

Dietary Supplement Use in the United States

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Home Study Webcast

4 Slides Per Page



Dietary Supplement Use in the United States

ACTIVITY DESCRIPTION

Dietary supplements are commonly used by patients nationwide and sold in almost every community pharmacy today. In fact, one in 10 people use 5 or more dietary supplements daily. Dietary reference intakes have been established for key vitamins and nutrients, but supplements are actually regulated as foods by the Office of Dietary Supplements (ODS). Commonly used supplements include: multi-vitamins, calcium, fish oil, and vitamin D, to name a few. Unfortunately, there have been recent scandals involving the safety and efficacy of dietary supplements in the United States. Therefore, it is imperative that clinicians have the knowledge, skills, and resources necessary to provide recommendations and education regarding their appropriate use and safety concerns.

TARGET AUDIENCE

The target audience for this activity is **pharmacists, pharmacy technicians** and **nurses** in hospital, community, and retail pharmacy settings.

LEARNING OBJECTIVES

After completing this activity, the **pharmacist** will be able to:

- Review what constitutes a dietary supplement
- Describe key regulations associated with dietary supplements
- Evaluate the safety and efficacy of dietary supplement use
- Identify reputable dietary supplement resources to enhance practice and provide patient education

After completing this activity, the **pharmacy technician** will be able to:

- Review what constitutes a dietary supplement
- Identify common dietary supplements and their uses

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Dr. Maria Thurston graduated with honors from the University of Georgia College of Pharmacy. She completed a PGY-1 pharmacy practice residency with the Atlanta Veterans Affairs Medical Center in Decatur, Georgia and a PGY-2 ambulatory care residency specializing in academia with the University of Georgia/Charlie Norwood Veterans Affairs Medical Center, where she also obtained a Graduate Certificate in Clinical Pharmacy. Dr. Thurston's areas of interest and expertise include: cardiovascular risk reduction, health coaching, patient education, interprofessional education and professional development. Dr. Thurston achieved the designation of Board Certified Pharmacotherapy Specialist in 2011. She was named the Georgia Society of Health-System Pharmacists Outstanding Young Health-System Pharmacist in 2012 and received the American College of Clinical Pharmacy Ambulatory Care PRN Member Recognition Award in 2016. She is currently serving as a Clinical Associate Professor in the Department of Pharmacy Practice with Mercer University College of Pharmacy where she coordinates the Nervous Systems Disorders II course and teaches various didactic lectures. She actively practices in a collaborative internal medicine clinic affiliated with Wellstar Atlanta Medical Center, where she precepts both pharmacy students and residents. She serves on committees for multiple regional and national pharmacy organizations and is a peer reviewer for scholarly journals. Her numerous regional and peer-reviewed publications are focused on topics relevant to primary care practice, and she has research and grants in the areas of medication adherence, health literacy, diabetes, heart failure, hypertension, mobile apps, interprofessional education, and professional development.

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Faculty: Maria Miller Thurston, Pharm.D., BCPS



Learning Objectives



1. Review what constitutes a dietary supplement
2. Describe key regulations associated with dietary supplements
3. Evaluate the safety and efficacy of dietary supplement use
4. Identify reputable dietary supplement resources to enhance practice and provide patient education



Background of Dietary Supplements



- Prevalence of regular supplement use
 - 48%-53% from 2007 to 2011
- Significant increase in those who “regularly used a variety of supplements”
 - 28% → 36% from 2010 to 2011
- Supplement use
 - Increases with age
 - Higher in women than in men

Dickinson A, Bateman J, El-Dash N, Franco JC. Consumer usage and reasons for using dietary supplements: report of a series of surveys. J Am Coll Nutr. 2014;33(2):176-82. doi:10.1080/07315724.2013.875423.



Background of Dietary Supplements



- 2011: 67% of respondents used vitamin or mineral supplements
 - Multivitamins were the most commonly used supplement (71%)
 - Omega-3/fish oil (33%), calcium (32%), vitamin D (32%), vitamin C (32%)
- Reasons most often cited for supplement use
 - Overall health and wellness (58%)
 - To fill nutrient gaps in the diet (42%)
- Data indicate supplement use is “part of an overall approach to living healthy”

Dickinson A, Bateman J, El-Dash N, Franco JC. Consumer usage and reasons for using dietary supplements: report of a series of surveys. J Am Coll Nutr. 2014;33(2):176-82. doi:10.1080/07315724.2013.875423.



