Vitamin, Mineral, and Multivitamin Supplements for the Primary Prevention of Cardiovascular Disease and Cancer: Recommendation Statement

This summary is one in a series excerpted from the Recommendation Statements released by the USPSTF. These statements address preventive health services for use in primary care clinical settings, including screening tests, counseling, and preventive medications.

The complete version of this statement, including supporting scientific evidence, evidence tables, grading system, members of the USPSTF at the time this recommendation was finalized, and references, is available on the USPSTF website at http://www.uspreventiveservicestaskforce.org/.

This series is coordinated by Sumi Sexton, MD, Associate Medical Editor.

A collection of USPSTF recommendation statements published in *AFP* is available at http://www.aafp.org/afp/uspstf.

Summary of Recommendations and Evidence

The U.S. Preventive Services Task Force (USPSTF) concludes that the current evidence is insufficient to assess the balance of benefits and harms of the use of multivitamins for the prevention of cardiovascular disease or cancer *(Table 1)*. **I statement.**

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the use of single- or paired-nutrient supplements (except beta carotene and vitamin E) for the prevention of cardiovascular disease or cancer. **I statement**.

The USPSTF recommends against the use of beta carotene or vitamin E supplements for the prevention of cardiovascular disease or cancer. **D recommendation.**

See the Clinical Considerations section for suggestions regarding the I statements.

Rationale

IMPORTANCE

Use of dietary supplements is common in the U.S. adult population: 49% of adults used at least one dietary supplement between 2007 and 2010, and 32% reported using a multivitamin-multimineral supplement.[1] Supplement use is more common in women and older adults than in men and younger adults.[2] Most dietary supplements are used to improve or maintain overall health.[1] The substantial effect of cardiovascular disease and cancer on health status and mortality in the United States has been well described,[3] and many supplements are promoted to prevent these conditions.[4]

BENEFITS OF VITAMIN SUPPLEMENTATION

The USPSTF found inadequate evidence on the benefits of supplementation with multivitamins to reduce the risk of cardiovascular disease or cancer. The USPSTF found inadequate evidence on the benefits of supplementation with individual vitamins or minerals or functional pairs in healthy populations without known nutritional deficiencies to reduce the risk of cardiovascular disease or cancer. The USPSTF found adequate evidence that supplementation with beta carotene or vitamin E in healthy populations without known nutritional deficiencies does not reduce the risk of cardiovascular disease or cancer.

HARMS OF VITAMIN SUPPLEMENTATION

The USPSTF found inadequate evidence on the harms of supplementation with multivitamins and most single vitamins or minerals or functional pairs. The USPSTF found adequate evidence that supplementation with beta carotene increases the risk of lung cancer in persons who are at increased risk of this condition. The USPSTF found adequate evidence that supplementation with vitamin E has few or no substantial harms.

USPSTF ASSESSMENT

The USPSTF concludes that the evidence is insufficient to determine the balance of benefits and harms of supplementation with multivitamins for the prevention of cardiovascular disease or cancer. The USPSTF concludes that the evidence is insufficient to determine the balance of benefits and harms of supplementation with single or paired nutrients (except beta carotene or vitamin E) for the prevention of cardiovascular disease or cancer. The USPSTF concludes with moderate certainty that there is no net benefit of supplementation with vitamin E or beta carotene for the prevention of cardiovascular disease or cancer.

Table 1. Vitamin, Mineral, and Multivitamin Supplements for the Primary Prevention of Cardiovascular Disease and Cancer: Clinical Summary of the USPSTF Recommendation

Population	Healthy adults without special nutritional needs. This recommendation does not apply to children, women who are pregnant or may become pregnant, or persons who are chronically ill or hospitalized or who have a known nutritional deficiency.		
Recommendation	Multivitamins: no recommendation Grade: I statement	Single- or paired-nutrient supplements: no recommendation Grade: I statement	Beta carotene or vitamin E: do not recommend Grade: D
Preventive medications	Evidence on supplementation with multivitamins to reduce the risk of cardiovascular disease or cancer is inadequate, as is the evidence on supplementation with individual vitamins, minerals, or functional pairs. Supplementation with beta carotene or vitamin E does not reduce the risk of cardiovascular disease or cancer.		
Balance of benefits and harms	The evidence is insufficient to determine the balance of benefits and harms of supplementation with multivitamins for the prevention of cardiovascular disease or cancer.	The evidence is insufficient to determine the balance of benefits and harms of supplementation with single or paired nutrients for the prevention of cardiovascular disease or cancer.	There is no net benefit of supplementation with vitamin E or beta carotene for the prevention of cardiovascular disease or cancer.
Other relevant USPSTF recommendations	The USPSTF has made several recommendations on the prevention of cardiovascular disease and cancer, including recommendations for smoking cessation; screening for lipid disorders, hypertension, diabetes mellitus, and cancer; obesity screening and counseling; and aspirin use. These recommendations are available at http://www.uspreventiveservicestaskforce.org/.		

