



Dental Office Blood Screenings: Saving Lives and Improving Outcomes

by Ronald L. Schefdore, DMD and Jack A. Maggiore, PhD

Educational objectives

Upon completion of this course, participants should be able to achieve the following:

1. Identify the connections between oral inflammation and systemic disease.
2. Detail the benefits of a dental practice engaged in active diagnosis and treatment of periodontal inflammation.
3. Explain the importance of recognizing the symptoms of diabetes.
4. List the most common risk factors of diabetes.
5. Describe the diagnostic tests for diabetes.

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The key ingredients that exceptional dental teams possess are passion and motivation. These teams are happier, enjoy an above average income, and take much pride in a job well done. Yet, according to the American Dental Association (ADA), 72 percent of the U.S. population has periodontal disease.¹ We need to improve in this area of dentistry to improve not only oral health, but overall health. Periodontal disease is connected to many medical conditions, including diabetes, metabolic disorders, and cardiovascular diseases, for which Healthy Heart Dentistry has developed a menu of blood tests designed to detect abnormalities of established biomarkers of medical conditions. Employing the Healthy Heart Dentistry educational program enables exceptional dental teams to demonstrate, with blood screening tests, improvement in their patients' oral and overall health. Through blood screening, blood pressure testing and addressing the nutritional deficiencies in patients with poor oral conditions, many offices have reported dramatic case studies in which they have had a hand in saving the lives of their dental patients with early detection and identification of underlying medical issues. It is through awareness, education, screening and a call to action that dental professionals are playing a broad and active role in today's health-care system and opening the communication lines with physicians to build a mutually referring relationship.

The baby boomers make up approximately 33 percent of the U.S. population and are approaching retirement age. A Society of Actuaries report shows that one of the top concerns of baby boomers (69 percent) is to maintain good health.² This generation has seen a half-century of medical advances, and has taken an active role in its health maintenance. This health-conscious approach to maintaining a high quality of life will continue through this generation's seventh and eighth decades of life – the most costly in terms of health-care dollars. The media continually reports on inflammation as being the basis for the

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chronic diseases of aging.³ The incidence of periodontal disease increases with age.⁴ Dental professionals had better be prepared to meet the emerging demands of this “perfect storm,” in which a large and health-conscious aging population, having a high percentage of periodontal disease with its underlying medical conditions, will present to dental offices.

Dental professionals are well aware that bleeding during dental cleaning indicates chronic inflammation. In the November 2008 *Journal of Periodontology*, Dr. McGuire states, “As clinicians we must translate what is going on with the inflammation research and incorporate it into our practices to provide the best possible care to our patients. My conclusion is that I should err on the side of aggressive control of periodontal inflammation, since, until proven otherwise, the consequences of under treatment could be more than the loss of a few teeth.”⁵ This is where dentistry meets medicine and forms the foundation for all future general dental practices. Because of recent research and media attention, dentistry has the opportunity to be perceived as the first line of health-care providers to identify, detect and improve patient health. Retaining patients is vital to a dental practice’s success. A recent survey of a randomized adult population by the authors revealed that 72 percent usually bleed during dental cleaning; 93 percent said their dentist does not provide oral cancer exams; 100 percent said their dentist does not perform blood pressure checks, blood screenings, nor offered advice on supplementation for nutritional deficiencies; and 68 percent said they would consider going to another dentist offering more advanced services and advice if the dentist was similar in cost.

The two main reasons of the high incidence of periodontal disease are the lack of a home care regimen, and dental professionals not diagnosing and treating the disease. According to a recent survey reported by the ADA:⁶

- While 80 percent of Americans say that care of one’s mouth, teeth and gums is “absolutely needed,” only 33 percent say they do an “excellent” job in caring for their teeth.
- Only 33 percent of patients:
 - Are aware of the oral-systemic connection.
 - Believe a little bleeding from brushing is normal when indeed it could be a sign of gum disease or something worse.
 - Are unaware that periodontal disease needs to be treated and cannot be ignored.
 - Are unaware that poor oral health is associated with serious health conditions such as stroke, heart disease and diabetes.

