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Vitamins: Some data and interactions

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Vitamins: Some data and interactions

Abstract

Too often, people are unaware of possible ramifications of vitamin interactions. They believe vitamins are innocuous and may not even inform medical professionals of their use. This creates a unique and important role for dental health-care providers because of the regularity with which many people see dental professionals. When clinicians ask poignant and thoughtful questions, they can uncover information that may affect not only the dental health of their patients, but also their medical health. Looking at patients holistically includes not only dental and medical histories, and cognitive and physical notations, but also a list of supplementations ingested. This information gives the clinician a clearer understanding of the full scope of care required for patients and will influence recommendations and treatment planning.

Educational Objectives

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

- identify water-soluble and fat-soluble vitamins;
- link the lack of vitamins to disease conditions;
- assess the functions of vitamins;
- alert to some contraindications of medicines and vitamins; and
- learn about common foods that contain vitamins.



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Introduction

We know that vitamins and minerals are vital. Vitamin C deficiencies can lead to scurvy, characterized by bleeding gums, loss of teeth, and listlessness. Blindness can result from lack of vitamin A. People can suffer from rickets, a condition where lack of vitamin D can produce weak, soft, and deformed bones.¹ These conditions are still common in certain parts of the world.

The human body cannot produce sufficient amounts of vitamins on its own. Unlike other species, such as dogs (which can generate vitamin C), a human's body cannot form vitamin C, although it may store it for a few days. The best practice is to get vitamin C daily from food. Although the human body, if exposed to sunlight, can synthesize vitamin D, most people need supplementation, particularly in northern climates in the winter. The human body is able to save some vitamins and release them slowly over time. "It's possible to consume them every now and again, perhaps in doses weeks or months apart rather than daily and still get your fill. Your body squirrels away the excess and doles it out gradually to meet your needs."¹

Vitamins are organic carbon-containing compounds that are needed in varying quantities by the body for optimum functioning. These smallest of molecules ward off diseases, promote health, and aid in optimum metabolism. There are 13 vitamins essential to human health, classified into two categories: water-soluble or fat-soluble.

The 13 essential vitamins that human bodies require are A, C, D, E, K, and the B vitamins: thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), pyridoxine (B6), biotin (B7), folate (B9), and cobalamin (B12).²

Fat-soluble and water-soluble vitamins

The fat-soluble vitamins, A, D, E, and K, are absorbed through the intestinal tract with the help of lipids or fats. These are the vitamins that can stay in the body as reserves for days and sometimes months. These fat-soluble vitamins are stored in fatty tissue and the liver.

Water-soluble vitamins, on the other hand, are excreted in the urine and cannot

stay in the body for more than a couple of days (with the exception of vitamin B12). People need regular replenishment of these essential compounds for optimum health. They include the B-complex vitamins and vitamin C. Water-soluble vitamins are packed into the watery portions of foods that are consumed. As food is digested, water-soluble vitamins are absorbed directly into the bloodstream. The same absorption applies as a supplement dissolves.

Because the human body consists of about 60% water, many of the water-soluble vitamins circulate easily throughout the body. The kidneys regulate levels of water-soluble vitamins. If too much of one vitamin is released, the kidneys will divert the excess to the urinary tract to be excreted. However, vitamin B12, even though a water-soluble vitamin, can be stored in the liver. There is probably several years' supply of vitamin B12 in the liver of people who eat meat regularly.¹ Generally, though, water-soluble vitamins should be replenished every few days.

Be aware that there is a small risk that consuming large amounts of some of these micronutrients through supplements may be harmful. For example, very high doses of B6—many times the recommended amount of 1.3 mg per day for adults—can damage nerves, causing numbness and muscle weakness.¹

Although it is not the role of dental professionals to advise patients on vitamins, hygienists and dentists can alert patients to seek medical advice or they may consult intraprofessionally for information on best practices. Learning of possible contraindications or recognizing patients who are considered at risk may prevent adverse reactions or even potentially death.³

This article, although not complete in its information, will give dental health-care providers some understanding and knowledge of vitamins, along with some contraindications and reactions.

