



Keep It Clean! The Hazards of Dirty Dentures and Oral Appliances

A Peer-Reviewed Publication

Written by Ian E. Shuman, DDS, MAGD

PUBLICATION DATE: MAY 2018

EXPIRATION DATE: APRIL 2021

EARN
3 CE
CREDITS

Keep It Clean! The Hazards of Dirty Dentures and Oral Appliances

EDUCATIONAL OBJECTIVES

At the conclusion of this educational activity, participants will be able to:

1. Identify the dental appliances that require maintenance.
2. Learn about the materials used to remove pathogens from appliances.
3. Discuss the pathogens that are harmful if not reduced or eliminated.

ABSTRACT

Dental appliances such as dentures, night guards, and sleep apnea appliances require home-care maintenance. This is due to the ability of pathogens to colonize and infect oral appliances. This can eventually lead to infecting the patient. Knowing what to use to best remove these pathogens and the dangers these pathogens can cause is the focus of this study.



Go Green, Go Online to take your course
www.DentalAcademyofCE.com

QUICK ACCESS CODE **15313**

This educational activity was developed by PennWell's Dental Group with no commercial support.

This course was written for dentists, dental hygienists and assistants, from novice to skilled.

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

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

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

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

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

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

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

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

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

Cancellation/Refund Policy: Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.



PennWell designates this activity for 3 continuing educational credits.

Dental Board of California: Provider 4527, course registration number CA#03-4527-15313
"This course meets the Dental Board of California's requirements for 3 units of continuing education."

The PennWell Corporation is designated as an Approved PACE Program Provider by the Academy of General Dentistry. The formal continuing dental education programs of this program provider are accepted by the AGD for Fellowship, Mastership and membership maintenance credit. Approval does not imply acceptance by a state or provincial board of dentistry or AGD endorsement. The current term of approval extends from (11/1/2015) to (10/31/2019) Provider ID# 320452.

ADA CERP® Continuing Education Recognition Program

PennWell is an ADA CERP recognized provider

ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry.

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



INTRODUCTION

When oral appliances are delivered, patients must be educated in the specific home-care maintenance of their appliances. Maintaining the cleanliness of the appliance should be a highlighted conversation, and the proper use of cleansers and devices such as ultrasonic baths must be discussed and demonstrated. Ideally, practices that stress this issue and give the patient the devices, materials, and products required often see excellent compliance. Unfortunately, the majority of patients do not know how to properly clean their oral appliances. This leads to pathogenic colonization both in the mouth and on the appliance itself, which can cause localized and systemic infections.

THE PROBLEM WITH ORAL APPLIANCES

The use of various oral appliances has increased in the patient population. Examples include complete and partial dentures, removable appliances for orthodontics, temporomandibular dysfunction, bruxism, and sleep issues such as snoring and apnea, among others. These devices all require routine home care to avoid the development of biofilm, colonization of pathogens, and infection. For the purposes of this course, the words “denture” and “appliances” will be used interchangeably.

APPLIANCE MATERIALS SUSCEPTIBLE TO COLONIZATION

In general, inflammation and soreness of the oral cavity is known as stomatitis. With poor home care of oral appliances, the development of biofilm, followed by the growth of various common and lesser-known pathogens will occur. This applies to the oral cavity as well, and the gingiva and dentures should be mechanically cleaned at least twice daily using an extra soft toothbrush to gently remove debris, denture adhesive, and biofilm. Left undisturbed, these pathogens will create a state of stomatitis. According to Garaicoa et al., “Several complications may arise in patients wearing complete prosthetic appliances, including denture-associated infections and mucosal stomatitis due to *Candida* species.”¹ Furthermore, in a study of the epidemiology and etiology of denture stomatitis by Gendreau and Loewy, stomatitis “... can be identified as inflammation and erythema of the oral mucosal areas covered by the denture.”² This, of course, includes all oral appliances that remain in contact with the oral cavity.

According to Cubera, “Denture stomatitis pertains to a number of pathological symptoms in the oral cavity caused by wearing acrylic dentures. Etiological factors include: mucosal trauma, fungal infection and accumulation of denture plaque. All of these factors appear to increase the ability of *Candida albicans* to colonize both the denture and oral mucosal surfaces.”³ It would appear that the colonization of undisturbed pathogens increases in acrylic based appliances, predominately complete and partial dentures. Studies in reducing this occurrence have been and are currently being conducted.

One such study is investigating the ability of a coating on the acrylic surfaces of dentures to reduce pathogenic buildup, especially the *Candida* genus. Hirasawa et al. applied cross-linkable copolymers containing sulfobetaine methacrylamide (SBMAm) to the surfaces of acrylic dentures.⁴ Their study revealed that the application of SBMAm “can enhance the hydrophilicity of the surface of denture-base resins and reduce the initial adhesion of *C. albicans*.”⁴ Other studies have used Parylene as a barrier to contamination. “Parylene is the trade name for a variety of chemical vapor deposited poly(p-xylylene) polymers used as moisture and dielectric barriers.”⁵ Zhou et al. applied Parylene to silicone elastomers (soft denture

liners) and denture base resin and found that the coating reduced the adherence and aggregation of *C. albicans*. As previously mentioned, pathogenic buildup is not confined to dentures. Oral appliances such as the common Essix appliance and other thermoplastics have been investigated as well.⁶ Removable appliances such as space maintainers in pediatric patients have led to the discovery of several disturbing pathogens that include *Candida* and *Enterococcus faecalis*.⁷

Removable appliances such as space maintainers in pediatric patients have led to the discovery of several disturbing pathogens that include *Candida* and *Enterococcus faecalis*.⁷

