PRISM
PROMOTING RESEARCH INTO SUPPLEMENTATION WITH MICRONUTRIENTS

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In this issue

A daily multivitamin lowers disease risk

Editorial

In developed countries, classical vitamin deficiency disorders such as scurvy, beriberi and pellagra are extremely rare. For this reason, most nutrition scientists felt, until recently, that people who eat a “balanced” diet get all the micronutrients they need from their food. They only endorsed micronutrient supplementation in special circumstances, such as during pregnancy or sickness, and then only under medical supervision. In recent years, however, knowledge about the roles of vitamins and minerals in maintaining health has advanced tremendously, and scientists’ views are changing.

A major step towards acceptance of universal micronutrient supplementation is the recent publication in the Journal of the American Medical Association

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of a scientific review and recommendation that reverses the AMA's long-standing antisupplementation policy. The authors, Dr Robert Fletcher and Dr Kathleen Fairfield of Harvard University, reviewed more than 150 studies to determine the health benefits of nine vitamins. They concluded that people with suboptimal levels of the vitamins A, B6, B12, folic acid, C, D and E run an increased risk for chronic and life-threatening conditions, including osteoporosis, heart disease and cancer, and that women with suboptimal levels are more likely to give birth to malformed infants. They therefore advise all adults to take at least one multivitamin pill daily.

This does not mean that people can forget about eating a wholesome diet. Foods contain many other compounds—many not yet identified—that may be important for good health. So vitamin supplements are an addition to, not a substitute for, sensible eating. It is therefore important that efforts to improve dietary habits continue. Unfortunately, experience shows that few people listen to the nutrition messages. Although US health experts have long encouraged Americans to eat five servings of fruit and vegetables daily, less than a quarter of the population actually does so. Even those who do may not get enough of some vitamins for optimal health. Addition of vitamins and minerals to cereal products, milk and dairy products has also not had the expected impact, so that too many individuals still have suboptimal vitamin levels.

Most multivitamin supplements contain around 100% of the daily requirement for nearly all vitamins except vitamin K. Many also contain varying amounts of minerals and trace elements (but generally well below the amounts needed for optimal nutrition). This means that a risk of accidental overdosage is extremely small. With few exceptions (vitamins A, D, K and iron) excessive intakes are without serious consequences. However, pregnant women, and those capable of becoming pregnant, as well as men and women at a high risk of haemochromatosis (a blood disorder caused by excessive iron) should seek medical advice before starting supplementation. Elderly people may need to take more than 100% of the daily requirement to compensate for impaired absorption. At an annual cost of less than $30/person, multivitamin supplements are affordable for most families.

Among researchers, there is a growing conviction that taking a daily multivitamin supplement can improve overall public health. It is to be hoped that this endorsement will result in more people reaping the health benefits.

A. Bowley, Editor

Source

Fairfield KM, Fletcher RH. Vitamins for chronic disease prevention in adults: scientific review. Am J Med Ass 2002; 287: 3116–3126.

Fairfield KM, Fletcher RH. Vitamins for chronic disease prevention in adults: clinical applications. Am J Med Ass 2002; 287: 3127–3129.

Interactions between dietary carotenoids do not affect plasma status

Intervention

To assess possible interactions between different dietary carotenoids, affecting their absorption from the intestine, Tyssandier et al. conducted a crossover feeding study in twenty healthy young women. During the first three weeks, ten women ate 96 g tomato puree (containing 15 mg lycopene and 1.5 mg β-carotene) daily in addition to their normal diet. Then, after a three-week washout period, they ate 92 g cooked, chopped spinach (containing 12 mg lutein and 8 mg β-carotene) daily for three weeks. Finally, after another three weeks, they again ate spinach together with a supplement containing 15 mg lycopene. The other group of ten women first ate the same amount of tomato puree, then the tomato puree plus spinach, and finally, the tomato puree plus a supplement containing 12 mg lutein and 0.6 mg zeaxanthin.

Addition of a second carotenoid to a meal reduced the chylomicron response to the first carotenoid. Nevertheless, medium-term response, as measured by plasma carotenoid concentrations, was not negatively affected.

Conclusion

Although different carotenoids in a meal compete for absorption from the intestine, this does not diminish plasma carotenoid concentrations in the medium term.