The use of vitamins

Vitamins and supplements are marketed extensively across the world with US retail sales climbing to 36 billion dollars in 2017 and rising. Multivitamins are the most lucrative in sales for supplement companies,

followed by vitamins D and C.⁴ Obviously, huge numbers of people are ingesting vitamins and minerals. According to results of the National Health and Nutrition Examination Survey, 52% of adults take dietary supplements.³ People hope to promote health by supplying their bodies with much needed nutrition that may (or may not) be missing from their diets. Vitamin supplementation is common and is regulated by the FDA.⁵

Risk factors

There are a number of risk factors that can have a bearing on the outcomes of both supplements and medication. These include patients taking multiple medications and/or supplements, inadequate liver or kidney function, old age, and narrow therapeutic indexes.⁴ Certain dietary supplements can change absorption, metabolism, or excretion of a medication and therefore affect its potency. Patients may be getting either too much or too little of a medication they need, and those with the above risk factors should be targeted for interventions to prevent drug interactions with vitamins and minerals.

Effects of the major vitamins

VITAMIN A

Vitamin A is a fat-soluble vitamin that is important for vision, bone growth, cell differentiation, and the immune system. Found in common foods such as yellow-orange fruits, dark green leafy vegetables, and liver, deficiencies often result in problems with eyesight. Additionally, inflammation caused by celiac disease and Crohn's disease can be exacerbated with deficiencies. People with pancreatic disorders may also experience malabsorption of vitamin A.⁶

Toxicity may arise when taking vitamin A while also ingesting retinoids. These medications, used to treat acne and psoriasis (Accutane and Soriatane respectively) are similar in composition to vitamin A and may result in toxicity. Symptoms of too much vitamin A include nausea, confusion, vomiting, sluggishness, blurred vision, and poor muscle coordination.³

VITAMIN B1—THIAMINE

Found in common foods such as grains, nuts, and meats, thiamine is important in helping

to break down carbohydrates in foods. Additionally, it is important for maintaining the central nervous system. Deficiencies in the developed world are often associated with alcoholism. Alcohol, a depressant, acts on the central nervous system, while any remaining vitamin B1 is flushed away through the diuretic properties of the alcoholic beverage. This combination can lead to vitamin B1 deficiency, characterized by severe weight loss, weakness, emotional disturbances, and memory loss.⁷

VITAMIN B2—RIBOFLAVIN

Like all of the B vitamins, riboflavin plays a role in energy production in the body. Flushed out of the body daily, it needs to be replenished through foods such as eggs, nuts, dairy products, meats, leafy green vegetables, and other common foods. Vitamin B2 is needed for growth of skin, blood cells, and vital organs and is also associated with eye health. The United States National Library of Medicine reports that eating a diet rich in riboflavin can lower the risk of developing cataracts. Taking supplements containing riboflavin and niacin may also be helpful in preventing cataracts. Deficiencies are rare; however, elderly people and alcoholics may be deficient.⁸

VITAMIN B3—NIACIN

Vitamin B3 is an essential vitamin required for processing fat in the body, lowering cholesterol levels, and regulating blood sugar levels. Foods high in niacin include fish, chicken, turkey, pork, beef, mushrooms, brown rice, peanuts, avocados, and green peas. A deficiency of niacin leads to pellagra, a condition characterized by diarrhea, dermatitis, dementia, inflammation of the mouth, amnesia, delirium, and if left untreated, death. It is a water-soluble vitamin that is well regulated by the body; thus, overdose is rare, yet it does occur.⁸ Patients with high cholesterol may try to self-treat their condition with a niacin supplement while taking common prescription medications (statins) to do the same. This may increase the risk of skeletal muscle breakdown (myopathies or rhabdomyolysis).³