The authors surveyed more than 500 dental professionals who were responsible for performing periodontal exams on their patients. Most admitted that more than 60 percent of their adult patients have significant bleeding with 4+mm pockets, and most did not commence any in-office treatment, or initiation of an

efficacious home protocol. This chronic inflammatory condition can be due to poor hygiene, a medical condition, or a nutritional deficiency that is not being addressed.

The American Public Health Association recently published the top preventive and treatment services of dentists and hygienists through a subsidized dental insurance plan. Despite the prevalence, awareness, and associated complications of periodontal disease, periodontal procedures were not in the top 75 percent of the list!⁷ Add to this concern the fact that according to the authors’ malpractice carrier, the top lawsuit for dentists is lack of diagnosing and treating periodontal disease. This trend is likely to continue as the list of medical conditions associated with periodontal inflammation expanded to pregnancy complications and pre-term labor. Why this lack of diagnosis and treatment amongst the dental profession when most dentists are looking for avenues to increase production and profitability; especially in these economic times? Herein lies a major opportunity for the caring and passionate dental professional to be the exceptional dental practice in the eyes of their patients.

Oral Inflammation Connections

The Healthy Heart Dentistry program emphasizes the need to identify and treat chronic oral inflammation because of the connection to:

- Heart Disease and Stroke
- Diabetes
- Osteoporosis
- Pregnancy Complications
- Respiratory diseases
- Sinus issues
- Gastric ulcers
- Cancers of the Pancreas, Kidney, and Blood Cells
- Chronic inflammation

The Lancet Oncology reported that men with a history of gum disease are 14 percent more likely to develop cancer than men with healthy gums. In fact, researchers uncovered that men with periodontal disease are 49 percent more likely to develop kidney cancer, 54 percent more likely to develop pancreatic cancer, and 30 percent more likely to develop blood cancers.⁸ The media creates the perception there is a *direct* link.

Dentists are key to inflammatory control. Half of all heart attacks and strokes occur in people who have normal cholesterol levels.⁹ Periodontal disease might be the missing link, as it increases the circulating concentration of fibrinogen, a blood clotting factor, and the acute phase protein called C-reactive protein (CRP). When a second inflammatory marker like fibrinogen, a periodontal disease byproduct, is elevated with CRP, a 13-fold increase in cardiovascular mortality.¹⁰ Compare this to smoking, a well-established risk factor, which presents a four-fold increase in cardiovascular events. Periodontal disease is

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major source of elevated CRP, purported to contribute to adverse cardiovascular events. Patients with peripheral arterial disease and an active inflammatory process as detected with high-sensitivity (HS) CRP have a six-fold increase in adverse cardiovascular outcomes.¹¹ If dentistry takes an active role in helping patients to control the high incidence of periodontal disease, one can envision a reduction in the number of heart attacks and stroke.

Dental Professionals on the Front Line

Today's patients visit their dentists more often than they visit their primary care physician.¹² Patients generally visit their physician with medical issues, but see their dentists when they are apparently healthy. Therefore, dentists are the ideal provider to identify and detect medical issues early in their progression. Many times an oral condition is one of the first signs of an underlying medical issue, as is the case with bleeding gums and diabetes.¹³ By incorporating simple and accurate blood screening tests, detecting medical issues before they cause irreparable damage is a valuable service that dental professionals can provide. Since periodontal disease can elevate glucose and hemoglobin A1c (HbA1c), cholesterol, and hsCRP levels¹⁴⁻²², it is well within the scope of dentistry to offer and perform these blood screening tests to detect and identify underlying medical issues to improve their patients' oral health, and ultimately overall health.

