A Comprehensive Review of Vascular Disease: Part 4—Understanding Genetics and Practical Application for Dentists

A Peer-Reviewed Publication
Written by Charles C. Whitney, M.D.

Abstract
Evidence shows an association between oral disease and systemic vascular disease. Physicians need our dental colleagues’ help if we strive to optimally reduce our patients’ risk of suffering a heart attack or stroke. This four-part series will give dental professionals an understanding of the pathology of cardiovascular disease and describe how you can intervene to reduce risk in your personal life and your patients’ lives. Incorporating a cardiovascular health program in your practice will elevate your credibility as a true health professional, improve your ability to cure dental disease, and drive the much-needed collaboration between physicians and dentists. Part 4 in this series describes how modern genetic testing can aid in vascular risk reduction. You’ll also learn practical ways for dentists to participate in the effort to improve your patients’ oral and vascular health.

Learning Objectives:
At the conclusion of this course the attendees will be able to understand:
1. The role of family history in cardiovascular disease assessment and treatment
2. Clinically valuable genetic tests available
3. Important roles dental professionals can play in the fight against cardiovascular disease and ways to promote dentist-physician collaboration.

Author Profile
Charles C. Whitney, M.D. is founder of Revolutionary Health Services, www.revolutionaryhealthservices.com, a practice established by the University of Pennsylvania as the second concierge medical practice in the state of Pennsylvania. He currently serves as Vice President of the American Academy of Private Physicians, www.AAPP.org, and has been a member of the Board of Directors since 2007. Dr. Whitney graduated from Jefferson Medical College in Philadelphia in 1990. He completed his residency at David Grant USAF Medical Center and served as a Physician in the United States Air Force before joining the University of Pennsylvania Health System.

Author Disclosure
The author is not employed by any of the companies referenced in this course. He is a Certified Health Coach and Business Coach with Take Shape for Life.

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Role of Genetic Testing
Every human is a unique individual. Personality, gifts/abilities, and likes/dislikes vary. You may learn in a different way than another person, and food even tastes different because taste buds are different.

Every human has 46 Chromosomes in the nucleus of our cells. It is the command center that provides instructions to produce proteins. We receive 23 chromosomes from our mother and 23 from our father, and they cannot be altered.

Identical twins have the exact same chromosome makeup. When identical twins are separated at birth, then reunite many years later, it’s amazing to see their similarities despite very different family influences and environments.

The corollary of this is true too. Even though the genetic makeup of identical twins is exact, and they look very much alike, the individuals can be very different. Environment plays a significant role. The expression of hard wired genetics will be different if you grow up to in Paris, France than it will be if you grow up in a rural or wilderness area.

Examining family history provides a peek at one’s genetics. It is a qualitative look at your genetics, to identify trends of disease including colon cancer, breast cancer, coronary artery disease, diabetes, and obesity.

Family history is a reflection of genetic makeup and provides very valuable information to guide testing and lifestyle choices. For example, we usually begin colon cancer screening at age 50, but will start 10 years earlier than the youngest relative who has had colon cancer. Healthy eating habits and physical activity are important for everyone, but especially if there is a strong family history of cardiovascular disease or a tendency towards obesity in the family. An unfavorable family history may not seem fair, but is reality, and should be acted upon.

21st century genetic testing allows for analysis of the specific genetic makeup of an individual. It provides more information than just looking at trends in your family. Genomic medicine is a growing tool in medicine where physicians act on an individual’s genetic code to guide treatment.

In April, 2003, mapping of the human genome was completed. Scientists have identified every gene that exists on every chromosome. Interestingly, over 99% of human DNA is exactly alike. The 1% that varies is what makes each person unique.

Single Nucleotide Polymorphisms (SNPs, pronounced “snips”) are sites of variability in DNA. These SNPs code to produce amino acids. Some amino acids have been found to correlate with specific medical conditions and place an individual at greater or lesser risk of developing that medical condition. Other amino acid variations correlate with different responses to medication.