Source

Tyssandier V, Cardinault N, Caris-Veyrat C et al. Vegetable-borne lutein, lycopene, and β-carotene compete for incorporation into chylomicrons, with no adverse effect on the medium-term (3-wk) plasma status of carotenoids in humans. Am J Clin Nutr 2002; 75: 526–534.

Antioxidants may help overweight smokers

Intervention

To investigate the protective effects of antioxidant supplementation on plasma F2-isoprostane levels (an indicator of oxidant stress) in smokers, 126 smokers took vitamin C (500 mg daily), a combination of vitamin C, vitamin E and α–lipoic acid, or a placebo for two months. Plasma F2-isoprostane levels were measured at baseline and after the intervention.

Both supplements reduced plasma F2-isoprostane levels significantly in overweight smokers compared with placebo. The combination was only slightly more effective than vitamin C alone. Supplementation had no effect in smokers with a normal or low bodyweight.

Conclusion

Use of an antioxidant supplement containing a high dose of vitamin C may help prevent smoking-related diseases. Stopping smoking is, however, still the best way to do this.

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Source

Dietrich M, Block G, Hudes M et al. Antioxidant supplementation decreases lipid peroxidation biomarker F2-isoprostanes in plasma of smokers. Cancer Epidemiol Biomark Prev 2002; 11: 7–13.

Antioxidants protect against exercise-induced tissue damage

Review

During strenuous exercise, the body may produce more reactive oxygen species (highly reactive metabolites of oxygen) than its antioxidant defence systems can cope with. The result is oxidative stress. This damages cell membranes, proteins and nucleic acids, and increases the risk for cancer, cardiovascular disease and premature aging. Studies in animals and humans have shown that supplementation with dietary antioxidants such as vitamin E, vitamin C and β-carotene is an effective form of protection against this free-radical damage.

Conclusion

To avoid tissue damage caused by excessive oxidation as a result of strenuous exercise, the author recommends that active individuals should consume a diet rich in antioxidant nutrients.

Source

Sen CK. Antioxidants in exercise nutrition. Sports Med 2001; 31: 891–908.

PREVENTION OF CARDIOVASCULAR DISEASE

Plasma folate reduced by vitamin B6 supplementation

Intervention

Concerned about possible risks associated with regular intake of high doses of vitamin B6, Bosy-Westphal et al. measured the effect of ten days' supplementation with 25 mg vitamin B6 on plasma folate, vitamin B12 and homocysteine levels in eight healthy volunteers.

Plasma folate levels fell by 27% ($p<0.01$). Plasma vitamin B12, basal and post-methionine-load homocysteine levels were not affected.

Conclusion

Although plasma folate is not a reliable indicator of folate deficiency, this effect of vitamin B6 supplementation may increase the risk for cardiovascular disorders, cancer and congenital malformations. Use of high doses of vitamin B6 alone should therefore be avoided until further investigations have clarified the biological significance of this finding.

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Source

Bosy-Westphal A, Holzapfen A, Czech N, Muller M. Plasma folate but not vitamin B12 or homocysteine concentrations are reduced after short-term vitamin B6 supplementation. Ann Nutr Metab 2001; 45: 255–258.

PREVENTION OF CANCER

Supplements may not lower stomach cancer mortality in US

Survey

Jacobs et al. examined the association between "regular" intake of vitamin supplements, and stomach cancer mortality in participants from the "Cancer Prevention Study II" (460,737 men and 585,354 women from all parts of the USA) who had no history of cancer and had provided data on vitamin supplement use at enrolment in 1982.

By 1998, 1,725 participants had died of stomach cancer. Participants who had taken vitamin C supplements for less than ten years before enrolment showed a reduced risk (RR: 0.68), but not those with more than ten years' use. Use of vitamin E or multivitamin supplements had no effect, irrespective of duration of use.

Conclusion

These results suggest that dietary supplements have little effect on stomach cancer mortality in the US population. This may be because people are relatively well nourished, and/or because the risk of stomach cancer is relatively low. This does not rule out the possibility of a protective role in populations with nutritional deficiencies and/or widespread H. pylori infection.

Source

Jacobs EJ, Connell CJ, McCullough ML et al. Vitamin C, vitamin E, and multivitamin supplement use and stomach cancer mortality in the Cancer Prevention Study II cohort. Cancer Epidemiol Biomark Prev 2002; 11: 35–41.