The Laboratory Tests

Glucose and Hemoglobin A1c for Diabetes Risk Assessment

Diabetes screening is advocated in those with a known increased risk: being older than age 45; having a family history of diabetes; having high blood pressure; of African American, Latino, or American Indian ancestry; living a sedentary lifestyle; and being overweight. Fasting blood glucose remains the screening test of choice for diabetes, according to the American Diabetes Association.²³ While the primary marker for diabetes has not changed, the diagnostic cutoff has recently dropped to 100mg/dL from 110mg/dL.²⁴ Despite tighter glucose control requirements, the percentage of undiagnosed diabetics remains unacceptably high, with 33 percent or 6.2 million people unaware that they have the disease. The reasons for this are twofold: 1) Diabetes might be "missed" when screening with solely a fasting glucose test as this test cannot identify elevations that occur after meals; and 2) people are not getting tested.

With dentists potentially serving in this screening capacity, a convenient, affordable, and reliable test might be made available directly to dental patients. The Diabetes Risk Assessment Kit, through Healthy Heart Dentistry (Fig. 1), combines a rapid blood glucose test to determine fasting blood sugar levels with a

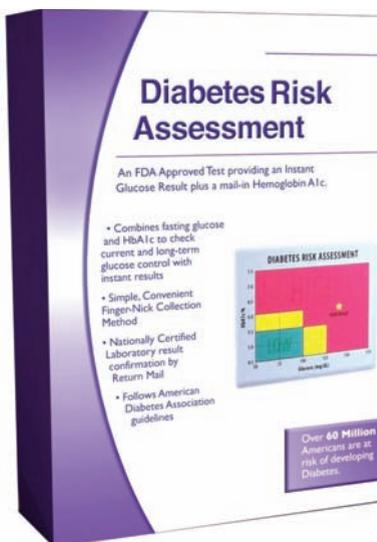


Figure 1. The Healthy Heart Dentistry Diabetes Risk Assessment Kit combines FDA-approved technologies of rapid fasting glucose and laboratory-tested hemoglobin A1c. The kit contains illustrated instructions, blood collection materials, laboratory requisition and patient consent form, and specimen transport system.

confirmatory, laboratory analyzed HbA1c test to determine long-term glucose control.

HbA1c is a compound that is formed when excess glucose irreversibly combines with hemoglobin and remains within the circulating red blood cells for the life of the cell, typically 90-120 days. Because of this, HbA1c is a stable, accurate indicator of the average blood glucose levels of the past three months. Where a single fasting glucose test could easily miss episodes of blood sugar spikes occurring after meals, HbA1c will be elevated if the patient has experienced periods of glucose intolerance.

A new consensus among diabetologists is to use HbA1c as a screening test for diabetes.²⁴ The Diabetes Risk Assessment Kit follows both the American Diabetes Association guidelines for diabetes testing by employing glucose as the first line test, and the most current consensus in using HbA1c as a screening tool. The kit contains everything required to perform the testing, including detailed instructions, alcohol prep, lancets, gauze, bandage, test card, laboratory consent form, and transport materials. To perform the test, a single drop of blood from a finger-nick is spotted onto the test area of the glucose test card (Fig. 2). A control indicator turns red alerting the user that sufficient blood has been applied. After three minutes, the red-cell trapping tab is lifted, and the test area will have turned one of the five shades of green. The color is compared to the reference card, which corresponds to a value between 50 and 150 mg/dL. Glucose results 75 or above should be confirmed using the HbA1c test. The top tab of the glucose test card that has trapped the red blood cells is sent to the laboratory for HbA1c testing. The laboratory report (Fig. 3) shows the HbA1c result compared to the target range. The fasting glucose result is plotted on the X-axis, and the HbA1c result on the Y-axis of the graph. The point where the two values meet is shown as a black diamond, labeled "your result." The risk assessment chart (Fig. 3) then

depicts where your result places you in the diabetes risk category – Low, Medium or High Risk. “High Risk” strongly suggests a diabetic state, and the patient is prompted to seek immediate medical attention. Similarly, “Medium Risk” suggests a pre-diabetic condition and that medical attention be sought. Even in cases of low risk, the continuity of care with the patient’s primary care physician is suggested, for if the patient is experiencing any diabetes-related symptoms and this screen proved negative, additional testing as directed by a physician might be needed.