Overdose of niacin has been linked with liver damage as well as hypotension, and it

might activate a peptic ulcer. It might also worsen allergies and symptoms of certain thyroid disorders. It can also interfere with glucose, so patients with diabetes need to be advised to seek their physicians' advice. Those with complex forms of arthritis should use niacin with caution. Too much niacin may cause an excess of uric acid in the blood (hyperuricemia), putting patients at risk of gout.³

VITAMIN B5—PANTOTHENIC ACID

No problems have been found to be associated with a lack of vitamin B5 alone; however, when someone is deficient in any of the vitamin B complex vitamins, they are often deficient in others. Found in peas, beans (except green beans), lean meats, and fish, little pantothenic acid is lost by cooking.⁹ Its main function is for growth and health. There have been claims that pantothenic acid may increase mental function, aiding with skin problems, preventing gray hair and arthritis, and helping to optimize breathing.³

VITAMIN B6—PYRIDOXINE

Unlike the fat-soluble vitamin A, the water-soluble B vitamins (with the exception of vitamin B12) are not stored in the body. Vitamin B6 (pyridoxine) is recommended to treat some types of anemia, and it is important for normal brain development. Also, it helps keep the nervous system and immune system healthy.¹⁰

Regular consumption of foods such as poultry, fish, potatoes, chickpeas, and bananas will guard against deficiencies. People who have kidney disease or conditions that prevent the small intestine from absorbing nutrients from foods (malabsorption syndromes) are more likely to be vitamin B6 deficient. Certain genetic diseases and some epilepsy medications also can lead to deficiency. Vitamin B6 deficiency is usually coupled with deficiency in other B vitamins, such as folate (vitamin B9) and cobalamin (vitamin B12). Although rare, an excess of vitamin B6 can damage nerves.¹¹

VITAMIN B7—BIOTIN

Although a lack of biotin is rare, certain conditions may preclude supplementation.

These conditions include genetic disorder of biotin deficiency, seborrheic dermatitis in infants, and surgical removal of the stomach.

Symptoms of vitamin B7 deficiency may include skin rash, heart problems, hair loss, and high levels of cholesterol in the blood. Cooking and preserving foods high in vitamin B7, such as carrots, liver, salmon, bananas, yeast, and cereals may reduce the level of biotin.¹²

VITAMIN B9—FOLATE

Vitamin B9 is important in red blood cell formation and for healthy cell growth and function. This nutrient is crucial during early pregnancy to reduce the risk of birth defects of the brain and spine, and supplements are often prescribed in pregnancy.¹³

Folate is found mainly in dark green leafy vegetables, beans, peas, nuts, oranges, lemons, bananas, melons, and strawberries. Patients suffering with rheumatoid arthritis and psoriasis are commonly deficient. Those who have celiac disease may be lacking in vitamin B9 as well. Their small intestine may not absorb nutrients from foods (malabsorption syndrome). There is also evidence to suggest that folate may reduce the efficacy of methotrexate in cancer therapy.³

VITAMIN B12—COBALAMIN

Vitamin B12 plays essential roles in red blood cell formation, cell metabolism, nerve function, and the production of DNA. The primary foods that contain B12 are meat products—including chicken, turkey, beef, pork, fish—and eggs. Vitamin B12 can also be obtained by eating and drinking plenty of dairy products.¹⁴

The human body can store several years' worth of vitamin B12, making deficiencies rare among meat eaters. However, because plants do not contain vitamin B12, vegetarians and vegans may be at risk of deficiency. Older adults and people with digestive tract conditions that affect absorption of nutrients also are susceptible to vitamin B12 deficiency.