Dietary Supplements in the News!



- Calls to poison control centers in the U.S. due to exposures to dietary supplements rose nearly 50 percent between 2005-2012
 - 70% involved children 6 years old and under
- Report published in the Journal of Medical Toxicology
 - Called for an increase in regulation by the Food and Drug Administration (FDA) for certain supplements that were associated with high amounts of toxicity

abc News. (2017, Jul 24). Study finds a major uptick in calls to poison control centers over dietary supplements. Retrieved from <http://abcnews.go.com/Health/story?id=4808688> Accessed September 25, 2017.



Dietary Supplement Definition



- Defined by the Dietary Supplement Health and Education Act (DSHEA) of 1994
- A product, other than tobacco, that:
 - Supplements the diet
 - Contains one or more dietary ingredients
 - Intended to be taken by mouth
 - Labeled as dietary supplement

National Institutes of Health (NIH) Office of Dietary Supplements. (2011, June 24). Dietary supplements background information. Retrieved from <https://ods.od.nih.gov/factsheets/DietarySupplements-HealthProfessional/> Accessed September 17, 2017.



New Dietary Ingredient



- Not sold in U.S. in dietary supplement before October 15, 1994
- FDA requires specific safety information
 - Ingredients present in food supply
 - History of use or safety evidence
- Dietary ingredient as defined by DSHEA

U.S. Food & Drug Administration. National Institutes of Health (NIH) Office of Dietary Supplements. (2011b, August 11). New dietary ingredients in dietary supplements: background for industry. Retrieved from <https://www.fda.gov/Food/DietarySupplements/ucm109164.htm> Accessed September 17, 2017.



Rules and Regulations



- **DSHEA 1994**
- Regulated by FDA as foods
- Limited claims can be made
 - Health
 - Nutrient content
 - Structure/function → Disclaimer required
- Not FDA "approved" for safety or efficacy prior to marketing
- Good Manufacturing Practices (GMP), but still variable quality control
- Advertising regulated by the Federal Trade Commission (FTC)

National Institutes of Health (NIH) Office of Dietary Supplements. (2011, June 24). Dietary supplements background information. Retrieved from <https://ods.od.nih.gov/factsheets/DietarySupplements-HealthProfessional/> Accessed September 17, 2017.



Quality Considerations



- Properly manufactured, contains the ingredients listed on the label, and does not contain harmful amounts of contaminants
- Independent organizations provide voluntary certification
 - U.S. Pharmacopeia (USP)
 - ConsumerLab.com
 - National Sanitation Foundation (NSF) International
 - Natural Products Association– TruLabel
 - Good Housekeeping Institute
- Seals of approval do NOT guarantee product safety/efficacy

National Institutes of Health (NIH) Office of Dietary Supplements. (2011, June 17). Dietary supplements: What you need to know. Retrieved from https://ods.od.nih.gov/HealthInformation/ODS_WhatYouNeedToKnow.aspx/ Accessed September 19, 2017.



Dietary Supplement Label



- General information
- Supplement facts panel
 - Proprietary blends
- Other ingredients
- Must include required criteria to avoid misbranding

Supplement Facts		
Serving Size 1 Gelcap Servings Per Container 100		
	Amount Per Serving	% Daily Value
Vitamin A (as retinyl acetate and 50% as beta-carotene)	900 mcg	100%
Vitamin C (as ascorbic acid)	90 mg	100%
Vitamin D (as cholecalciferol)	20 mcg (800 IU)	100%
Vitamin E (as d-alpha-tocopheryl acetate)	15 mg	100%
Thiamin (as thiamin mononitrate)	1.2 mg	100%
Riboflavin	1.2 mg	100%
Niacin (as niacinamide)	16 mg	100%
Vitamin B ₆ (as pyridoxine hydrochloride)	1.7 mg	100%
Folate	400 mcg DFE	100%
	(240 mcg folic acid)	
Vitamin B ₁₂ (as cyanocobalamin)	2.4 mcg	100%
Biotin	3 mcg	100%
Pantothenic Acid (as calcium pantothenate)	5 mg	100%

Other ingredients: Gelatin, lactose, magnesium stearate, microcrystalline cellulose, FD&C Yellow No. 6, propylene glycol, preservatives (propylparaben and sodium benzoate).