THE PATHOGENS RESPONSIBLE FOR COLONIZING APPLIANCES: A PARTIAL LIST

There are multitudes of pathogenic species that are responsible for colonization on oral appliances. At its most basic, dentures have been long known for harboring *Candida*, specifically *C. albicans*. This has been proven in countless studies and has been shown to influence the presence of *C. albicans* in the palatal mucosa. Other yeasts have been found in diseased oral tissues such as *C. tropicalis*, *C. parapsilosis*, *C. glabrata*, *C. krusei*, and *C. dubliniensis*.⁸⁻¹² Other pathogens, in particular bacteria, have remained for the most part uninvestigated.¹³ What is known is that bacterial pathogens such as *Streptococcus mutans*, *Veillonella atypica*, and *Granulicatella adiacens*¹⁴ as well as “*Escherichia coli*, *Klebsiella pneumoniae*, and *Enterobacter aerogenes*, *E. cloacae* and Gram-negative bacilli (*Enterobacteriaceae* and nonfermenting)...” were found in the oral cavity.¹³

Interestingly, potentially pathogenic bacteria, including gram-negative bacilli of *Actinomyces*

netobacter, *Pseudomonas*, *Moraxella*, *Micrococcus*, and *Alcaligenes* species “were reported as sources of contamination in commercial dental laboratories.”¹⁵⁻¹⁷ The implication reaches far and wide and would require that laboratories implement procedures to eliminate potential sources of contamination by decontaminating the appliances upon receipt from and prior to sending to the dental office.

Even more astounding is the interdependent relationship between various floras. Three pathogenic species, *Candida albicans*, *Actinomyces oris*, and *Streptococcus oralis* (all plentiful in early dental plaque) were detected in the biofilms on denture material. “Synergistic interactions between all three-species occurred within biofilms ... Bacterial cells coaggregated with each other and adhered singly or in coaggregates to *C. albicans* hyphal filaments. *Streptococcus oralis* appeared to enhance hyphal filament production and *C. albicans* biovolume was increased 2-fold. Concomitantly, cell numbers of *S. oralis* and *A. oris* were enhanced by *C. albicans*. Thus, cooperative physical and metabolic processes occurring between these three microbial species intensify pathogenic plaque communities on denture surfaces.”¹⁸ These interactions were also found in the oral microbial biofilms on salivary pellicles, and therefore this occurrence is not restricted to dentures and other oral appliances alone.¹⁹

Perhaps just as alarming is the discovery of the presence of nonoral flora in the oral cavity of patients with removable dentures. In examining the bacterial flora of saliva samples between case and control groups, Derafshi et al. determined that there was a significant difference in gram-negative rods, with these nonoral pathogenic bacteria detected from the saliva of the denture wearers.¹⁴

**Perhaps just as alarming
is the discovery of the
presence of nonoral flora in
the oral cavity of patients
with removable dentures.**

THE POTENTIAL HEALTH HAZARDS OF INFECTED APPLIANCES

Oral appliances act as reservoirs for pathogenic organisms with oral flora now seen as a primary cause of systemic diseases. These organisms have been implicated as the cause of a wide variety of both common and seemingly unrelated diseases. These have included oral infections as well as systemic ones such as chronic obstructive pulmonary disease, aspiration pneumonia, bacterial endocarditis, and gastrointestinal infection, among others.

Thrush, also known as yeast, is perhaps the most common oral disease in this category. This is caused by *C. albicans* and other fungi and can present in a variety of ways including pseudomembranous, erythematous, hyperplastic, angular cheilitis, and median rhomboid glossitis. However, determination of pathology must be obtained by biopsy to eliminate other disease states that present in similar fashions.

Chronic obstructive pulmonary disease (COPD) has been detected in patients who wear dentures. This is due to the adherence and growth of various microorganisms including the yeastlike fungi *Candida albicans* and *Candida tropicalis* and the gram-negative bacilli *Klebsiella pneumoniae* and *Klebsiella oxytoca*. These are the most “frequent potential pathogens of the respiratory tract isolated from the denture plaque of patients with chronic obstructive pulmonary disease (COPD).”²⁰ While COPD currently has no cure, attempting to eliminate these pathogenic organisms from the affected appliance and mouth can reduce the signs and symptoms.

Respiratory infections have also been determined to be caused by dentures. Dentures have long been known as a nidus for pathogenic colonization. The effects of this phenomenon can be seen most readily in the geriatric population in the form of pneumonia. In a study conducted by Sumi et al., “the denture bacterial flora of 50 dependent elderly were examined to identify microorganisms by the culture method.”²¹ These floras were investigated to determine if they were directly responsible for causing pneumonia in these patients. In all, “18 species of microorganisms were detected in denture plaque in this study. A variety of pathogens with the potential to cause respiratory infection pathogens colonized on the dentures of dependent elderly.”²¹

Other studies confirm these findings, and these respiratory pathogens have been detected on the surface of cast metal partial dentures. After collecting the biofilm aggregate from cast metal partial clasps, Mengatto et al. found the existence of bacteria grouped in five phyla: Firmicutes, Actinobacteria, Bacteroidetes, Proteobacteria, and Fusobacteria.²² To prevent this problem, some researchers have proposed that patients sleep without their dentures. Inuma et al. undertook a study of 524 randomly selected elderly patients with a mean age of 87.8 years.²³ Over a three-year period, “48 events associated with pneumonia (20 deaths and 28 acute hospitalizations) were identified. Among 453 denture wearers, 186 (40.8%) who wore their dentures during sleep were at higher risk for pneumonia than those who removed their dentures at night. This study provided empirical evidence that denture wearing during sleep is associated not only with oral inflammatory and microbial burden but also with incident pneumonia, suggesting potential implications of oral hygiene programs for pneumonia prevention in the community.”²³

Infective endocarditis (known as bacterial endocarditis) has been linked to disease of oral origin. At its most basic, an ill-fitting denture can cause oral ulcerations, allowing bacteria to enter the bloodstream through the inflammatory tissue. This can develop into a bacteremia. According to the American Heart Association,

“Denture wearers should be encouraged to have periodic examinations or to return to the practitioner if discomfort develops. When new dentures are inserted, it is advisable to have the patient return to the practitioner to correct any problems that could cause mucosal ulceration.”²⁴ A study by Nedumgottil attempted to detect the pathogens in the biofilm of complete dentures.²⁵ This is especially concerning in the elderly, who are more prone to infective endocarditis due to compromised immune systems. This study reported that the co-occurrence of these three pathogens (*S. mutans*, *V. atypica*, and *G. adiacens*) is a first in biofilms of denture wearers.