Left untreated, a vitamin B12 deficiency can lead to anemia, fatigue, muscle

weakness, intestinal problems, nerve damage, and mood disturbances.¹⁴

VITAMIN C

Also known as ascorbic acid, vitamin C is found in a wide range of foods, including oranges, strawberries, Brussels sprouts, peppers, and kale, with the function of aiding in the formation of blood vessels, cartilage, muscle, and collagen in bones. Vitamin C is vital to the body's healing process, protects against heart disease, aids in the absorption of iron, and helps form muscle and collagen in bones.¹⁵ Humans cannot synthesize this water-soluble vitamin; therefore, daily intake is optimum for health. Severe vitamin C deficiency can lead to a disease characterized by anemia, bleeding gums, bruising, and poor wound healing (scurvy).¹ It is also an antioxidant and can aid in protecting against some cancers by neutralizing free radicals.¹⁶

Vitamin C can affect prescription drugs such as barbiturates and can also affect chemotherapy and drugs that contain acetaminophen. Patients should speak to their physicians if they are on medications. Notably, people who take medications containing aluminum, such as phosphate binders, may have increased absorption of vitamin C. Effects on people with kidney problems could be harmful.³

VITAMIN D

This vitamin is important for bone health. Vitamin D is required in order for calcium to be absorbed by the body. The body can naturally manufacture it when direct sunlight converts a chemical in the skin into an active form of the vitamin (calciferol). Vitamin D is added to many foods including fortified milk and fortified cereal,¹⁷ and is found in small amounts in fatty fish such as salmon, mackerel, and sardines.¹⁸

VITAMIN E

Vitamin E is found in oils, nuts, meats, dairy, leafy greens, and fortified cereals. This fat-soluble vitamin is a nutrient that's important for vision, reproduction, and the health of blood, brain, and skin. It is often taken for conditions such as atherosclerosis, Alzheimer's disease, and various cancers.

It is also a common supplement for those with cardiovascular disease.¹⁹

Be alert to patients taking warfarin or other prescription blood thinners along with any of the following: ginkgo biloba (an herbal supplement), aspirin, or vitamin E. Ingesting any or all of these products together can thin the blood too much and interfere with the body's ability to clot. This could increase the potential for internal bleeding or stroke.⁵

It is not yet known what interactions vitamin E has on chemotherapy. Presently, doctors may counsel patients to avoid vitamin E while under treatment.

VITAMIN K

Found in leafy greens, broccoli, prunes, and meats, vitamin K can aid in clotting and can therefore have an effect on patients taking blood thinners by reducing its effectiveness. Patients who are prescribed blood thinners should maintain their intake of vitamin K carefully.²⁰ Too much vitamin K puts the patient at risk for suboptimal anticoagulation, possibly leading to thromboembolic events such as deep venous thrombosis, pulmonary embolism, myocardial infarction, or stroke.³

Advise patients to follow their physicians' directions carefully regarding vitamin K supplements.

Conclusion

Adverse reactions to a shortage or surplus of vitamins can range in severity and significance. Consultation with other health professionals is recommended. As clinicians, it is important that we understand that supplementation is not innocuous, and there can be adverse effects. We recognize the impact of prescription medications, which is reflected in obtaining medical histories and updates from our patients; however, we should also include vitamin and mineral updates. We raise the care of our patients when we understand interactions and work intraprofessionally with pharmacists and doctors or nurse practitioners. This holistic model fits better into the delivery of care for our patients. Discovering the full gamut of supplementation our patients ingest could

have a bearing on both their dental health and also their overall health. As preventive health-care providers, we are charged to elevate our patients' care on every level.