National Institutes of Health (NIH) Office of Dietary Supplements. (2011, June 24). Dietary supplements: background information. Retrieved from <https://ods.od.nih.gov/factsheets/DietarySupplements-HealthProfessional/> Accessed September 17, 2017. Image Source: <https://www.fda.gov/downloads/food/guidance/regulatory/GuidanceDocuments/Labeling/Nutrition/UCM513884.pdf>



General Safety Considerations



- Side effects
- Drug interactions
- Use caution in pregnancy, nursing, and children
- Manufacturer's responsibility to ensure safety
 - Government efforts to improve public safety
- Report adverse reactions
 - 800-FDA-1088 or online Medwatch form
 - www.safetyreporting.hhs.gov

National Institutes of Health (NIH) Office of Dietary Supplements. (2011, June 17). Dietary supplements: What you need to know. Retrieved from https://ods.od.nih.gov/HealthInformation/ODS_WhatYouNeedToKnow.aspx/ Accessed September 19, 2017.



General Efficacy Considerations



- Efficacy vs. effectiveness
- Supplements do not replace a healthy diet
- Benefits for overall health and some conditions
 - Calcium and Vitamin D
 - Folic acid
 - Omega-3 fatty acids from fish oils
- Limited definitive information on bioactives in botanicals
- Ongoing study required → government funded grants available

National Institutes of Health (NIH) Office of Dietary Supplements. (2011, June 17). Dietary supplements: What you need to know. Retrieved from https://ods.od.nih.gov/HealthInformation/ODS_WhatYouNeedToKnow.aspx/ Accessed September 19, 2017.



Common Dietary Supplements



- Coenzyme Q10
- Omega-3/Fish Oil
- Cinnamon
- St. John's Wort
- Echinacea
- Saw palmetto
- Glucosamine and chondroitin
- Vitamin C
- Vitamin D
- Vitamin B12
- Folate
- Calcium
- Iron



Coenzyme Q10



Efficacy

- May have cardiovascular benefits
- Inconclusive evidence
 - Statin muscle weakness
 - Reproductive disorders
 - Cancer

Safety

- No serious side effects
- Insomnia, increased liver enzymes, rash, nausea, upper abdominal pain, dizziness, sensitivity to light, irritability, headache, heartburn, fatigue
- May make warfarin less effective

National Center for Complementary and Integrative Health (NCCIH). Coenzyme Q10 (CoQ10). In Depth. Last updated: March 2016. Retrieved from <https://nccih.nih.gov/health/supplements/coq10> Accessed: September 20, 2017.



Omega-3 Fatty Acids



Efficacy

- Fish oil improves blood lipids
- Appear to reduce risk of cardiovascular death
- Potential in other conditions

Safety

- Mostly gastrointestinal (GI) side effects
- Antiplatelet effects at high doses
- Dose limits
 - 3g/day EPA and DHA combined, up to 2g/day from dietary supplements

National Center for Complementary and Integrative Health (NCCIH). Omega-3 Fatty Acids. Last updated: November 2016. Retrieved from <https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/> Accessed: September 20, 2017.



Cinnamon



Efficacy

- People use for:
 - GI problems
 - Loss of appetite
 - Diabetes
- Research doesn't support use

Safety

- Potential for allergic reaction
- Short-term use in small amounts
- Coumarin – liver disease
- Delay in medical care

National Center for Complementary and Integrative Health (NCCIH). Cinnamon. Last updated: September 2016. Retrieved from <https://nccih.nih.gov/health/cinnamon/> Accessed: September 20, 2017.



St. John's Wort



Efficacy

- Some evidence, not definitive
- Mild to moderate major depressive disorder

Safety

- Drug interactions (CYP 3A4)!
- Serotonin syndrome
- Possible psychosis
- Worsen anxiety
- Minor: sunlight sensitivity, upset stomach

NCCH Clinical Digest: Depression and Complementary Health Approaches: What the Science Says. Last updated: October 2015. Retrieved from <https://nccih.nih.gov/health/providers/digest/depression-scienceheading2> Accessed September 20, 2017.



Echinacea



Efficacy

- Use: treat colds
- Weak evidence
- Potential effect
- Clinical relevance?