There are many SNPs associated with vascular disease. I will only discuss a few that have risen to the top in reliability. Every test discussed can be used for practical clinical application, allowing us to guide treatment based on genetic makeup.

The following is a review of the most clinically valuable genetic tests available in 2012. This list will eventually change. Some will disappear and others will be added as we discover more about the human genome. Genetic risks must be analyzed in the context of a complete cardiovascular assessment.

Each test looks at a single gene on a specific chromosome. I will describe the unique risk associated with the “high risk” amino acid produced at that site. Individuals get one copy of a gene from their mother and one copy from their father, so two different amino acids may be produced. Generally, two “bad genes” are worse than one.

I will then describe how the information may be practically applied to a vascular assessment and treatment plan to reduce cardiovascular risk. It is not necessary for every person to undergo every test. Testing currently may be expensive and should be individualized.

9p21- This test helps determine how aggressively to treat someone with insulin resistance. High risk is present when the gene codes to produce the amino acid Guanine (G) at the 9p21 site. Low risk is when both genes produce Cytosine (C). One copy of G gives you a 26% increased risk of heart attack or stroke, two copies gives a 64% increased risk of event.1

9p21 testing is most important in people who have insulin resistance. Strong evidence suggests that diabetic 9p21 carriers of GG have increased risk of dying from a vascular event than non-carriers. Diabetics in good control had a 2X increased risk, and those in poor control had a 4X increase risk of death from vascular disease.2

The take home message is that anyone who has a GG or GC 9p21 gene would be wise to do everything possible to prevent insulin resistance. If diabetes already exists, maximize control!

APO E- Like APO B discussed in the lipid section of course #2, APO E is a protein stuck to the outside of lipid particles. There are 3 different types of APO E, types 2, 3, and 4. The combination received from parents gives your personal genotype of APO E. If you are a 2/2 or 2/3, you are APO E2 (11% of the population). If you are 3/3 or 2/4 you are APO E3 (64%), and 3/4 or 4/4 are APO E4 (25%).

APO E genotype correlates with vascular disease risk. Those who are APO E4 have a 21% increased risk of suffering an event compared to those who are APO E2.3
The practical benefit of knowing your APO E genotype is guidance of dietary choices and their effects on lipids. Details can be found in Table 2, but are summarized as follows:

- Soluble fiber, plant sterols, soy protein have equally beneficial effects in all APO E types.
- Omega-3 fish oil more significantly improves small dense LDL cholesterol particles in APO E4 individuals, but may actually lower HDL cholesterol.
- Low fat diet is extremely helpful in APO E4, but may actually increase small dense particles in APO E2.
- Alcohol- Improves both HDL and LDL in APO E2, but actually worsens both HDL and LDL in APO E4, so should be minimized in this group.

Medical ethics in genetic testing is an important topic to consider. APO E testing illustrates this point. Knowing you are APO E 4/4 is helpful to guide dietary intervention to reduce vascular risk. However, there may be significantly increased lifetime risk of Alzheimer’s Disease in a person who is APO E4. Many would want to know that information, but many would not, even though the information could improve their cardiovascular disease prevention plan.

KIF-6- The test for KIF-6 genotype is known as the “statin check”. You are considered a carrier of the KIF-6 variant if your gene codes for 1 or 2 copies of the amino acid Arginine (Arg). Non-carriers have 2 copies of Tryptophan (Trp). Multiple well structured controlled trials have shown up to a 50% increased risk of vascular event in KIF-6 carriers.4 The good news is that they also showed that treatment with a statin lowers a carrier’s risk of event more than it does in a non carrier. Non-carriers are more likely to need multiple medications to control lipids.

LPA- This is known as the aspirin check. Risks associated with aspirin therapy make it necessary to better select people who should take aspirin for cardiovascular event prophylaxis. The LPA test helps guide that decision.