Gastrointestinal disturbances and, more specifically, bacterial gastroenteritis are another group of illnesses caused by pathogenic invasion. These can be identified to cause gastric and intestinal inflammation with accompanying symptoms of vomiting, severe abdominal cramps, and diarrhea. Numerous bacteria can cause gastroenteritis, including *Staphylococcus*, *Shigella*, *Salmonella*, *Campylobacter*, and *E. coli*.²⁶ “Besides aspiration pneumonia, oral pathogens have been implicated in bacterial endocarditis, gastrointestinal infection and chronic obstructive pulmonary disease, among others, and dentures offer a reservoir for microorganisms associated with these infections”²⁷⁻²⁹ “Therefore, it is crucial that careful daily removal of the biofilm present in the oral cavity and on complete dentures is performed with adequate denture cleansing in order to prevent associated oral and systemic diseases.”^{30,31}

METHODS FOR CLEANING DENTURES AND ORAL APPLIANCES

Just as in the mouth, there are two methods for removing plaque biofilm from dentures and oral appliances: mechanical and chemical. As stated by Coulthwaite et al., an effective oral hygiene regimen is important to “control denture plaque biofilm and contributes to the control of associated oral and systemic diseases.”¹⁹

Mechanical means of plaque biofilm removal include manual brushing³² and ultrasonic baths.^{33,34} However, mechanical methods alone are not completely effective in maintaining the hygiene of dentures and oral appliances. Cruz et al. reported that brushing alone cannot sufficiently maintain the hygiene of dentures and that other adjunctive methods are necessary to achieve better results.³² To optimize denture hygiene, many chemical methods have been used either alone or in combination with mechanical methods. These chemicals, many of which are found in denture cleansing tablets, include sodium hypochlorite,³⁵ citric acid,³⁶ chlorhexidine,^{37,38} glutaraldehyde,³⁹ and sodium perborate.⁴⁰ The primary mechanism of action of denture cleansing tablets “depends on the release of oxygen.”³²

Manual brushing will disturb and break up biofilm, disrupting the colonization of microorganisms on dentures and oral appliances. Brushing “represents the most commonly applied hygiene practice.”⁴¹ However, aggressive brushing can mar the surface of the denture,⁴² rendering it more susceptible to porosities, irregularities, and ultimately increased colonization. In patients with poor manual dexterity, alternative cleaning methods are required.⁴³ For many patients with and without physical challenges, the ultrasonic methods can be preferred and are usually supplemented with a chemical solution. Different studies have yielded varying results in relation to the efficacy of the ultrasonic technique depending on whether chemical agents are used as supplements or not.^{33,34} Often, denture and appliance patients will present with an unhygienic device. **Figure 1** This can be remedied using a personal ultrasonic water bath (mechanical) and a denture cleanser (chemical), (Sonic Cleaner and Cleanadent Crystals, Dr. B Dental Solutions) **Figure 2** with the final result being a clean denture or appliance free of harmful pathogens. **Figure 3**

Figure 1



Figure 2



Figure 3



TABLE: WHAT IS THE TREATMENT FOR OROPHARYNGEAL CANDIDIASIS?

Recommendations	
•	For mild disease, clotrimazole troches, 10 mg 5 times daily, OR miconazole mucoadhesive buccal 50-mg tablet applied to the mucosal surface over the canine fossa once daily for 7–14 days are recommended (strong recommendation; high-quality evidence).
•	Alternatives for mild disease include nystatin suspension (100 000 U/mL) 4–6 mL 4 times daily, OR 1–2 nystatin pastilles (200 000 U each) 4 times daily, for 7–14 days (strong recommendation; moderate-quality evidence).
•	For moderate to severe disease, oral fluconazole, 100–200 mg daily, for 7–14 days is recommended (strong recommendation; high-quality evidence).
•	For fluconazole-refractory disease, itraconazole solution, 200 mg once daily OR posaconazole suspension, 400 mg twice daily for 3 days, then 400 mg daily, for up to 28 days are recommended (strong recommendation; moderate-quality evidence).
•	Alternatives for fluconazole-refractory disease include voriconazole, 200 mg twice daily, OR AmB deoxycholate oral suspension, 100 mg/mL 4 times daily (strong recommendation; moderate-quality evidence).
•	Intravenous echinocandin (caspofungin: 70-mg loading dose, then 50 mg daily; micafungin: 100 mg daily; or anidulafungin: 200-mg loading dose, then 100 mg daily) OR intravenous AmB deoxycholate, 0.3 mg/kg daily are other alternatives for refractory disease (weak recommendation; moderate-quality evidence).
•	Chronic suppressive therapy is usually unnecessary. If required for patients who have recurrent infection, fluconazole, 100 mg 3 times weekly, is recommended (strong recommendation; high-quality evidence).
•	For HIV-infected patients, antiretroviral therapy is strongly recommended to reduce the incidence of recurrent infections (strong recommendation; high-quality evidence).
•	For denture-related candidiasis, disinfection of the denture, in addition to antifungal therapy, is recommended (strong recommendation; moderate-quality evidence).