Safety

- Few side effects
- Risk of rash (higher in children)

NCCH Clinical Digest: The common cold and complementary health approaches. Last updated: August 2017. Retrieved from <https://nccih.nih.gov/health/providers/digest/cold> Accessed September 20, 2017.



Saw Palmetto



Efficacy

- Use: symptoms of BPH
- Small studies: modest benefit
- Cochrane review: no more effective than placebo

Safety

- Well-tolerated
- Mild side effects
 - Stomach discomfort

NCCH Clinical Digest: Benign Prostatic Hyperplasia and Complementary and Integrative Approaches. Last updated: June 2016. Retrieved from <https://nccih.nih.gov/health/providers/digest/BPH> Accessed September 20, 2017.



Glucosamine and Chondroitin



Efficacy

- Use: osteoarthritis
 - Knee or hip
- Conflicting results
- Sulfate > Hydrochloride

Safety

- Shellfish allergy
- No serious side effects
- May interact with warfarin
- Animal studies: kidney

National Center for Complementary and Integrative Health (NCCIH). Glucosamine and Chondroitin for Osteoarthritis. Last updated: November 2014. Retrieved from <https://nccih.nih.gov/health/glucosaminechondroitin> Accessed September 20, 2017.



Vitamin C

- Antioxidant used for immune health and wound healing
 - Inconsistent evidence on cancer risk, protection against cardiovascular disease and macular degeneration
- Shorten common cold duration
- Deficiency leads to scurvy
- Low toxicity
 - GI disturbances

Table 1: Recommended Dietary Allowances (RDAs) for Vitamin C [8]

Age	Male	Female	Pregnancy	Lactation
0–6 months	40 mg*	40 mg*		
7–12 months	50 mg*	50 mg*		
1–3 years	15 mg	15 mg		
4–8 years	25 mg	25 mg		
9–13 years	45 mg	45 mg		
14–18 years	75 mg	65 mg	80 mg	115 mg
19+ years	90 mg	75 mg	85 mg	120 mg
Smokers	Individuals who smoke require 35 mg/day more vitamin C than nonsmokers.			

* Adequate Intake (AI)

Office of Dietary Supplements (ODS). Vitamin C Fact Sheet for Health Professionals. Last updated: June 24, 2011. Retrieved from <https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/> Accessed September 26, 2017.



Vitamin D

- Fat-soluble vitamin
- Exogenous and endogenous
- Bone growth and remodeling
- Calcium absorption
- Status: serum concentration 25(OH)D

Table 1: Serum 25-Hydroxyvitamin D [25(OH)D] Concentrations and Health* [1]

nmol/L**	ng/mL*	Health status
<30	<12	Associated with vitamin D deficiency, leading to rickets in infants and children and osteomalacia in adults
30 to <50	12 to <20	Generally considered inadequate for bone and overall health in healthy individuals
≥50	≥20	Generally considered adequate for bone and overall health in healthy individuals
>125	>50	Emerging evidence links potential adverse effects to such high levels, particularly >150 nmol/L (>60 ng/mL)

* Serum concentrations of 25(OH)D are reported in both nanomoles per liter (nmol/L) and nanograms per milliliter (ng/mL).

** 1 nmol/L = 0.4 ng/mL

National Center for Complementary and Integrative Health (NCCIH). Vitamin D Fact Sheet for Health Professionals. Last updated: February 2016. Retrieved from <https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/> Accessed September 20, 2017. Image source: <https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/>



Vitamin D (continued)

- Supplements
 - D₂ (ergocalciferol)
 - D₃ (cholecalciferol)
- Deficiency: Rickets, osteomalacia
- Groups at risk inadequacy
- Toxicity symptoms
- Drug interactions

Table 2: Recommended Dietary Allowances (RDAs) for Vitamin D [1]

Age	Male	Female	Pregnancy	Lactation
0–12 months*	400 IU (10 mcg)	400 IU (10 mcg)		
1–13 years	600 IU (15 mcg)	600 IU (15 mcg)		
14–18 years	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)
19–50 years	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)
51–70 years	600 IU (15 mcg)	600 IU (15 mcg)		
>70 years	800 IU (20 mcg)	800 IU (20 mcg)		

* Adequate Intake (AI)

National Center for Complementary and Integrative Health (NCCIH). Vitamin D Fact Sheet for Health Professionals. Last updated: February 2016. Retrieved from <https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/> Accessed September 20, 2017.