If your LPA codes for the production of the amino acid methionine (Met), you have double the risk of vascular event compared to those with two copies of Isoleucine (Ile).5,6 That’s the bad news. The good news is that Met carriers have twice the benefit from aspirin prophylaxis compared to those with Ile/Ile, nullifying their increased risk from being a carrier.5

Therefore, the LPA gene test helps determine who should get aspirin, especially in people with moderate cardiovascular

Figure 1- Diet recommendations based on Apo E genotype.

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<th>Apo E review of literature†</th>
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Legend: ↓ decreases ↑ increases ↔ no change ↓↓ significantly decreases ↑↑ significantly increases

References:
5. Am J Clin Nutr 2003;77:1098-111

† This chart represents a summary of reported metabolic responses seen with different Apo E genotypes. Providers must consider the appropriate context for each patient’s best therapeutic recommendation, based on their overall metabolic and cardiac risk profile.

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risk. Although the risk of taking baby aspirin is low, some people develop GI bleeds from taking aspirin. In Met carriers, only 37 women need to be treated to prevent one vascular event. 625 non-carriers with Ile/Ile must be treated to prevent an event.7 There are no data that look at men.

Both men and women who are LPA carriers should strongly consider taking low dose aspirin. The risk of bleed may not warrant treatment in non-carriers, depending on other risk factors.

Everyone with known arterial plaque should consider low dose aspirin. LPA testing may not be necessary in this group.

**TCF7L2** - Those homozygous for Tyrosine (TT) have a 69% lifetime risk of type II diabetes. The general population carries a 28% risk. One copy of T does not appear to add any increased risk over the general population.7

Those who are TT would be wise to normalize their weight, eat optimally, and stay physically active in an effort to prevent insulin resistance, and subsequent diabetes.

**IL 1a+1b (MyPeriopath PST)**

As previously discussed, there are several oral bacteria that in high quantities place patients at significant risk for both periodontal disease and arterial disease. A genetic variant of the IL1 gene places you at high risk for periodontal inflammation at much lower bacterial loads. Breakdown may occur at bacteria levels lower than meet the threshold of significance indicated on MyPeriopath testing. About 30% of the Caucasian population has this genetic variant.

Although no association has been proven, there is speculation that people with this genetic variant may also be at risk for vascular disease at lower levels of these bacteria. If so, risk factor treatment should be more aggressive, and it may be helpful to use low dose doxycycline, that inhibits inflammatory enzyme activity.

**Haptoglobin** - Vitamin E is an antioxidant. For many years, it has been speculated that taking a vitamin E supplement lowers cardiovascular risk. In the general population, studies have not supported this theory.

However, there is evidence that supports treatment with Vitamin E in a subset of the population. Multiple studies have shown that diabetics with a Hap 2-2 genotype have 2-5X increased risk of a vascular event then those who are Hap 1-1 or 1-2.5 Taking Vitamin E 400 IU daily neutralized that risk.9

**CYP2C19** - Plavix is a medication that inhibits the function of platelets. It is routinely given to patients who have had a coronary artery stent placed, and some who suffer a stroke while on aspirin. There is significant genetic variability with how well this medication works, and the activity can be assessed with the CYP2C19 test. Everyone who takes Plavix should have this gene tested.

Testing classifies you as a high metabolizer, average metabolizer, or poor metabolizer of Plavix. Those who are poor metabolizers should take Effient, an alternative medication in the same family. The genetic variant that makes some a poor metabolizer of Plavix does not affect Effient.

### An approach to assessing and treating vascular disease

**Standard of care** is a term used in healthcare. If a clinician adheres to the standard of care, he or she will be able to defend a malpractice action. As medical discoveries are made, yesterday’s standard of care becomes today’s malpractice. Physicians appropriately change our recommendations over time; however, the medical community is very slow to accept and implement quality changes.