Pappas P, et al. Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America, *Clinical Infectious Diseases*, Volume 62, Issue 4, 15 February 2016, Pages e1–e50

Citric acid is a weak organic acid with a pH of 3.2. It has been extensively studied and found to be effective as an antimicrobial against microorganisms such as *S. dysenteriae*⁴⁶ and other anaerobic bacteria (especially cocci),⁴⁷ and fungi.⁴⁸

As mentioned, a variety of chemical methods have been used to clean dentures and oral appliances. One of the most effective, sodium hypochlorite, has been studied extensively and is a main ingredient in many over-the-counter denture and appliance cleaners. A study by Kiesow et al. on the antimicrobial activity of consumer denture products and their material compatibility was conducted. “The purpose of this in vitro study was to determine the compatibility of denture materials with and the antimicrobial effects of typical cleaning regimens. Bleach was highly antimicrobial but incompatible with metal dental prosthesis components.”⁴⁴ A study by Keyf and Güngör confirmed this finding, noting that “Within the limitations of this study, the commercial cleaning solutions had influenced the decrease of reflectance on the surface of the dental alloy. Thus, solutions should not be limitlessly used on dentures with metal components, because they caused clinically significant reflectance changes on the surface of the alloy after 30 days.”⁴⁵ Therefore, other chemicals should be used that are more gentle yet highly effective.

Citric acid is a weak organic acid with a pH of 3.2. It has been extensively studied and found to be effective as an antimicrobial against microorganisms such as *S. dysenteriae*⁴⁶ and other anaerobic bacteria (especially cocci),⁴⁷ and fungi.⁴⁸ The exact mechanism of action against fungal growth is not completely understood. Originally thought

TABLE: ADA RECOMMENDATIONS FOR DENTURE CARE

•	When cleaning your denture, it's a good idea to stand over a folded towel or a sink of water just in case you accidentally drop the denture. Brush the denture each day to remove food deposits and plaque. Brushing helps prevent the appliance from becoming permanently stained.
•	It's best to use a brush that is designed for cleaning dentures. A denture brush has bristles that are arranged to fit the shape of the denture. A regular, soft-bristled toothbrush is also acceptable. Avoid using a brush with hard bristles, which can damage the denture.
•	Some people use hand soap or mild dishwashing liquid to clean their dentures, which are both acceptable. Other types of household cleaners and many toothpastes are too abrasive and should not be used for cleaning dentures.
•	Clean your denture by thoroughly rinsing off loose food particles. Moisten the brush and apply the denture cleaner. Brush all denture surfaces gently to avoid damaging the plastic or bending the attachments.
•	A denture could lose its proper shape if it is not kept moist. At night, the denture should be placed in soaking solution or water. However, if the appliance has metal attachments, they could be tarnished if placed in soaking solution. Your dentist can recommend the proper method for keeping your denture in good shape.
•	You can do serious harm to your denture and to your health by trying to adjust or repair the denture. A denture that is not made to fit precisely by a dentist can cause irritation and sores. Using a do-it-yourself kit can damage the appliance beyond repair. Glues sold over-the-counter often contain harmful chemicals and should not be used on a denture.
•	If your denture no longer fits properly, if it breaks, cracks or chips, or if one of the teeth becomes loose, see your dentist immediately. In many cases, dentists can make necessary adjustments or repairs, often on the same day. Complicated repairs may require that the denture be sent to a special dental laboratory.

© 2018 American Dental Association

to be pH driven, it is now known that growth and morphology of fungi are influenced by the pH of media.⁴⁹ Some mechanisms have been suggested to explain the inhibitory mode of organic acids. Organic acids resulting in a decrease in pH value may influence the growth by acidifying the cell, which will consume a great amount of energy to maintain the intracellular pH homeostasis. Other explanations have also been proposed including membrane disruption, interruption of metabolic reactions, and accumulation of toxic anions. There are several denture cleansers on the market that contain citric acid as their primary ingredient (Polident, GlaxoSmithKline; Cleanadent Crystals, Dr. B Dental Solutions).

A study by Faot et al. evaluated biofilms containing *C. albicans* on PMMA resin specimens. The group included “purified water as a control and two experimental groups that used either a 1:5 dilution of citric acid denture cleanser or a 1:8 dilution of citric acid denture cleanser. Residual biofilms adhering to the specimens were collected and quantified.”³⁶ It was determined that citric acid denture cleansers had the ability to reduce *C. albicans* biofilm accumulation and cell viability.³⁶

According to the National Center for Biotechnology Information, “Chlorhexidine is a disinfectant and topical anti-infective agent used also as mouthwash to prevent oral plaque. The physiologic effect of chlorhexidine is by means of Decreased Cell Wall Integrity.”⁵⁰ With these properties in mind, a solution of 0.12% chlorhexidine digluconate and 0.05% cetylpyridinium chloride were tested for disinfection efficacy of acrylic dentures. Following an immersion for “8 night hours for 4 days,” the results demonstrated substantial reduction in *C. albicans* colonization.⁵¹ However, there is still concern over the effects chlorhexidine may have on PMMA resins.⁵²