Identifying those with pre-diabetes is unique to the Healthy Heart Dentistry Diabetes Risk Assessment. This is vitally important as more than 57 million Americans are believed to be in a pre-diabetic state. Plus, if detected early, pre-diabetes might be reversible with a commitment to lifestyle changes. The primary reason for the large number of pre-diabetics is the obesity epidemic. Obesity has emerged as the top preventable cause of diabetes.

Implementing a dental office diabetes screening program is a turnkey operation through the Healthy Heart Dentistry program, called Dentistry Against Diabetes. Information on getting started can be found at www.dentistryagainstdiabetes.com, or www.healthyheartdentistry.com.

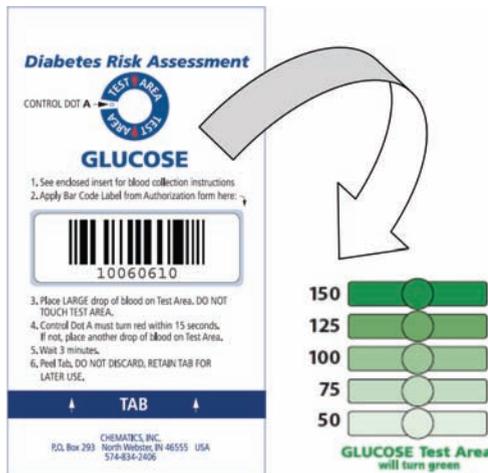


Figure 2. The ChemCard for glucose is a three-minute determination of blood sugar. A single drop of blood is added to the test area, and the control dot turns red to indicate that sufficient blood exists. After three minutes the tab, which traps the red blood cells, is removed. The shade of green color of the test pad is compared to the reference chart, and the best match provides the glucose level in mg/dL. Glucose results 75 mg/dL or higher are confirmed with hemoglobin A1c testing, which is performed on the blood cells trapped in the top layer of the card tab.

High-Sensitivity C-Reactive Protein (hsCRP) for Inflammation

C-reactive protein or CRP is the most commonly measured blood marker of inflammation. CRP becomes elevated in most cases of periodontal inflammation, from mild gingivitis to advanced periodontitis. CRP has remained visible in the press and public media since its discovery to be elevated in many cases of cardiovascular disease, even when cholesterol is normal. When CRP is measured in the range below 10 mg/L, the assays are called “high-sensitivity CRP”, or hsCRP. The hsCRP levels that are above three and below 10 mg/L in the absence of any symptomatic infection or visible inflammation place individuals at high risk for cardiovascular disease. The benefit of measuring CRP is that it might become elevated in the blood faster than the onset of inflammatory symptoms of pain and fever.²⁵ In severe inflammatory injuries, CRP levels could increase 1,000-fold, but in most cases, levels encountered in advanced periodontal inflammation will yield CRP levels in the range of 10 to 100 mg/L.^{26,27} As CRP blood levels drop when inflammation subsides, it serves as a valuable marker for therapeutic effectiveness when using an hsCRP assay, such as the Healthy Heart Dentistry hsCRP test kit.