It is also true that much of today’s optimal care becomes tomorrow’s standard of care as time and research changes the way we practice medicine.

**Standard of care treats a population, optimal care treats the individual.**

Moderate and high risk individuals would be wise to seek optimal care. We all should seek low risk interventions like dental flossing that optimally create health. Standard of care is based on the latest clinical guidelines. Clinical guidelines is a term used to determine which tests an individual should undergo and treatments they should receive. Clinical guidelines are evidence-based recommendations for physicians to use when treating their patients. Guidelines have been developed for treating most medical conditions such as diabetes, heart disease, asthma, and various cancers. The clinical trials used to establish guidelines study a large number of individuals; they study a population. By necessity, the group is viewed as one entity and all subjects in the study are treated alike. For example, the group may have an average glucose of 93, but the glucose of individual people can vary widely around that number.

Health insurance companies use clinical guidelines to determine what testing and treatment they will cover.

Optimal care treats the individual; N=1. Guidelines are very helpful as a general guide for physicians to make evidence based decisions to treat patients. However, guidelines are only research based suggestions. They are not meant to be rigid “rules” that we must follow. Physicians should adequately assess a patient’s unique combination of medical problems, life situation, and personality and then order appropriate testing. Results are analyzed and a customized treatment plan is developed. Optimal care is not a cookie cutter approach to patient treatment.

### How can dentists intervene in prevention and treatment of cardiovascular disease?

Dentists are positioned very well to participate in optimally assessing and treating vascular disease. In fact, physicians cannot optimally prevent heart attacks and strokes in their patients without the assistance of a dentist. We need to collaborate!

Our mouth is the gateway to many systemic diseases, especially cardiovascular disease. Dentists recognize this better than most physicians.
There are several simple ways a dentist can revolutionize their patient care by promoting oral systemic health in their practice. In doing so, you will promote dentist-physician collaboration, and build your practice.

Imagine the response of a physician if their patient’s dentist diagnoses early vascular disease, prediabetes, and hypertension, or if a dentist is able to help their patient lose and maintain optimal weight to actually cure multiple diseases.

Collaborate with a physician in your region. There are a growing number of physicians who understand the significance of the oral systemic link. Dental professionals need physicians, and physicians need dentists if they hope to optimally treat their patients. Start looking for physician members of the American Academy for Oral Systemic Health (www.AAOSH.org). A second resource is the American Academy Private Physicians (www.AAPP.org). Consider becoming a member of both these organizations that are aggressively attempting to educate professionals about the need for collaboration.

The following sections outline ways that dental professionals can incorporate heart attack and stroke assessment and treatment into their practices. All health professionals who care about our patients need to be involved in promoting comprehensive health. That’s why we are called Healthcare Professionals……… it’s about the person, not the body part!

**Check Blood Pressures:** Automatic blood pressure monitors are readily available, very accurate, and inexpensive. Dental assistants can do the screening. Size of cuff is important, so multiple sizes will be necessary. A cuff too small can cause falsely elevated readings.

**Proper cuff size is based on upper arm circumference:**

- Arm circumference 22 to 26 cm, ‘small adult’ cuff, 12 x 22 cm
- Arm circumference 27 to 34 cm, ‘adult’ cuff, 16 x 30 cm
- Arm circumference 35 to 44 cm, ‘large adult’ cuff, 16 x 36 cm
- Arm circumference 45 to 52 cm, ‘adult thigh’ cuff, 16 x 42 cm

When measuring blood pressure, follow these guidelines:

- Don’t take a pressure immediately after eating or exercise.
- Rest for at least 5 minutes.
- Their arm should be supported and held approximately at the level of their heart.
- Sit with back supported and feet flat on the ground.

A reading below 120/80 is normal. A value above 130/80 warrants further investigation.

Don’t rely on one reading. If their blood pressure is elevated, ask them to purchase their own cuff and take 12-14 readings at varying times of the day over a 7 day period. They should take the results to their physician.