Vitamin B12

- Water soluble
- RBC formation, neurological function, DNA synthesis
- Signs/Symptoms deficiency
- Groups at risk for deficiency
- Low risk toxicity
- Drug interactions

Table 1: Recommended Dietary Allowances (RDAs) for Vitamin B12 [5]

Age	Male	Female	Pregnancy	Lactation
0–6 months*	0.4 mcg	0.4 mcg		
7–12 months*	0.5 mcg	0.5 mcg		
1–3 years	0.9 mcg	0.9 mcg		
4–8 years	1.2 mcg	1.2 mcg		
9–13 years	1.8 mcg	1.8 mcg		
14+ years	2.4 mcg	2.4 mcg	2.6 mcg	2.8 mcg

* Adequate Intake

National Center for Complementary and Integrative Health (NCCIH). Vitamin B12 Fact Sheet for Health Professionals. Last updated: February 2016. Retrieved from <https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/> Accessed September 20, 2017. Image source: <https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/>



Folate

- Water soluble B vitamin
- Coenzyme or substrate
- Variety of products
- Risk for folate inadequacy
 - Alcohol dependence
 - Women of childbearing age (neural tube defects)
- Safety considerations
 - Drug interactions

Table 1: Recommended Dietary Allowances (RDAs) for Folate [2]

Age	Male	Female	Pregnant	Lactating
Birth to 6 months*	65 mcg DFE*	65 mcg DFE*		
7–12 months*	80 mcg DFE*	80 mcg DFE*		
1–3 years	150 mcg DFE	150 mcg DFE		
4–8 years	200 mcg DFE	200 mcg DFE		
9–13 years	300 mcg DFE	300 mcg DFE		
14–18 years	400 mcg DFE	400 mcg DFE	600 mcg DFE	500 mcg DFE
19+ years	400 mcg DFE	400 mcg DFE	600 mcg DFE	500 mcg DFE

* Adequate Intake (AI)

National Center for Complementary and Integrative Health (NCCIH). Folate Dietary Supplement Fact Sheet. Last updated: April 2016. Retrieved from <https://ods.od.nih.gov/factsheets/Folate-HealthProfessional/>. Accessed September 20, 2017. Image source: <https://ods.od.nih.gov/factsheets/Folate-HealthProfessional/>



Calcium

- Mineral
- Involved in multiple physiological pathways
- Carbonate (40% elemental) vs. Citrate (21% elemental)
- Vitamin D required for absorption
- Groups at risk for inadequacy
- Risks with excessive

Table 1: Recommended Dietary Allowances (RDAs) for Calcium [1]

Age	Male	Female	Pregnant	Lactating
0–6 months*	200 mg	200 mg		
7–12 months*	260 mg	260 mg		
1–3 years	700 mg	700 mg		
4–8 years	1,000 mg	1,000 mg		
9–13 years	1,300 mg	1,300 mg		
14–18 years	1,300 mg	1,300 mg	1,300 mg	1,300 mg
19–50 years	1,000 mg	1,000 mg	1,000 mg	1,000 mg
51–70 years	1,000 mg	1,200 mg		
71+ years	1,200 mg	1,200 mg		

* Adequate Intake (AI)

National Center for Complementary and Integrative Health (NCCIH). Calcium Dietary Supplement Fact Sheet for Health Professionals. Last updated: November 2016. Retrieved from <https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/>. Accessed September 20, 2017. Image source: <https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/>



Iron

- Mineral
- Essential component of hemoglobin
- Iron deficiency anemia
 - Hgb <13 g/dL men
 - Hgb <12 g/dL women
- GI side effects

Table 1: Recommended Dietary Allowances (RDAs) for Iron [5]

Age	Male	Female	Pregnancy	Lactation
Birth to 6 months	0.27 mg*	0.27 mg*		
7–12 months	11 mg	11 mg		
1–3 years	7 mg	7 mg		
4–8 years	10 mg	10 mg		
9–13 years	8 mg	8 mg		
14–18 years	11 mg	15 mg	27 mg	10 mg
19–50 years	8 mg	18 mg	27 mg	9 mg
51+ years	8 mg	8 mg		

* Adequate Intake (AI)