BIBLIOGRAPHY

- Garaica JL, Fischer CL, Bates AM, Holloway J, Avila-Ortiz G, Guthmiller JM, Johnson GK, Stanford C, Brogden KA. Promise of combining antifungal agents in denture adhesives to fight *Candida* species infections. *J Prosthodont*. 2016 Nov 21
- Gendreau L, Loewy ZG. Epidemiology and etiology of denture stomatitis. *J Prosthodont*. 2011 Jun;20(4):251-60.
- Cubera K. [Denture stomatitis - definition, etiology, classification and treatment]. *Przegl Lek*. 2013;70(11):947-9. Review. Polish.
- Hirasawa M, Tsutsumi-Arai C, Takakusaki K, Oya T, Fueki K, Wakabayashi N. Superhydrophilic co-polymer coatings on denture surfaces reduce *Candida albicans* adhesion—an in vitro study. *Arch Oral Biol*. 2018 Mar;87:143-150.
- <https://en.wikipedia.org/wiki/Parylene> Accessed 02-21-2018.
- Chang CS, Al-Awadi S, Ready D, Noar J. An assessment of the effectiveness of mechanical and chemical cleaning of Essix orthodontic retainer. *J Orthod*. 2014 Jun;41(2):110-7.
- Arikan V, Kizilci E, Ozalp N, Ozcelik B. Effects of fixed and removable space maintainers on plaque accumulation, periodontal health, *Candidal* and *Enterococcus Faecalis* Carriage. *Med Princ Pract*. 2015 Jun; 24(4): 311–317.
- Pereira-Cenci T, Antoninha Del Bel Cury A, Crielaard W, Martien ten Cate J. Development of *Candida*-associated denture stomatitis: new insights. *J Appl Oral Sci*. 2008 Apr; 16(2): 86–94.
- Coleman DC, Sullivan DJ, Bennett DE, Moran GP, Barry HJ, Shanley DB. Candidiasis: the emergence of a novel species, *Candida dubliniensis*. *AIDS*. 1997;11:557–567.
- MacPhail LM, Greenspan D, Dodd CL, Heinic GS, Beck C, Ekoku E. Association of fungal species with oral candidiasis in HIV infection. *J Dent Res*. 1993;72:353–353.
- Samaranayake YH, Samaranayake LP. Experimental oral candidiasis in animal models. *Clin Microbiol Rev*. 2001 Apr; 14(2):398-429.
- Samaranayake YH, Samaranayake LP. *Candida krusei*: biology, epidemiology, pathogenicity and clinical manifestations of an emerging pathogen. *J Med Microbiol*. 1994 Nov; 41(5):295-310.
- Shi B, et al. The denture-associated oral microbiome in health and stomatitis. *Renate Lux mSphere*. 2016 Nov-Dec; 1(6): e00215-16. Published online 2016 Dec 28.
- Nedumgottil BM. Relative presence of *Streptococcus mutans*, *Veillonella atypica*, and *Granulicatella adiacens* in biofilm of complete dentures. *J Indian Prosthodont Soc*. 2018 Jan-Mar; 18(1): 24–28.
- Derafshi R, et al. Isolation and identification of nonoral pathogenic bacteria in the oral cavity of patients with removable dentures. *Int Soc Prev Community Dent*. 2017 Jul-Aug; 7(4): 197–201.
- Williams HN, Falkler WA Jr, Hasler JF, Libonati JP. The recovery and significance of nonoral opportunistic pathogenic bacteria in dental laboratory pumice. *J Prosthet Dent*. 1985 Nov; 54(5):725-30.
- Nair VV, Karibasappa GN, Dodamani A, Prashanth VK. Microbial contamination of removable dental prosthesis at different interval of usage: an in vitro study. *J Indian Prosthodont Soc*. 2016 Oct-Dec; 16(4):346-351.
- Cavalcanti IM, Nobbs AH, Ricomini-Filho AP, Jenkinson HF, Del Bel Cury AA. Interkingdom cooperation between *Candida albicans*, *Streptococcus oralis* and *Actinomyces oris* modulates early biofilm development on denture material. *Pathog Dis*. 2016 Apr;74(3).
- Cavalcanti IM, Del Bel Cury AA, Jenkinson HF, Nobbs AH. Interactions between *Streptococcus oralis*, *Actinomyces oris*, and *Candida albicans* in the development of multispecies oral microbial biofilms on salivary pellicle. *Mol Oral Microbiol*. 2017 Feb;32(1):60-73.
- Coulthwaite L, Verran J. Potential pathogenic aspects of denture plaque. *Br J Biomed Sci*. 2007;64(4):180-9.
- Przybyłowska D, Piskorska K, Golaś M, Sikora M, Swoboda-Kopeć E, Kostrzewa-Janicka J, Mierzwińska-Nastalska E. Evaluation of genetic diversity of *Candida* spp. and *Klebsiella* spp. isolated from the denture plaque of COPD patients. *Adv Exp Med Biol*. 2017;955:1-8.
- Sumi Y, Miura H, Sunakawa M, Michiwaki Y, Sakagami N. Colonization of denture plaque by respiratory pathogens in dependent elderly. *Gerodontology*. 2002 Jul;19(1):25-9.
- Mengatto CM, Marchini L, Bernardes LA, Gomes SC, Silva AM, Rizzatti-Barbosa CM. Partial denture metal framework may harbor potentially pathogenic bacteria. *J Adv Prosthodont*. 2015 Dec;7(6):468-74.
- Iinuma T, Arai Y, Abe Y, Takayama M, Fukumoto M, Fukui Y, Iwase T, Takebayashi T, Hirose N, Gionhaku N, Komiya K. Denture wearing during sleep doubles the risk of pneumonia in the very elderly. *J Dent Res*. 2015 Mar;94(3 Suppl):28S-36S.
- Dajani AS. Prevention of bacterial endocarditis: recommendations by the American Heart Association. *JAMA*. 1997;277:1794-1801.
- Nedumgottil BM. Relative presence of *Streptococcus mutans*, *Veillonella atypica*, and *Granulicatella adiacens* in biofilm of complete dentures. *J Indian Prosthodont Soc*. 2018 Jan-Mar;18(1):24-28.