**Hemoglobin A1c testing:** Hemoglobin A1c (glycosylated hemoglobin) measures glucose that is attached to hemoglobin in circulating red blood cells (RBC). It is a permanent attachment and the lifespan of and RBC is approximately 3 months. Therefore, hemoglobin A1c is a good estimate of glucose control in an individual over the past 3 months. It is the gold standard for following someone with diabetes. It is also an effective way to identify individuals with insulin resistance. Testing is nonfasting.

Hemoglobin A1c testing can be done in any outpatient office setting and only requires a CLIA level I certification which most dentists already have. The machines are inexpensive and testing is billable.

A hemoglobin A1c level >5.6 suggests insulin resistance and should be referred for physician evaluation.

**Glucose testing:** Similarly, glucose monitors measure blood glucose level. This test must be fasting. A level over 90 suggests possible insulin resistance. Borderline hemoglobin A1c and glucose readings are more significant in the presence of comorbidities like obesity, periodontal inflammation, and high blood pressure.

**CIMT ultrasound:** Carotid Intima-Media Thickness (CIMT) ultrasound is the optimal tool to discover early vascular disease as discussed in detail in part 1 of this series. It is relatively inexpensive ($190-$250) and quite portable so could be performed in a dental office. There is no discomfort, no disrobing, and the test takes about 10 min. to perform.

Physician oversight would be necessary and abnormal results referred to the patient’s physician for further assessment and treatment.

**Home sleep monitoring:** Sleep apnea is a root cause of vascular disease that contributes to hypertension, insulin resistance, and vascular inflammation as outlined in detail in part 3 of this series. Historically, evaluation for sleep apnea has been done in a sleep center, but technology now allows accurate testing at home. Most patients prefer home testing and it is much less expensive, so many health insurances reimburse home testing. In 2011 the American Association of Clinical Endocrinologists recommended that all diabetics undergo testing for sleep apnea. 16

Curing sleep apnea requires weight loss and an oral appliance if pharyngeal laxity is present. Continuous Positive Airway Pressure (CPAP) is sometime necessary at first, depending on the severity of apnea and other comorbidities. However, CPAP is only meant to be a temporizing treatment until the disease is cured by weight loss and/or an oral appliance.

Both testing and treatment can effectively be accomplished through a dental office. A physician should be consulted if CPAP is necessary.

**Tobacco cessation:** Dentists can educate the patient about the effect of tobacco on both oral and systemic disease. Tobacco cessation can be provided in the dental office or referral can be made to a local cessation program and their
physician to initiate tools to assist the process. Available tools include nicotine replacement and medication to suppress the desire for nicotine.

**Oral microbial testing:** It has been well established that causative oral bacteria are found in vascular plaque\(^{11-13}\) and increase an individual’s risk for heart attack and stroke.\(^{14}\) Although these bacteria may also cause concomitant oral inflammation the bacteria may be present at high levels in the absence of visible oral inflammation.\(^{15}\)

Salivary testing is now available through OralDNA Labs and Hain Lifescience that looks for DNA evidence of these bacteria and accurately measures the bacterial load.

Optimal treatment of systemic vascular disease requires maximal elimination of these causative bacteria regardless of the presence or absence of active gum inflammation. Testing is easily done in either a dental or physician office by simply collecting a saliva sample.

**Dental treatments that promote systemic health:** There are many dental health interventions that promote oral health, but also help to attain and maintain healthy oral flora to reduce risk of causative bacteria becoming systemic and contribute to vascular plaque deposition and vascular events. Options include:

- Mechanically remove biofilm.
- Restore periodontal health where necessary.
- Correct malalignment and crowding.
- Removal of third molars that may be a focus of infection and inflammation.
- Microbial specific treatments based on bacterial load.
- Localized and systemic antibiotics when appropriate.
- Xylitol regimens

**Promote healthy lifestyles:** For many Americans, the phrase *lifestyle change* is a four letter word! It elicits a gut level dread and a feeling of being overwhelmed. Many think that it involves time consuming physical exhaustion and significant deprivation from good food and fun. Physicians tell their patients to reduce stress, exercise, eat healthy, and lose weight, but often fail to provide the tools to help accomplish these goals. Most have tried but failed.