Like the Diabetes Risk Assessment Kit, The Healthy Heart Dentistry hsCRP Blood screening kits (Fig. 4) contain all the

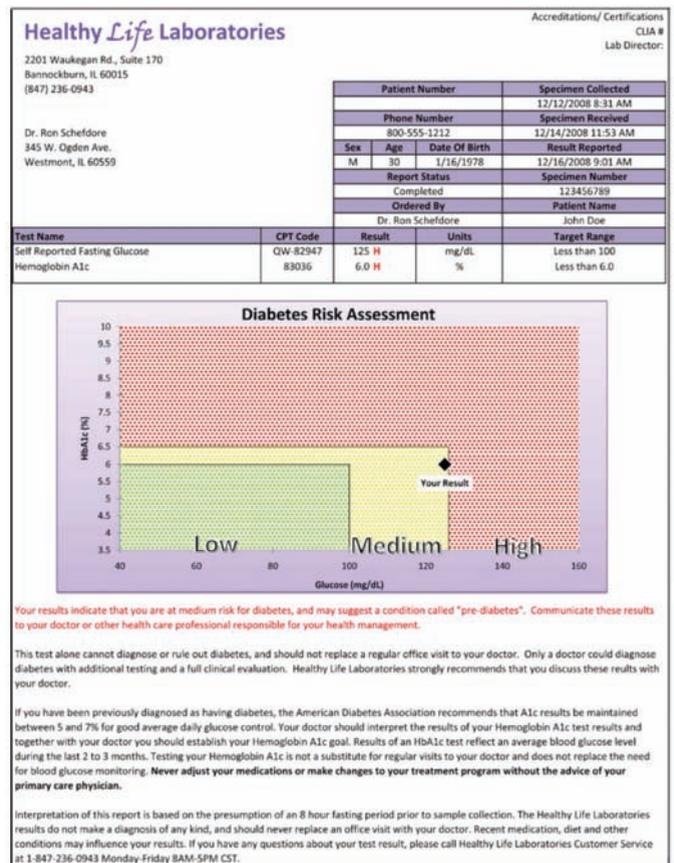


Figure 3. The Diabetes Risk Assessment laboratory report provides the results of the glucose and hemoglobin A1c tests, compared to the target range. The results are plotted on a special matrix, which generates a risk indicator for diabetes. This patient is at medium risk with a glucose of 125 mg/dL combined with an HbA1c of six percent. This suggests a state of pre-diabetes and recommends that the patient follow up with his physician.

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required components to perform the blood testing, requiring just three drops of blood from a finger nick spotted onto a special collection card. The hsCRP testing occurs in a certified clinical laboratory, and a professional laboratory report is mailed to the patient and faxed to the dentist.

While single-cohort studies do not support the hypothesis that periodontal treatment can reduce systemic CRP levels,¹¹ dentists using the Healthy Heart Dentistry program are reporting a consistent reduction of hsCRP of 30-90 percent in eight weeks after periodontal treatment. We have consulted with physicians who recommend that periodontal treatment be completed before making a physician referral when there is a modest elevation of cholesterol and hsCRP. Physicians feel they can make a more accurate diagnosis if the periodontal disease is controlled first. This is not to be taken as treatment advice for the reader, as each practitioner should establish his own protocol in conjunction with his referring physicians in their respective clinical area. An elevated hsCRP level after periodontal treatment can be due to a variety of conditions from too much adipose or body fat, to a variety of cancers. The following cancers are among those which elevate CRP: lung, colon, prostate, ovarian, and Hodgkin's lymphoma.²⁸⁻³³ In the authors' private practice four patients were diagnosed with three of the above cancers following subsequent referral to the patients' physician.

New Screening Test Offerings

New blood screening tests available through Healthy Heart Dentistry include Vitamin D and the 8-in-1 test, the Perio Metabolic Profile. Recent clinical research has implicated vitamin D deficiency as a major factor in the etiology of rickets, a wide variety of cancers, as well as hypertension, stroke, heart attack, diabetes, bone fractures, periodontal disease, and multiple sclerosis.^{34,35} The Vitamin D test through Healthy Heart Dentistry requires just three drops of fingernick blood, and provides a comprehensive look at the patient's naturally occurring vitamin D resulting from exposure to sunlight, and the dietary form, found in supplements and fortified foods. The new Perio Metabolic Profile (Fig. 5) examines eight biological markers of