References

1. HelpGuide.org. Vitamins and minerals—Are you getting what you need? <https://www.helpguide.org/harvard/vitamins-and-minerals.htm>. Accessed Sept. 6, 2018.
2. Nordqvist C. Vitamins: What are they and what do they do? *Medical News Today*. Sept. 26, 2017. <https://www.medicalnewstoday.com/articles/195878.php>. Accessed Sept. 11, 2018.
3. Sulli MM, Ezzo DC. Drug interactions with vitamins and minerals. *US Pharmacist*. <https://www.uspharmacist.com/article/drug-interactions-with-vitamins-and-minerals>. Accessed Sept. 06, 2018.
4. Statista—The Statistics Portal. Retail sales of vitamins & nutritional supplements in the United States from 2000 to 2017 (in billion U.S. dollars). 2018. <https://www.statista.com/statistics/235801/retail-sales-of-vitamins-and-nutritional-supplements-in-the-us/>. Accessed Sept. 10, 2018.
5. US Food and Drug Administration. Mixing medications and dietary supplements can endanger your health. <https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm420349.htm>. Accessed Sept. 19, 2018.
6. Mayo Clinic staff. Vitamin A. Mayo Clinic. Oct. 27, 2017. <https://www.mayoclinic.org/drugs-supplements-vitamin-a/art-20365945>. Accessed Sept. 06, 2018.
7. Wong C. Beriberi: Understanding thiamine (vitamin B1) deficiency. Feb. 28, 2018. <https://www.verywellhealth.com/beriberi-understanding-thiamine-deficiency-4158113>.
8. Mayo Clinic staff. Niacin. Mayo Clinic. Oct. 24, 2017. <https://www.mayoclinic.org/drugs-supplements-niacin/art-20364984>. Accessed Sept. 08, 2018.
9. Mayo Clinic. Drugs and supplements: pantothenic acid (oral route). <https://www.mayoclinic.org/drugs-supplements/pantothenic-acid-oral-route/side-effects/drg-20065349?p=1>. Accessed Sept. 21, 2018.
10. Mayo Clinic. Vitamin B 6. Oct. 17, 2017 <https://www.mayoclinic.org/drugs-supplements-vitamin-b6/art-20363468>. Accessed Feb. 18, 2019.
11. WebMD. Pyridoxine (Vitamin B6). <https://www.webmd.com/vitamins/ai/ingredientmono-934/pyridoxine-vitamin-b6>. Accessed Sept. 18, 2018.
12. Mayo Clinic. Drugs and Supplements (Oral Route). <https://www.mayoclinic.org/drugs-supplements/biotin-oral-route/description/drg-20062359>. Accessed Feb. 16, 2019.

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QUESTIONS

1. Which statement is true?
 - A. Vitamins are nonessential for health
 - B. Vitamin supplementation is always required
 - C. Vitamins are essential for health
 - D. The FDA does not regulate vitamins
2. Which is a sign of vitamin C deficiency (scurvy)?
 - A. Bleeding gums
 - B. Loss of teeth
 - C. Listlessness
 - D. All of the above
3. What is the role of dental professionals concerning vitamins?
 - A. Question the patient on vitamin supplementation
 - B. Make notations of vitamins ingested and understand possible contraindications
 - C. Recommend to patients with possible contraindications that they discuss vitamin intake with their physicians
 - D. All of the above
4. Which statement is true?
 - A. All vitamins can be stored in the body
 - B. Vitamin C needs to be ingested daily
 - C. There are both water-soluble and fat-soluble vitamins
 - D. Vitamin C is a fat-soluble vitamin
5. Which statement is false?
 - A. The liver has the function of ridding the body of excess water-soluble vitamins
 - B. Vitamins A, D, E, and K are fat-soluble vitamins
 - C. Vitamin D can be made with sunlight exposure to the skin
 - D. Water-soluble vitamins are excreted in urine
6. Which might be a risk for someone ingesting vitamins while taking medication?
 - A. Absorption of the medication may be affected, resulting in incorrect dosage
 - B. Metabolism of the medication may change, resulting in inefficiency or even harmful effect
 - C. Excretion of medication may be affected
 - D. All of the above
7. Which statement is false?
 - A. The FDA regulates vitamins
 - B. Few people take vitamins
 - C. Vitamin supplementation is a big industry in the US
 - D. There are many brands of vitamins
8. What are some of the risk factors that can have a bearing on the outcomes of both supplements and medication?
 - A. Multiple medications and/or supplements
 - B. Inadequate liver or kidney function
 - C. Old age
 - D. All of the above
9. Which statement is false about vitamin A?
 - A. It is a water-soluble vitamin
 - B. It is often associated with eye health
 - C. It is important for the immune system
 - D. It aids in bone growth and cell differentiation
10. What could be the result of vitamin A and retinoid (acne medications)?
 - A. Toxicity
 - B. Nothing
 - C. Malabsorption
 - D. Blockage
11. Inflammation caused by Crohn's and celiac diseases results in:
 - A. Overproduction of vitamin A
 - B. No effect
 - C. Deficiency of vitamin A
 - D. No relation to vitamin A
12. Which are not symptoms of vitamin A toxicity?
 - A. Blurred vision, confusion
 - B. Nausea, vomiting
 - C. Poor muscle coordination, sluggishness
 - D. All of the above
13. Although uncommon, vitamin B1 (thiamine) deficiencies may be more common in:
 - A. Children
 - B. Alcoholics
 - C. Dental professionals
 - D. All of the above
14. Which statement is true about vitamin B2 (riboflavin)?
 - A. Deficiencies are rare
 - B. Associated with eye health
 - C. Deficiencies may be associated with extreme diet weight loss
 - D. All of the above
15. Which statement is false about vitamin B3 (niacin)?
 - A. Overdoses of niacin can lead to liver damage
 - B. It is only gotten through supplementation
 - C. It is required to process fat in the body
 - D. It helps regulate cholesterol and blood sugar levels
16. Which of the following patients need not be concerned with ingesting vitamin B3?
 - A. Diabetic patients
 - B. Patients with complex forms of arthritis
 - C. Patients on no medications
 - D. Patients taking statin medications
17. Which condition may inhibit the absorption of vitamin B6 (pyridoxine)?
 - A. Kidney disease or a malabsorption syndrome
 - B. Heart disease
 - C. Arthritis
 - D. Dementia