National Center for Complementary and Integrative Health (NCCIH). Iron Dietary Supplement Fact Sheet for Health Professionals. Last updated: February 2016. Retrieved from <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>. Accessed September 20, 2017. Image source: <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>



Iron (continued)

- Supplement forms
 - Ferrous fumarate = 33% elemental iron
 - Ferrous sulfate = 20% elemental iron
 - Ferrous gluconate = 12% elemental iron
- Risk for iron inadequacy in certain populations
- Risk of high dose iron – children
- Drug interactions

National Center for Complementary and Integrative Health (NCCIH). Iron Dietary Supplement Fact Sheet for Health Professionals. Last updated: February 2016. Retrieved from <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/>. Accessed September 20, 2017.



Reputable Resources



- Office of Dietary Supplements (ODS)
- National Center for Complementary and Integrative Health (NCCIH)
- Operation Supplement Safety (OPSS) → App available
- Center for Drug Evaluation and Research (CDER)
- Dietary Supplement Databases
 - Dietary Supplement Label Database, Dietary Supplement Ingredient Database, and Computer Access to Research on Dietary Supplements (CARDS) Database
- FDA
- Medline Plus
- PubMed



Tips for Your Patients



- Use non-commercial sites for product information
 - Be cautious of information from sellers
- Look for seals of approval
 - Select well known manufacturers
- Avoid products that display these claims:
 - "works better than..." "totally safe" "no side effects"
- "Natural" does not always mean "safe"
- Ask a healthcare professional if the product is beneficial/safe



Summary



- Dietary supplements are not regulated the same as prescription drug products
 - 1994 Dietary Supplement Health and Education Act (DSHEA)
- Various products on the market are not all equivalent
 - Gold-standard clinical trial data evaluating safety/efficacy is lacking
 - Some products have shown potential efficacy benefits
 - Always consider safety: *Absence of evidence is not evidence of absence*
- Reputable resources are available to guide therapy recommendations and patient care



Questions?



Exam Questions:

1. A dietary supplement is considered a product, other than tobacco, that:
 - a. Supplements the diet
 - b. Contains three or more dietary ingredients
 - c. Is not intended to be taken by mouth
 - d. Is labeled as a prescription product
2. Which of the following is true for Calcium Carbonate?
 - a. Take this medication with food
 - b. Contains 21% elemental calcium
 - c. Vitamin D is not required for absorption
 - d. There are no risks associated with excessive calcium
3. Which of the following is known to be a potent inducer of CYP 3A4 and has multiple drug interactions?
 - a. Echinacea
 - b. Saw Palmetto
 - c. St. John's Wort
 - d. Cinnamon
4. What claim can the manufacturer make about their dietary supplement? The supplement:
 - a. Can treat a disease
 - b. May affect a particular body system
 - c. Will cure a disease
 - d. Has been proven safe and effective
5. If a product contains a label with the U.S. Pharmacopeia (USP) verified dietary supplement seal of approval, you know that _____.
 - a. The product is safe
 - b. Good Manufacturing Practices were followed
 - c. The product is efficacious
 - d. The product costs more money

6. To which government organization can you submit dietary supplement adverse event reports?
- FDA
 - NIH
 - AAFP
 - DSHEA
7. A patient presents with a history of knee osteoarthritis and is inquiring about taking glucosamine and chondroitin. You ask the patient if she has any allergies and she states that she is allergic to shellfish. What do you recommend to the patient regarding her request today?
- You should not take glucosamine and chondroitin due to your shellfish allergy.
 - You can take glucosamine and chondroitin for your osteoarthritis.
 - The sulfate form of glucosamine would be the best product.
 - There is no evidence regarding the use of glucosamine and chondroitin in knee osteoarthritis.
8. Which of the following supplements reduces the risk of neural tube defects when taken by women of childbearing age?
- Vitamin B12
 - Vitamin D
 - Folic acid
 - Iron
9. Which of the following is NOT an available salt form of iron?
- Ferrous fumarate
 - Ferrous sulfate
 - Ferrous tartrate
 - Ferrous gluconate

10. You are trying to enhance your knowledge of dietary supplements. Which of the following are reputable resources to review to learn more?

- a. Office of Dietary Supplements website
- b. National Center for Complementary and Integrative Health website
- c. Medline Plus website
- d. A and B
- e. A, B, and C