

## Vitamin and Mineral Supplements and Exercise

People who engage in physically active lifestyles are frequently targets of advertisements proclaiming the need for vitamin and mineral supplements. These advertisements presume that athletes, ranging from international competitors to weekend participants in recreational activities, are at risk of developing nutritional deficiencies and subsequent impairments in performance and health. Surveys of athletes indicate the success of these advertisements; the prevalence of use of vitamin and mineral supplements is widespread. Estimates indicate that more than 50% of elite, female endurance athletes and about 40% of non-elite male athletes regularly consume vitamin and mineral supplements.

Use of daily supplements is also prevalent among other groups of athletes as 56% of male and 33% of female high school and collegiate athletes report using vitamin and mineral supplements. Consumption of these supplements, however, is not limited to athletes; results of the National Health and Nutrition Examination Survey (1976-1980) indicate that a considerable fraction of women (25%) and men (16%) ingest vitamin and mineral supplements daily. Proponents of vitamin and mineral supplementation argue that daily consumption of these supplements enhances performance, provides a source of energy and prevents illness and injury.

Scientific evidence to support these claims is lacking.

Physical activity may increase the need for some vitamins and minerals. However, the increased requirement generally can be attained by consuming a balanced diet based on a variety of foods. Individuals at risk for low vitamin and/or mineral intake are those who consume a low energy diet for extended periods of time. These individuals are at risk of developing a marginal, subclinical nutrient deficiency. Although vitamin and mineral supplementation may improve the nutritional status of an individual who consumes marginal amounts of nutrients and may enhance the physical performance of those athletes with overt nutrient deficiencies, there is no scientific evidence to support the general use of vitamin and mineral supplements to improve athletic performance. The increased energy intake of physically active individuals should provide the additional vitamins and minerals needed if a wide variety of foods is included in the diet.

Estimates of nutrient requirements for physically active people are based on population standards.

Commonly used estimates are the recommended daily allowance (RDA) and the estimated safe and adequate daily dietary intake (ESADDI). These estimates are calculated to meet the needs of nearly all members of the U.S. population, with the exception of pregnant women and people with medical problems. Although population standards, such as RDA and ESADDI, were not derived for individuals participating in strenuous physical activity, they provide a reasonable approximation of the vitamin and mineral needs of physically active people.

### Vitamins

Vitamins are essential organic compounds that function as regulators of protein, carbohydrate and fat metabolism. Although vitamins are necessary to transform the potential energy in food to chemical energy for work, they are not direct sources of energy.

Scientific evidence for an ergogenic benefit of vitamin supplements in individuals who consume a well balanced diet is lacking. Furthermore, any improvement in physical performance attributed to vitamin supplement use in an adequately nourished individual is likely the result of a placebo effect.



A recent issue is the use of antioxidant vitamins to enhance performance and promote health.

These vitamins include vitamins C and E, along with beta carotene (a precursor of vitamin A). Preliminary evidence suggests a potential, indirect, beneficial effect of supplementation with these vitamins on performance by reducing skeletal muscle damage and enhancing some aspects of immune function. These provocative findings await confirmation in well-designed clinical trials.

## **Minerals**

Minerals are inorganic elements and act as cofactors for enzymes that influence all aspects of energy metabolism. Minerals are not sources of energy. Mineral nutritional status may be impaired among individuals who restrict their energy intake for performance or aesthetic reasons. In particular, girls and women participating in ballet, gymnastics and endurance running may be prone to inadequate intakes of calcium and iron. Low dietary calcium may increase the risk of stress fractures in athletes. Although it is not known if supplemental calcium will enhance performance, additional calcium, preferably from food, may be beneficial in achieving optimal peak bone mass in girls and young women and reducing bone loss in the elderly.

Reduced body iron status may alter physical performance. Among female athletes, decreased serum ferritin, an index of body iron stores, is common, but anemia is infrequent (5%). Decreased body iron stores may be attributed to low iron intake or increased iron loss due to menstruation, gastrointestinal bleeding and sweating. Supplemental iron is beneficial in improving iron status of athletes with reduced body iron stores and improving endurance performance of anemic athletes. The effects of iron supplementation on performance of non-anemic athletes are equivocal.

## **Foods with high vitamin and mineral content**

As physically active individuals seek to maximize essential nutrient intakes, proper food selection is necessary. In some cases, foods that have a high content of minerals are also significant sources of B vitamins. Some examples of readily available foods that contribute significantly to the individual's vitamin and mineral requirements are summarized below:

### **Minerals**

Beef, lean  
Pork, lean  
Chicken, skinless  
Tuna, water-packed  
Kidney beans  
Milk, skim  
Yogurt

### **B Vitamins**

Beef, lean  
Pork, lean  
Chicken  
Tuna  
Refried beans  
Milk, skim  
Yogurt



**Vitamins A, C and E**

Carrots  
 Milk, skim  
 Peanuts  
 Orange juice  
 Broccoli  
 Spinach  
 Strawberries

Indiscriminate use of vitamin and mineral supplements in individuals without nutrient deficiency can result in detrimental effects. Chronic ingestion of large doses of ascorbic acid can produce physiologic disturbances. Some examples include renal stone formation, decreased coagulation time, erythrocyte hemolysis, and gastrointestinal disturbances. It was recently suggested that the iron-overload induced cardiac deaths of three athletes may have been precipitated by megadose supplements of vitamin C. Thus, a genetic predisposition among some individuals to develop iron overload should limit daily vitamin C ingestion to 500 milligrams. Similarly, luxuriant intakes of supplemental zinc will induce a secondary copper deficiency and decrease high density lipoprotein cholesterol concentrations. Among otherwise well-nourished individuals, long-term consumption of vitamin and mineral supplements in amounts exceeding RDA or ESADDI can result in adverse effects on other nutrients. Thus, vitamin and mineral supplement usage should be viewed judiciously, if at all, in healthy individuals.

**Conclusion**

- Because of their interest in maximizing performance, athletes may seek to use dietary supplements to gain competitive advantages. However, the athletes should be aware of the following critical points:
- Performance will not be improved if individuals consuming nutritionally-adequate diets use nutritional supplements.
- Only athletes with a defined nutrient deficiency or deficiencies will benefit from supplementation of the limiting nutrient(s).
- Concerns about the nutritional adequacy of an individual's diet should be evaluated by a registered dietician experienced in counseling athletes.
- Athletes should consume a diet that includes a variety of foods to optimize vitamin and mineral intakes rather than use nutritional supplements.
- Use of megadoses of vitamins and minerals is not recommended because of potential adverse interactions among nutrients and toxicity.
- Physically active people who intermittently use vitamin and mineral supplements as a prophylaxis should use a product that does not exceed the RDA or ESADDI for essential nutrients.

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Current Comments are official statements by the American College of Sports Medicine concerning topics of interest to the public at large.

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