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QUESTIONS

18. Which statement is false about vitamin B7 (biotin)?
- Deficiencies are common
 - It is only found in cooked meat
 - Cooking and preserving food has no effect on vitamin B7
 - All of the above
19. Which statement is false about vitamin B6?
- It is never recommended for people suffering with anemia
 - Certain genetic diseases and some epilepsy medications may lead to deficiencies
 - It is usually coupled with other B vitamin deficiencies (B6 and B12)
 - People with kidney disease should be checked for enough vitamin B6
20. Which statement is false about vitamin B9 (folate)?
- It is crucial for early pregnancy
 - Brain and spinal development are not affected with deficiencies
 - It is important for healthy blood cell formation
 - It is important for healthy cell growth
21. Patients who may have a vitamin B9 deficiency include those suffering with:
- Rheumatoid arthritis
 - Psoriasis
 - Celiac disease
 - All of the above
22. Which statement is true?
- Efficacy of some medications taken by patients can be affected by vitamins
 - All vitamins are the same
 - Vitamins only enhance health; they are not required
 - Vitamins never influence the absorption of other needed nutrients
23. Which statement is false?
- Red meat is a good source of vitamin B12
 - Vitamin B12's primary function is to aid in bone growth
 - The human body can store vitamin B12 for several years
 - Vegetarians and vegans are at a higher risk of vitamin B12 deficiencies
24. Which statement is true?
- Vitamin C is an antioxidant
 - Humans can synthesize vitamin C
 - Scurvy has no oral implications
 - Vitamin C has no role in neutralizing nitrates in some packaged foods
25. Which statement is false?
- Wound healing is not enhanced with vitamin C
 - Antacids with aluminum and vitamin C should be taken at different times
 - Vitamin C can affect prescription drugs, such as barbiturates, chemotherapy, and other drugs that contain acetaminophen
 - Vitamin C is found in many easily available foods
26. Which statement is false?
- Vitamin D is found in some fatty fish
 - The human body can synthesize vitamin D when in sunlight
 - Foods cannot be fortified with vitamin D
 - Vitamin D is important for bone health
27. The fat-soluble vitamin E is often taken by those suffering with:
- Conditions such as atherosclerosis
 - Alzheimer's disease and various cancers
 - Cardiovascular disease
 - All of the above
28. Caution should be taken with people taking vitamin E and:
- Warfarin
 - Receiving chemotherapy
 - Ginkgo biloba (an herbal supplement) and/or aspirin
 - All of the above
29. Under what condition can a spike in vitamin K potentially lead to suboptimal anticoagulation, possibly leading to thromboembolic events such as deep venous thrombosis, pulmonary embolism, myocardial infarction, or stroke?
- Patients taking warfarin
 - Patients on no medication
 - Patients who use herbal supplements
 - Patients with heart disease
30. What actions should dental professionals take when they are alerted to possible contraindications of vitamins and/or medications?
- Inform patients of possible contraindications
 - Consult with other health professionals
 - Refer patients to their physicians
 - All of the above