27. <https://www.healthline.com/health/bacterial-gastroenteritis#causes> Accessed 02-25-2018.
28. Neppelenbroek KH. The importance of daily removal of the denture biofilm for oral and systemic diseases prevention. *J Appl Oral Sci.* 2015 Nov-Dec; 23(6): 547–548.
29. Coulthwaite L, Verran J. Potential pathogenic aspects of denture plaque. *Br J Biomed Sci.* 2007; 64(4):180-9.
30. Kashiwabara T, Yoshijima Y, Hongama S, Nagao K, Hirota K, Ichikawa T. Denture plaque microflora in geriatric inpatients and maxillary defect patients. *Prosthodont Res Pract.* 2007;6(3):153–158.
31. Neppelenbroek KH. The importance of daily removal of the denture biofilm for oral and systemic diseases prevention. *J Appl Oral Sci.* 2015 Nov-Dec; 23(6): 547–548.
32. Felton D, Cooper L, Duqum I, Minsley G, Guckes A, Haug S, Meredith P, Solie C, Avery D, Deal Chandler N, American College of Prosthodontists. Evidence-based guidelines for the care and maintenance of complete dentures: a publication of the American College of Prosthodontists. *J Prosthodont.* 2011 Feb; 20 Suppl 1(1):S1-S12.
33. Costa Cruz P, et al. The effectiveness of chemical denture cleansers and ultrasonic device in biofilm removal from complete dentures. *J Appl Oral Sci.* 2011 Nov-Dec;19(6):668-73.
34. de Andrade IM, Cruz PC, da Silva CH, de Souza RF, Paranhos Hde F, Candido RC, Marin JM, de Souza-Gugelmin MC. Effervescent tablets and ultrasonic devices against *Candida* and mutans streptococci in denture biofilm. *Gerodontology.* 2011 Dec; 28(4):264-70.
35. Nishi Y, Seto K, Kamashita Y, Kaji A, Kurono A, Nagaoka E. Survival of microorganisms on complete dentures following ultrasonic cleaning combined with immersion in peroxide-based cleanser solution. *Gerodontology.* 2014 Sep; 31(3):202-9.
36. Salles MM, Badaró MM, Arruda CN, Leite VM, Silva CH, Watanabe E, Oliveira Vde C, Paranhos Hde F. Antimicrobial activity of complete denture cleanser solutions based on sodium hypochlorite and *Ricinus communis*—a randomized clinical study. *J Appl Oral Sci.* 2015 Nov-Dec;23(6):637-42.
37. Faot F, Cavalcanti YW, Mendonça e Bertolini Md, Pinto Lde R, da Silva WJ, Cury AA. Efficacy of citric acid denture cleanser on the *Candida albicans* biofilm formed on poly(methyl methacrylate): effects on residual biofilm and recolonization process. *BMC Oral Health.* 2014 Jun 23;14:77.
38. Budtz-Jørgensen E, Løe H. Chlorhexidine as a denture disinfectant in the treatment of denture stomatitis. *Scand J Dent Res.* 1972; 80(6):457-64.
39. Lal K, Santarpia RP 3rd, Pollock JJ, Renner RP. Assessment of antimicrobial treatment of denture stomatitis using an in vivo replica model system: therapeutic efficacy of an oral rinse. *J Prosthet Dent.* 1992 Jan; 67(1):72-7.
40. Farahani M, Sane'i A. Principles of infection control in dental environment. 1st ed. Tehran: Baraye Farda Publishing Co.; 1999. pp. 213–4.
41. King RB. *Encyclopedia of Inorganic Chemistry.* 2nd ed. USA: Wiley; 2005. p. 6696.
42. Papadichou S, Polyzois G. Hygiene practices in removable prosthodontics: a systematic review. *Int J Dent Hyg.* 2017 Nov 9.
43. Firouz F, Izadi AR, Khalesi M, Vafaei F, Beikmohammadi SH, Heidari B. Assessment of effect of chemical disinfectants on surface roughness of heat-polymerized denture base acrylic resin. *Sci J Hamadan Univ Med Sci.* 2012;19:57–60.
44. Rossato MB, Unfer B, May LG, Braun KO. Analysis of the effectiveness of different hygiene procedures used in dental prostheses. *Oral Health Prev Dent.* 2011; 9(3):221-7.
45. Kiesow A, Sarembe S, Pizzey RL, Axe AS, Bradshaw DJ. Material compatibility and antimicrobial activity of consumer products commonly used to clean dentures. *J Prosthet Dent.* 2016 Feb;115(2):189-198.e8.
46. Keyf F, Güngör T. Comparison of effects of bleach and cleansing tablet on reflectance and surface changes of a dental alloy used for removable partial dentures. *J Biomater Appl.* 2003 Jul;18(1):5-14.
47. Ye-Won I, et al. Antimicrobial activities of acetic acid, citric acid and lactic acid against *Shigella* species. *J Food Saf.* 2013;33:79–85.
48. Georgopoulou M, Kontakiotis E, Nakou M. Evaluation of the antimicrobial effectiveness of citric acid and sodium hypochlorite on the anaerobic flora of the infected root canal. *Int Endod J.* 1994 May;27(3):139-43.
49. Hassan R, El-Kadi S, Sand M. Effect of some organic acids on some fungal growth and their toxins production. *International Journal of Advances in Biology (IJAB) Vol 2. No .1, February 2015.*
50. Higgins C, Brinkhaus F. Efficacy of several organic acids against molds. *J. Appl. Poultry Res., Vol. 8, pp 480-487, 1999.*
51. National Center for Biotechnology Information. PubChem Compound Database; CID=9552079, <https://pubchem.ncbi.nlm.nih.gov/compound/9552079> (accessed Feb. 26, 2018).
52. Aoun G, Cassia A, Berberi A. Effectiveness of a chlorhexidine digluconate 0.12% and cetylpyridinium chloride 0.05% solution in eliminating *Candida albicans* colonizing dentures: a randomized clinical in vivo study. *J Contemp Dent Pract.* 2015 Jun 1; 16(6):433-6.
53. Pires CW, Fraga S, Beck AC, Braun KO, Peres PE. Chemical methods for cleaning conventional dentures: what is the best antimicrobial option? An in vitro study. *Oral Health Prev Dent.* 2017;15(1):73-77.



AUTHOR PROFILE

Dr. Ian Shuman maintains a full time general, reconstructive and aesthetic dental practice in Pasadena, Maryland. An educator and author, Dr. Shuman is a pioneer in developing advanced, minimally invasive techniques. Dr. Shuman is the Editorial Director of Continuing Education for PennWell Publishing. He is a Master in the Academy of General Dentistry, an Associate Fellow of the American Academy of Implant Dentistry, and a Fellow of the Pierre Fauchard Academy. Dr. Shuman was named one of the Top Clinicians in Continuing Education since 2005 by Dentistry Today. Dr. Shuman's mission is to teach dental professionals current methods for creating beautiful, long lasting restorations that preserve the maximum amount of tooth structure.