In his book *Habits of Health*, Dr. Wayne Scott Andersen presents a different view of lifestyle changes. Throughout our lifetime, we all develop hundreds of unhealthy habits that promote disease. We are blind to many of these habits, completely unaware of their impact. They have become a part of us.

Dr. Andersen suggests that we stop trying to eliminate our bad habits, because doing so makes us feel like we are depriving ourselves of something we enjoy. Also, many unhealthy habits will go unrecognized and therefore, never be addressed. He suggests that instead, we decide what we want. If creating health is what we want, we should begin to learn and implement healthy habits that help us reach our goals. In the process of learning healthy habits, we begin to recognize many unhealthy habits we have adopted. As we begin to implement healthy habits one by one, they begin to water down the significance of the unhealthy habits in our lives. The unhealthy habits begin to have less control over us.

Prescription medications are a Band-Aid to make our blood pressure, glucose, and cholesterol numbers look better, but they don’t cure the underlying disease process that cause these conditions in the first place.

Two thirds of Americans are overweight or obese. Attaining and maintaining an optimal weight can actually cure hypertension, dyslipidemia, insulin resistance, and sleep apnea. Maintaining optimal weight is difficult without actually creating health through lifestyle changes.

Take Shape for Life as an optimal health program created by Dr. Anderson that can be easily plugged into any dental office. With the help of a personal health coach, patients can safely, quickly, and easily attain their optimal weight, then overcome the logistical and psychological barriers that caused them to gain weight in the first place.

**An urgent need for dentist-physician collaboration**

The purpose of this series of courses is to educate dental professionals about the epidemiology and pathophysiology of vascular disease and vascular events, and to empower you with ways to contribute in the fight against disease. At the same time, your efforts will open the eyes of physicians around the country and begin the much-needed discussion of finding ways to cross refer.

Imagine the response of a physician if their patient presents for treatment, having been referred by their dentist with a borderline hemoglobin A1c, blood pressure, and an abnormal CIMT ultrasound. More so, imagine the physician’s response if the patient presents lightheaded because they are overmedicated having cured their hypertension and diabetes because they lost 50 pounds with the assistance of a health coach provided by their dentist.

Think of the respect a patient will have for their dentist who helps them cure their sleep apnea through weight loss prior to making an oral appliance. The credibility of that dentist will be immense, and referrals will grow.

We are all health professionals, and our duty is to treat the person, not the body part. With such clear evidence that our mouth is a gateway to systemic disease, it is imperative that dentists and physicians collaborate. Neither can optimally treat our patients without doing so.

At this time, dentists understand the need to collaborate much better than most physicians do. With grass root efforts as described here by innovative dentists, help from organizations like AAOSH and AAPP, and further research clarifying the oral-systemic link and offering ways to intervene, we can change how healthcare providers view vascular disease, and physician-dentist collaboration will become routine practice.
References:
4. CARE, PROSPER, WOSCOPS, PROVE-IT trials

Author Profile
Charles C. Whitney, M.D. is founder of Revolutionary Health Services, www.revolutionaryhealthservices.com, a practice established by the University of Pennsylvania as the second concierge medical practice in the state of Pennsylvania. He currently serves as Vice President of the American Academy of Private Physicians, www.AAPP.org, and has been a member of the Board of Directors since 2007. Dr. Whitney graduated from Jefferson Medical College in Philadelphia in 1990. He completed his residency at David Grant USAF Medical Center and served as a Physician in the United States Air Force before joining the University of Pennsylvania Health System.