Vitamins: Some data and interactions

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Educational Objectives

1. identify water-soluble and fat-soluble vitamins;
2. link the lack of vitamins to disease conditions;
3. assess the functions of vitamins;
4. alert to some contraindications of medicines and vitamins; and
5. learn about common foods that contain vitamins.

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1. Were the individual course objectives met?

Objective #1: Yes No Objective #3: Yes No Objective #5: Yes No
 Objective #2: Yes No Objective #4: Yes No

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

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| 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?

Mail/fax completed answer sheet to:
Endeavor Business Media
 Attn: Dental Division
 1421 S. Sheridan Rd.; Tulsa, OK 74112
 Fax: (918) 831-9804

Payment of \$59 is enclosed.
Make check payable to Endeavor Business Media

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

Acct. number: _____
 Exp. date: _____ CVC #: _____
 Billing address: _____

Charges on your statement will show up as Endeavor.

- | | |
|---------------------|---------------------|
| 1. (A) (B) (C) (D) | 16. (A) (B) (C) (D) |
| 2. (A) (B) (C) (D) | 17. (A) (B) (C) (D) |
| 3. (A) (B) (C) (D) | 18. (A) (B) (C) (D) |
| 4. (A) (B) (C) (D) | 19. (A) (B) (C) (D) |
| 5. (A) (B) (C) (D) | 20. (A) (B) (C) (D) |
| 6. (A) (B) (C) (D) | 21. (A) (B) (C) (D) |
| 7. (A) (B) (C) (D) | 22. (A) (B) (C) (D) |
| 8. (A) (B) (C) (D) | 23. (A) (B) (C) (D) |
| 9. (A) (B) (C) (D) | 24. (A) (B) (C) (D) |
| 10. (A) (B) (C) (D) | 25. (A) (B) (C) (D) |
| 11. (A) (B) (C) (D) | 26. (A) (B) (C) (D) |
| 12. (A) (B) (C) (D) | 27. (A) (B) (C) (D) |
| 13. (A) (B) (C) (D) | 28. (A) (B) (C) (D) |
| 14. (A) (B) (C) (D) | 29. (A) (B) (C) (D) |
| 15. (A) (B) (C) (D) | 30. (A) (B) (C) (D) |

AGD Code 150

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

INSTRUCTIONS
 All questions 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 EVALUATION AND FEEDBACK
 We encourage participant feedback. Complete the survey above and e-mail feedback to Aileen Gunter (agunter@endeavor2b.com) and Laura Winfield (lwinfield@endeavor2b.com).

COURSE CREDITS AND COST
 All participants scoring at least 70% on the examination will receive a verification form for three CE credits. The formal CE program of this sponsor is accepted by the AGD for fellowship and mastership credit. Please contact Endeavor for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. Endeavor is a California CE provider. The California provider number is 4527. The cost for courses ranges from \$20 to \$110.

PROVIDER INFORMATION
 Endeavor Business Media 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 neither approves nor endorses individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns about a CE provider may be directed to the provider or to ADA CERP at ada.org/goto/cerp.

Endeavor 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.

RECORD KEEPING
 Endeavor maintains records of your successful completion of any exam for a minimum of six years. Please contact our offices for a copy of your CE 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.

EDUCATIONAL DISCLAIMER
 Completing a single CE course should not provide enough information to give participants the feeling that they are experts 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 AND REFUND POLICY
 Any participant who is not 100% satisfied with this course can request a full refund by contacting Endeavor in writing.

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