AUTHOR DISCLOSURE

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

The author of this course receives an honorarium.

Use this page to review the questions and answers. Return to www.DentalAcademyOfCE.com and sign in. If you have not previously purchased the program select it from the "Online Courses" listing and complete the online purchase. Once purchased the exam will be added to your Archives page where a Take Exam link will be provided. Click on the "Take Exam" link, complete all the program questions and submit your answers. An immediate grade report will be provided and upon receiving a passing grade your "Verification Form" will be provided immediately for viewing and/or printing. Verification Forms can be viewed and/or printed anytime in the future by returning to the site, sign in and return to your Archives Page.

QUESTIONS

1. **Patients must be educated in the home-care maintenance of their:**
 - a. dentures
 - b. oral devices
 - c. appliances
 - d. all of the above
2. **The proper use of which of the following must be discussed and demonstrated and devices such as**
 - a. ultrasonic baths
 - b. sodium hypochlorite soaks
 - c. cleansers
 - d. a and c
3. **A poorly cleaned oral appliance can lead to infection in the:**
 - a. appliance
 - b. mouth
 - c. a and b
 - d. none of the above
4. **A poorly cleaned oral appliance can lead to infection due to:**
 - a. mitral valve prolapse
 - b. biofilm removal
 - c. pathogenic colonization
 - d. a and b
5. **The use of all of these oral appliances has increased in the patient population, except for:**
 - a. snoring and apnea appliances
 - b. the reverse Nesbit
 - c. complete and partial dentures
 - d. bruxism appliances
6. **According to Garaicoa et al., what pathogenic species can cause complications in patients wearing complete prosthetic appliances, including denture-associated infections and mucosal stomatitis?**
 - a. Endophthalmitis keratosii
 - b. Lacazia loboi
 - c. Candida
 - d. Mucormycetes
7. **Which of the following researchers found that stomatitis "... can be identified as inflammation and erythema of the oral mucosal areas covered by the denture"?**
 - a. Gendreau and Loewy
 - b. Gary and Trudeau
 - c. Haddad and Harris
 - d. Cockley et al.
8. **According to Cubera, "Denture stomatitis pertains to a number of pathological symptoms in the oral cavity caused by wearing acrylic dentures" that include:**
 - a. mucosal trauma
 - b. fungal infection
 - c. accumulation of denture plaque
 - d. all of the above
9. **To reduce pathogenic buildup on the acrylic surfaces of dentures, Hirasawa et al. applied cross-linkable copolymers containing:**
 - a. trinitroanisole
 - b. sulfobetaine methacrylamide
 - c. styphnic acid
 - d. diethylene glycol dinitrate
10. **Zhou et al. applied which of the following to silicone elastomers?**
 - a. ethyl cyanoacetate
 - b. resorcinol
 - c. cyanoacrylate
 - d. Parylene
11. **Removable appliances such as space maintainers in pediatric patients have led to the discovery of several disturbing pathogens that include which of the following?**
 - a. Agama impalearis
 - b. Enterococcus faecalis
 - c. Uromastix geyri
 - d. Uromastix acanthinura
12. **There are multitudes of Candida species that have been found in diseased oral tissues including all but which of the following?**
 - a. C. krusei
 - b. C. tropicalis
 - c. C. gossypii
 - d. C. parapsilosis
13. **Pathogenic organisms associated with oral appliances have been implicated in which of the following diseases?**
 - a. chronic obstructive pulmonary disease
 - b. aspiration pneumonia
 - c. gastrointestinal infection
 - d. all of the above
14. **Pathogenic bacteria, including gram-negative bacilli of Acinetobacter, Pseudomonas, Moraxella Micrococcus, and Alcaligenes species, were reported as sources of contamination in:**
 - a. commercial dental laboratories
 - b. autoclaves
 - c. chromium cobalt bases only
 - d. a and b
15. **Cavalcanti et al. reported on the interdependent relationship between which three floras in the biofilms on denture material?**
 - a. Candida albicans, Actinomyces mycetemcomitans, and Streptococcus oralis
 - b. Candida albicans, Actinomyces oris, and Streptococcus oralis
 - c. Candida albicans, Actinomyces oris, and Streptococcus alivarius
 - d. Candida albicans, Actinomyces oris, and Streptococcus mutans
16. **According to Sumi et al., how many species of microorganisms with the potential to cause respiratory infection were detected in denture plaque colonized on the dentures of dependent elderly?**
 - a. 18
 - b. 28
 - c. 118
 - d. 2,800
17. **Bacteria that cause gastroenteritis include all but which of the following?**
 - a. Pylocolibacter
 - b. Salmonella
 - c. Shigella
 - d. Staphylococcus
18. **When discussing endocarditis, which organization stated: "Denture wearers should be encouraged to have periodic examinations or to return to the practitioner if discomfort develops"?**
 - a. American Medical Association
 - b. American Heart Association
 - c. American Dental Association
 - d. a and c
19. **Bacterial gastroenteritis can be identified to cause gastric and intestinal inflammation with accompanying symptoms of all but which of the following?**
 - a. severe abdominal cramps
 - b. diarrhea
 - c. vomiting
 - d. prolapse

QUESTIONS (CONTINUED)

20. Some of the chemicals found in denture cleansing tablets may include:

- a. sodium hypochlorite and citric acid
- b. sodium perborate and nitrotoluene
- c. glutaraldehyde and benzoic acid
- d. none of the above

21. Mechanical means of plaque biofilm removal include:

- a. manual brushing
- b. hygroscopic immersion
- c. ultrasonic baths
- d. a and c

22. In a study by Kiesow, bleach was highly antimicrobial but incompatible with what types of dental prosthesis components?