Disclaimer
The author is not employed by any of the companies referenced in this course. He is a Certified Health Coach and Business Coach with Take Shape for Life.

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Questions

1. Which of the following statements is true about current use of genetic testing?
   a. The nucleus of every cell has 23 chromosomes.
   b. In genomic medicine, physicians act on an individual’s genetic code to guide treatment.
   c. In identical twins, all genes are expressed the same.
   d. Family history is now of minimal value with the availability of genetic testing.

2. Which of the following statements is true?
   a. 99% of human DNA is exactly like.
   b. Genetic code guides the production of amino acids.
   c. Single nucleotide polymorphisms (SNPs) are sites of variability in DNA.
   d. SNPs may be used to assess how a person will respond to a medication.
   e. All of the above statements are true.

3. Which of the statements is NOT true about the APO E genetic test?
   a. Patients should be counseled before testing is done.
   b. Soluble fiber, pan sterols, and so i are good for all APO E genotypes.
   c. Low-fat diet is most helpful in the APO E4 genotype.
   d. Alcohol should be minimized in those with an APO E4 genotype.
   e. All of the above statements are true.

4. Which statement is NOT true about 9p21?
   a. High risk is when the SNP codes for Guanine (G).
   b. The GG genotype conveys a 64% increased risk of vascular event.
   c. The ar risk genotype guides cholesterol treatment.
   d. Carriers of GG should aggressively change lifestyles and possibly use medication to treat insulin resistance.
   e. All of the above statements are true.

5. KIF-6 carriers of Arginine (Arg):
   a. Have up to a 50% increased risk of vascular event.
   b. Respond better to statins.
   c. Are more likely to need multiple medications to treat cholesterol than noncarriers.
   d. A and B only.
   e. All of the above.

6. Which of the following statements about aspirin prophylaxis is NOT true?
   a. LPA carriers of the SNP code for Methionine (Met) have an increased risk for vascular event.
   c. LPA testing help to determine who should take low-dose aspirin.
   d. Taking low-dose aspirin chronically has very little risk.
   e. All of the above.

7. Which of the following statements is NOT true about the interleukin-1 (IL-1) gene variant (MyPerioID)?
   a. The variant places a patient at risk of periodontal breakdown at low levels of bacterial load.
   b. 10% of the Caucasian population carries the variant, Jean.
   c. The IL-1 may be associated with increased risk of vascular event.
   d. Low-dose doxycycline (Periostat) should be considered in patients with the IL-1 variant.
   e. Vascular risk factor treatment should be more aggressive in those with the IL-1 variant.

8. The CYP2C19 gene test determines whether a person is a high, average, or poor metabolizer of the medication:
   a. Dilantin.
   b. Coumadin.
   c. Aspirin.
   d. Plavix.
   e. Lovoxin.

9. Which of the following statements are true?
   a. Standard care uses guidelines to treat a population.
   b. Clinical guidelines must be followed to meet standard of care requirements.
   c. In optimal care, treatment plan is developed to treat an individual’s clinical picture.
   d. A and C only.
   e. All of the above.

10. Which of the following are ways for dental professionals to encourage physician-dentist collaboration?
    a. Look for local physician members of the American Academy of Oral Systemic Health (AAOSH) and the American Academy of Private Physicians (AAPP).
    b. Implement an optimal health program like TSL.
    c. Check hemoglobin A1c readings in high risk patients.
    d. Check office blood pressures.
    e. All of the above.

11. Which of the following statements are true about office blood pressure readings?
    a. A blood pressure cuff too small can falsely elevate the reading.
    b. The patient should rest for at least 5 min. before eating or exercise.
    c. Have the patient sit with their arm supported at the level of their heart and feet flat on the floor.
    d. A and B only.
    e. All of the above.

12. What is the upper level of normal for a blood pressure to be considered completely normal?
    a. 110/70.
    b. 120/80.
    c. 130/80.
    d. 140/90.
    e. 160/100.