NOTE: *For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, go to http://www.uspreventiveservicestaskforce.org/.*

USPSTF = U.S. Preventive Services Task Force.

Clinical Considerations

PATIENT POPULATION

The focus of this recommendation is healthy adults without special nutritional needs. Populations studied were typically 50 years or older. This recommendation does not apply to children, women who are pregnant or may become pregnant, or persons who are chronically ill or hospitalized or who have a known nutritional deficiency.

SUGGESTIONS FOR PRACTICE REGARDING THE I STATEMENTS

Potential Preventable Burden. Evidence from in vitro and animal research and population-based epidemiologic studies supports the hypothesis that oxidative stress may play a fundamental role in the initiation and progression of cancer and common cardiovascular diseases.[3] If this hypothesis is correct, then some combination of specific supplements, a specific dose, a vulnerable host, and specific timing may be useful.

Potential Harms. Important harms have been shown with the use of beta carotene in persons who smoke tobacco or have an occupational exposure to asbestos. There are several known adverse effects caused by excessive doses of vitamins; for example, moderate doses of vitamin A supplements may reduce bone mineral density, but high doses may be hepatotoxic or teratogenic. Otherwise, the vitamins reviewed by the USPSTF had few known risks. Because many of these vitamins are fat soluble, the lifetime effect of high doses should be taken into consideration.

The USPSTF did not address doses higher than the tolerable upper intake level, as determined by the U.S. Food and Nutrition Board. Vitamins A and D have known harms at doses exceeding the tolerable upper intake levels,[5] and the potential for harm

from other supplements at high doses should be carefully considered.

The U.S. Pharmacopeia has developed reference standards to aid in quality control of dietary supplement production; however, the content and concentration of ingredients in commercially available formulations probably vary considerably. This variability in the composition of dietary supplements makes extrapolating results obtained from controlled clinical trials challenging.

Costs. Although dietary supplements themselves are not particularly costly, the cumulative effect of this class of agent on spending is substantial. In 2010, $28.1 billion was spent on dietary supplements in the United States.[6]

Current Practice. Surveys conducted by the dietary supplement industry suggest that many physicians and nurses have recommended dietary supplements to their patients for health and wellness.[7]

ADDITIONAL APPROACHES TO PREVENTION

Appropriate intake of vitamin and mineral nutrients is essential to overall health.[5] Despite the uncertain benefit of vitamin supplementation, the 2010 Dietary Guidelines for Americans suggest that nutrients should come primarily from foods and provide guidance on how to consume a nutrient-rich diet.[8] Adequate nutrition by eating a diet rich in fruits, vegetables, whole grains, fat-free and low-fat dairy products, and seafood has been associated with a reduced risk of cardiovascular disease and cancer.[9,10]

Specific groups of patients with well-defined conditions may benefit from specific nutrients. For example, women planning or capable of pregnancy should receive a daily supplement containing folic acid to help prevent neural tube defects. The USPSTF also recommends vitamin D supplements for older persons at risk of falling.

USEFUL RESOURCES

The USPSTF has a large portfolio of recommendations for the prevention of cardiovascular disease and cancer, including smoking cessation; screening for lipid disorders, hypertension, diabetes mellitus, and cancer; obesity screening and counseling; and aspirin use (available at http://www.uspreventiveservicestaskforce.org).

This recommendation statement was first published in *Ann Intern Med.* 2014;160(8):558-564.

The "Other Considerations," "Discussion," "Update of Previous USPSTF Recommendation," and "Recommendations of Others" sections of this recommendation statement are available at http://www.uspreventiveservicestaskforce.org/Page/Topic/recommendation-summary/vitamin-supplementation-to-prevent-cancer-and-cvd-counseling.

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