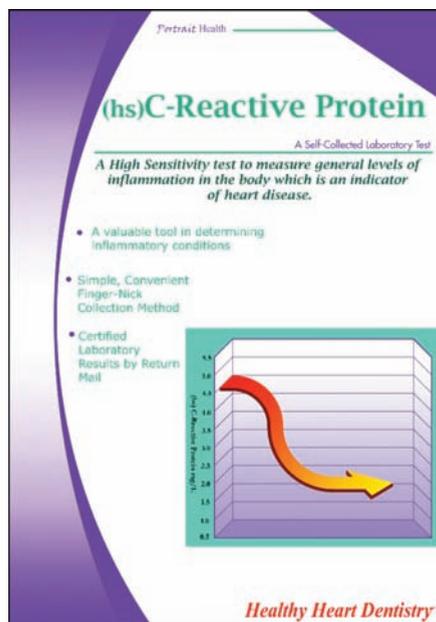


Figure 4. The Healthy Heart Dentistry hsCRP Test Kit contains illustrated instructions, blood collection materials, laboratory requisition and patient consent form, and specimen transport system to deliver the specimen to an accredited clinical laboratory which analyzes the specimen for hsCRP using FDA-approved analytics.

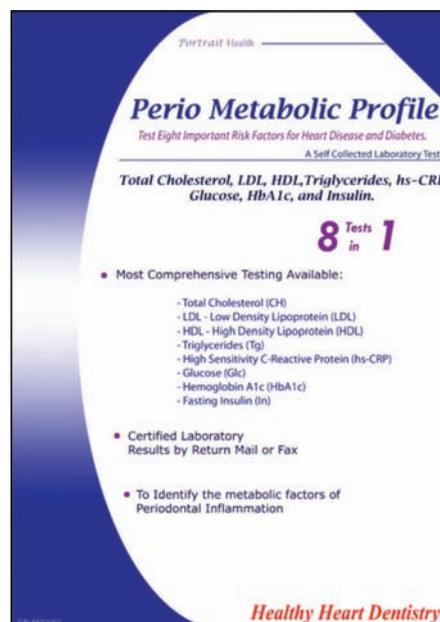


Figure 5. The Healthy Heart Dentistry Perio Metabolic Profile examines eight biological markers related to the systemic association of periodontal inflammation: hsCRP, HbA1c, glucose, cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL), low-density lipoprotein cholesterol (LDL), and insulin.

the systemic association of periodontal inflammation. Just four drops of fingernick blood provides a complete panel of hsCRP, HbA1c, glucose, cholesterol, triglycerides, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol and insulin. This is currently the most comprehensive profile available to dental professionals to determine if the metabolic syndrome is contributing to their patients' periodontal condition, and vice versa.

Dental Office Blood Screening Advantages

- Identify undiagnosed or poorly controlled diabetics.
- Identify pre-diabetics and those at risk of developing diabetes.
- Demonstrate to what extent periodontal disease is causing elevations in blood glucose, cholesterol, and hsCRP.
- Can identify elevated hsCRP secondary to systemic cancers.
- The professional lab report is used to open up discussions with physicians to build a mutually referring relationship.

Hidden medical issues can create an unhealthy oral environment, and likewise, an unhealthy oral environment causes a plethora of systemic illnesses. This bilateral association is no longer the issue of debate; it is the premise on which we have established our mission. ■

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Authors' Bios

Dr. Ron Scheffore practices adult general dentistry in the Chicago area and is the president of Healthy Heart Dentistry and Pharmaden Nutraceuticals. He is the author of the popular book *Better Service, Better Dentistry, Better Income*. He can be reached at celebritysmiles@aol.com, or by fax at 630-986-1524. Additional information can be found by visiting www.healthyheartdentistry.com and www.pharmaden.net.