13. Which of the following statements is true about hemoglobin A1c testing?
    a. Testing requires a CLIA level II certification.
    b. It measures glucose permanently attached to red blood cells and a red blood cell lifespan is 6 months.
    c. It is a fasting test.
    d. It is the gold standard for following a diabetic’s glucose control.
    e. All of the above.

14. Carotid intima-media thickness (CIMT) ultrasound testing:
    a. Is the optimal tool to detect early vascular disease.
    b. It is the gold standard for following a diabetic’s glucose control.
    c. There is no disrobing, no discomfort, and the test takes about 10 min. to perform.
    d. B and C only.
    e. All of the above.

15. Which of the following statements is NOT true about home sleep monitoring for obstructive sleep apnea (OSA)?
    a. Since it is a new technology, insurances do not reimburse for home testing.
    b. Most patients prefer testing in their own home.
    c. The American Academy of clinical endocrinologists recommend that all diabetics undergo testing for sleep apnea.
    d. Curing sleep apnea with weight loss, oral appliance, or CPAP can improve hypertension, insulin resistance, and vascular inflammation.
    e. All of the above.

16. Which of the following is/are true about oral microbial testing?
    a. Bacteria that are high risk to cause systemic disease may be present in high loads in the absence of visible gum inflammation.
    b. Samples are obtained by probing in pocket depths greater than 4 mm.
    c. Testing looks for DNA evidence of high risk oral bacteria.
    d. To target for treatment to eliminate all oral bacteria.
    e. A and C.

17. Which of the following are dental treatments that help prevent vascular plaque deposition and events?
    a. Correct malalignment of teeth.
    b. Remove third molars that may be a focus of infection.
    c. Local and systemic antibiotics.
    d. Xylitol regimens.
    e. All of the above.

18. Which of the following statements about being overweight is/are true?
    a. Two thirds of Americans are overweight or obese.
    b. Being overweight can contribute to treatment resistant sleep apnea, periodontal disease, and insulin resistance.
    c. Attaining and maintaining optimal weight can cure hypertension, and insulin resistance.
    d. Patients need to overcome the logistical and psychological barriers that led to their original weight gain.
    e. All of the above.

19. In his book, Habits of Health, Dr. Wayne Scott Anderson suggests:
    a. To identify and eliminate bad habits.
    b. To learn and implement good habits.
    c. That by implementing healthy habits, the bad habits begin to have less of an addictive hold on us.
    d. B and C.
    e. All of the above.

20. Which of the following nonprofit organizations are valuable resources to find colleagues to initiate dentist-physician collaboration?
    a. www.AAPP.org
    b. www.AAFP.org
    c. www.AAOSH.org
    d. www.ACS.org
    e. A and C.
California Provider number is 4527. The cost for courses ranges from $29.00 to $110.00. Participants are urged to contact PennWell for current term of approval. 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 2 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. For Questions Call 216.398.7822

Educational Objectives:

1. The role of family history in cardiovascular disease assessment and treatment
2. Clinically valuable genetic tests available
3. Important roles dental professionals can play in the fight against cardiovascular disease and ways to promote dentist-physician collaboration.

Course Evaluation

1. Were the individual course objectives met? Yes No
   Objective #1: Yes No
   Objective #2: Yes No

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

2. To what intent were the course objectives accomplished overall? S 4 3 2 1 0
3. Please rate your personal mastery of the course objectives. S 4 3 2 1 0
4. How would you rate the objectives and educational methods? S 4 3 2 1 0
5. How do you rate the author's grasp of the topic? S 4 3 2 1 0
6. Please rate the instructor's effectiveness. S 4 3 2 1 0
7. Was the overall administration of the course effective? S 4 3 2 1 0
8. Please rate the usefulness and clinical applicability of this course. S 4 3 2 1 0
9. Please rate the usefulness of the supplemental webliography. S 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?

Please photocopy answer sheet for additional participants.

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