should be limited to use on natural teeth and not to be used to probe or scale around dental implants.
   a. True  b. False

6. Air powder polishing units are completely safe for implant surfaces and should be encouraged for more use around implants during hygiene appointments.
   a. True  b. False

7. It has been reported that the overall prevalence rate of vitamin D deficiency was 41.6% in the US population, with the highest rate seen in blacks (82.1%), followed by Hispanics (69.2%).
   a. True  b. False
Evolution of Comprehensive Care, Part 3

8. Intravenous bisphosphonates, rather than oral bisphosphonates, will reduce the patient’s risk for bone issues and the potential of osteonecrosis of the jaw due to lower vascularity of the jawbone.
   a. True  b. False

9. Some of the mechanisms that explain the increased pathology seen in diabetic patients as a result of periodontal infection are altered vascular physiology, reduced immune response, particularly protective response by neutrophils and reduced ability for tissues to heal.
   a. True  b. False

10. Mechanical oral hygiene practices may prevent the death of about one in 10 elderly residents of nursing homes from healthcare-associated pneumonia.
    a. True  b. False

11. Recent evidence of these biological mechanisms show that people with higher levels of bacteria in their mouths also tend to have thicker carotid arteries, which is an indicator of cardiovascular disease.
    a. True  b. False

12. There appears to be a strong correlation between patients on dialysis and a high number of patients suffered from gingivitis (46%), severe periodontitis (35%), and 37% had cavities due to caries.
    a. True  b. False
Evolution of Comprehensive Care, Part 3

PROGRAM COMPLETION INFORMATION

If you wish to purchase and complete this activity traditionally (mail or fax) rather than online, you must provide the information requested below. Please be sure to select your answers carefully and complete the evaluation information. To receive credit you must answer at least 9 of the 12 questions correctly.

Complete online at: dentalctoday.com

TRADITIONAL COMPLETION INFORMATION:

Mail or fax this completed form with payment to:

Dentistry Today
Department of Continuing Education
100 Passaic Avenue
Fairfield, NJ 07004
Fax: 973-882-3622

PAYMENT & CREDIT INFORMATION:

Examination Fee: $60.00 Credit Hours: 3

Note: There is a $10 surcharge to process a check drawn on any bank other than a US bank. Should you have additional questions, please contact us at (973) 882-4700.

☐ I have enclosed a check or money order.
☐ I am using a credit card.

My Credit Card information is provided below.

☐ American Express ☐ Visa ☐ MC ☐ Discover

Please provide the following (please print clearly):

Exact Name on Credit Card

Credit Card # / Expiration Date

Signature

PERSONAL CERTIFICATION INFORMATION:

Last Name (PLEASE PRINT CLEARLY OR TYPE)

First Name

Profession / Credentials License Number

Street Address

Suite or Apartment Number

City State Zip Code

Daytime Telephone Number With Area Code

Fax Number With Area Code

E-mail Address

ANSWER FORM: VOLUME 34 NO. 5 PAGE 90

Please check the correct box for each question below.

1. ☐ a. True ☐ b. False
2. ☐ a. True ☐ b. False
3. ☐ a. True ☐ b. False
4. ☐ a. True ☐ b. False
5. ☐ a. True ☐ b. False
6. ☐ a. True ☐ b. False
7. ☐ a. True ☐ b. False
8. ☐ a. True ☐ b. False
9. ☐ a. True ☐ b. False
10. ☐ a. True ☐ b. False
11. ☐ a. True ☐ b. False
12. ☐ a. True ☐ b. False

PROGRAM EVALUATION FORM

Please complete the following activity evaluation questions.

Rating Scale: Excellent = 5 and Poor = 0

Course objectives were achieved.

Content was useful and benefited your clinical practice.

Review questions were clear and relevant to the editorial.

Illustrations and photographs were clear and relevant.

Written presentation was informative and concise.

How much time did you spend reading the activity and completing the test?

What aspect of this course was most helpful and why?

What topics interest you for future Dentistry Today CE courses?

This CE activity was not developed in accordance with AGD PACE or ADA CERP standards. CEUs for this activity will not be accepted by the AGD for MAGD/FAGD credit.