Dr. Jack Maggiore serves as the Chief Scientific Officer of Healthy Heart Dentistry, and President of Healthy Life Laboratories, and is a medical technologist, certified by the American Society for Clinical Pathology, with a Master of Science in Clinical Chemistry and Doctorate in Pathology from the University of Illinois. He holds several medical device patents, and has authored more than 30 abstracts, publications, and textbook chapters. His expertise includes clinical trials and regulatory affairs. His clinical research interests include diabetes disease management, and development of novel biomarkers for chronic diseases. Dr. Maggiore's mission is to work with health care professionals to empower consumers to take a more active role in their health maintenance.

Disclosure: Dr. Ron Scheffore declares that he is the president of Healthy Heart Dentistry and Pharmaden.

Dr. Jack Maggiore declares that he is the owner/part owner of Healthy Heart Dentistry.

Post-test

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1. Recent findings suggest that the first clinical symptom of diabetes is:
 - a. Ischemic stroke.
 - b. Bleeding gums.
 - c. Pallor secondary to anemia.
 - d. Dizziness.
2. The most commonly measured blood marker of inflammation is:
 - a. Glucose.
 - b. Interleukin 6 and the cytokines.
 - c. C-Reactive Protein.
 - d. Cholesterol.
3. A recent survey estimates that the percentage of patients who bleed during teeth cleaning is:
 - a. 10 percent
 - b. 43 percent
 - c. 72 percent
 - d. 100 percent
4. Dentists make ideal health care professionals to screen for diabetes because:
 - a. Tooth loss is the very first sign of diabetes mellitus.
 - b. Only dentists are licensed to perform the latest screening test for diabetes.
 - c. The predisposition to develop anemic conditions is first recognized by dentists.
 - d. More people see their dentist than their primary care physician.
5. What is true about diabetes?
 - a. Type 1 is more common than Type 2 diabetes.
 - b. Obesity is a preventable cause of Type 2 diabetes.
 - c. Type 2 diabetes is only diagnosed in adults.
 - d. Type 2 diabetes is also known as insulin-dependent diabetes.
6. Which of the following is not associated with an increased risk of diabetes?
 - a. Being female.
 - b. Lack of exercise.
 - c. Childhood obesity.
 - d. Having a father with diabetes.
7. Which is a true statement regarding pre-diabetes?
 - a. Pre-diabetes only occurs in advance of insulin-dependent diabetes.
 - b. Pre-diabetes might be reversible with a commitment to lifestyle changes.
 - c. Pre-diabetes is able to be diagnosed with CRP testing alone.
 - d. Pre-diabetes affects more than half of the population in the United States.
8. Increased CRP is associated with higher risk of
 - a. Cardiovascular diseases.
 - b. Nutritional deficiencies.
 - c. Depression.
 - d. Inborn errors of metabolism.
9. Despite decades of advances of medical technology, which test remains the primary diagnostic tool for diabetes?
 - a. C-Reactive Protein.
 - b. HDL-Cholesterol.
 - c. Interleukin 6.
 - d. Blood Glucose.
10. Awareness, education, diagnostic testing, and call to action are necessary components of:
 - a. Successful medical and dental health initiatives.
 - b. All continuing education objectives.
 - c. Diagnostic algorithms.
 - d. Guidelines for authorship in peer-reviewed medical and dental journals.

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7. a b c d
8. a b c d
9. a b c d
10. a b c d

Program Evaluation

Please evaluate this program by circling the corresponding numbers: (3 = Excellent to 1 = Poor)

- | | |
|---|-------|
| 1. Course objectives were consistent with the course as advertised | 3 2 1 |
| 2. Course material was up-to-date, well-organized and presented in sufficient depth | 3 2 1 |
| 3. Instructor demonstrated a comprehensive knowledge of the subject | 3 2 1 |
| 4. Overall, I would rate this course | 3 2 1 |
| 5. Overall, I would rate this instructor | 3 2 1 |

For any questions, please contact Rita Zakher, DMD, MBA, director of continuing education at rita@dentaltown.com