- a. metal
- b. PMMA
- c. acrylic
- d. silicone

23. Who stated the following: "Thus solutions should not be limitlessly used on dentures with metal components, because they caused clinically significant reflectance changes on the surface of the alloy after 30 days"?

- a. Curie
- b. Keyf and Gungör
- c. Joliot
- d. Theresa and Cori

24. Citric acid is a:

- a. weak inorganic acid
- b. strong inorganic acid
- c. weak organic acid
- d. high pH solvent

25. In regard to the exact mechanism of action against fungal growth by citric acid, which of the following is true?

- a. not completely understood
- b. originally thought to be pH driven
- c. influenced by the pH of media
- d. all of the above

26. Citric acid, an active ingredient in successfully removing denture and appliance biofilm, can be found in which of the following products?

- a. Dr. B's Cleanadent Crystals
- b. Dr. Scholl's powder
- c. Dr. Blaine's RevitaDerm
- d. none of the above

27. According to the National Center for Biotechnology Information, which of the following is a disinfectant and topical anti-infective agent used also as a mouthwash to prevent oral plaque?

- a. Everclear
- b. phenolphthalein
- c. urushiol
- d. chlorhexidine

28. Other explanations for the mechanism of citric acid have also been proposed including which of the following?

- a. membrane disruption
- b. interruption of metabolic reactions
- c. accumulation of toxic anions
- d. all of the above

29. Numerous bacteria can cause gastroenteritis, including Salmonella, E. coli, and:

- a. Staphylococcus
- b. Campylobacter
- c. Shigella
- d. all of the above

30. After collecting the biofilm aggregate from cast metal partial clasps, Mengatto et al. found the existence of which of the following bacterial phyla?

- a. Synergistetes
- b. Firmicutes
- c. Lentisphaerae
- d. Lepidopterae

NOTES

PUBLICATION DATE:	MAY 2018
EXPIRATION DATE:	APRIL 2021

Keep It Clean!

The Hazards of Dirty Dentures and Oral Appliances

Name: _____ Title: _____ Specialty: _____

Address: _____ E-mail: _____

City: _____ State: _____ ZIP: _____ Country: _____

Telephone: Home () _____ Office () _____

Lic. Renewal Date: _____ AGD Member ID: _____

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 3 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. **For Questions Call 800-633-1681**

EDUCATIONAL OBJECTIVES

- Identify the dental appliances that require maintenance.
- Learn about the materials used to remove pathogens from appliances.
- Discuss the pathogens that are harmful if not reduced or eliminated.

COURSE EVALUATION

1. Were the individual course objectives met?

Objective #1: Yes No Objective #2: Yes No

Objective #3: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

2. To what extent were the course objectives accomplished overall? 5 4 3 2 1 0

3. Please rate your personal mastery of the course objectives. 5 4 3 2 1 0

4. How would you rate the objectives and educational methods? 5 4 3 2 1 0

5. How do you rate the author's grasp of the topic? 5 4 3 2 1 0

6. Please rate the instructor's effectiveness. 5 4 3 2 1 0

7. Was the overall administration of the course effective? 5 4 3 2 1 0

8. Please rate the usefulness and clinical applicability of this course. 5 4 3 2 1 0

9. Please rate the usefulness of the supplemental web bibliography. 5 4 3 2 1 0

10. Do you feel that the references were adequate? Yes No

11. Would you participate in a similar program on a different topic? Yes No

12. If any of the continuing education questions were unclear or ambiguous, please list them.

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

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

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

If not taking online, mail completed answer sheet to

PennWell Corp.

Attn: Dental Division,
1421 S. Sheridan Rd., Tulsa, OK, 74112
or fax to: 918-212-9037

For IMMEDIATE results,
go to www.DentalAcademyOfCE.com to take tests online.

QUICK ACCESS CODE 15313

Answer sheets can be faxed with credit card payment to
918-212-9037.

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

If paying by credit card, please complete the following: MC Visa AmEx Discover

Acct. Number: _____

Exp. Date: _____

Charges on your statement will show up as PennWell

- | | |
|---|---|
| 1. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 16. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 2. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 17. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 3. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 18. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 4. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 19. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 5. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 20. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 6. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 21. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 7. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 22. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 8. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 23. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 9. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 24. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 10. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 25. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 11. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 26. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 12. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 27. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 13. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 28. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 14. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 29. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 15. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 30. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |

AGD Code 670

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

COURSE EVALUATION and PARTICIPANT FEEDBACK

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

INSTRUCTIONS

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

COURSE CREDITS/COST

All participants scoring at least 70% on the examination will receive a verification form verifying 3 CE credits. The formal continuing education program of this sponsor is accepted by the AGD for Fellowship/Masterhip credit. Please contact PennWell for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. PennWell is a California Provider. The California Provider number is 4527. The cost for courses ranges from \$20.00 to \$110.00.

PROVIDER INFORMATION

PennWell is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry.

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

The PennWell Corporation is designated as an Approved PACE Program Provider by the Academy of General Dentistry. The formal continuing dental education programs of this program provider are accepted by the AGD for Fellowship, Masterhip and membership maintenance credit. Approval does not imply acceptance by a state or provincial board of dentistry or AGD endorsement. The current term of approval extends from (11/1/2015) to (10/31/2019) Provider ID# 320452

RECORD KEEPING

PennWell maintains records of your successful completion of any exam for a minimum of six years. Please contact our offices for a copy of your continuing education credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

Completing a single continuing education course does not provide enough information to give the participant the feeling that s/he is an expert in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

CANCELLATION/REFUND POLICY

Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.

IMAGE AUTHENTICITY

The images provided and included in this course have not been altered.

© 2018 by the Academy of Dental Therapeutics and Stomatology, a division of PennWell