NUTRITION AND EYE HEALTH

Vitamin C supplementation lowers cataract risk in women

Survey

To assess the relationship between usual nutrient intakes and development of age-related cortical and posterior subcapsular lens opacities, Taylor et al. enrolled 492 nondiabetic women without previously diagnosed cataracts from the Nurses' Health Study (NHS) cohort. Usual nutrient intake and

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supplement use were calculated from food-frequency questionnaires, which participants had completed at two-year intervals since 1980.

At eye examination in the period 1993–95, cortical opacities were found in 336 eyes, and posterior subcapsular opacities in 127. Multiple cataracts were found in one third of the eyes. Overall, no nutrient seemed to be associated with cataract development. However, women younger than 60 years, who took more than 360 mg vitamin C daily, had a 57% lower risk for cortical cataract than those who took less than 140 mg. Women who used vitamin C supplements for ten years or more also had a 60% lower risk. In women who had never smoked, development of posterior subcapsular lens opacities was associated with total carotenoid intake.

Conclusion

These findings add to the evidence that antioxidant nutrients can slow the rate of development of age-related lens opacities, and that smoking weakens the beneficial effect.

Source

Taylor A, Jacques PF, Chylack LT Jr et al. Long-term intake of vitamins and carotenoids and odds of early age-related cortical and posterior subcapsular lens opacities. Am J Clin Nutr 2002; 75: 540–549.

Antioxidants protect against lens damage

Review

Cataract is a major cause of preventable blindness. In the USA, 5% of people aged 65 years, and 50% of those older than 75 years experience visual impairment due to cataract. In developing countries, cataract is more common, and occurs earlier in life. Measures taken to delay cataract formation could reduce the economic burden (currently more than $5 billion annually in USA) and improve the quality of life for millions of older people.

Age-related eye damage involves oxidative stress and reduced efficacy of protective mechanisms. Available evidence indicates that cataract development can be delayed by ensuring adequate intakes of antioxidant nutrients (vitamin C, vitamin E, lutein, etc).Nutritional status can be optimised by dietary improvement and use of supplements.

Conclusion

Data suggest that improving nutrition, possibly by use of antioxidant supplements, provides the least costly and most practicable way of delaying cataract.

Source

Taylor A, Hobbs M. 2001 assessment of nutritional influences on risk for cataract. Nutrition 2001; 17: 845–857.

Vitamin D in human milk not affected by maternal diet

Survey

To investigate the impact of maternal diet on fat-soluble vitamins in human milk, Olafsdottir et al. assessed the dietary habits and use of fish oil supplements in 77 lactating Icelandic mothers, and measured levels of the vitamins A, E and D in their milk.

Women who used cod liver oil supplements were more likely to achieve the recommended intakes of the vitamins. Most of them had adequate levels of the vitamins A and E in their milk, but not enough vitamin D, even with supplementation.

Conclusion

Levels of vitamins A and E in human milk, but not vitamin D, are affected by the mother's diet. Mothers can more easily achieve the required intakes of fat-soluble vitamins through supplementation than through food. Breast-fed infants may also need vitamin D supplementation.

Source

Olafsdottir AS, Wagner K-H, Thorsdottir I, Elmadfa I. Fat-soluble vitamins in the maternal diet, influence of cod liver oil supplementation and impact of the maternal diet on human milk composition. Ann Nutr Metab 2001; 45: 265–272.

Breast-fed infants at high risk for vitamin K deficiency

Survey

Greer investigated the vitamin K status over the first six months of life in 119 exclusively breast-fed infants who had received 1 mg vitamin K intramuscularly at birth. Plasma vitamin K levels were persistently low after the fourth week (<50% of normal adult level). Vitamin K in breast milk was also very low. New analytical methods have shown that foods contain less vitamin K than previously thought. Recalculating intakes using these new data showed that the mean daily maternal vitamin K intake was around 1 µg/kg bodyweight.

Conclusion

Even when the mother's daily vitamin K intake equals the RDA of 1 µg/kg, her milk generally does not contain enough vitamin K to meet her infant's requirement. This indicates that, without appropriate prophylaxis, exclusively breast-fed infants are deficient in vitamin K and so have an increased risk of haemorrhagic disease. By taking a supplement of 5 mg vitamin K, mothers can increase its concentration in their milk to an adequate level.

Source

Greer FR. Are breast-fed infants vitamin K deficient? Adv Exp Med Biol 2001; 501: 391–395.

Diabetics may benefit from antioxidant supplementation

Intervention

Diabetic patients are particularly susceptible to the effects of oxidative stress. To determine how antioxidant supplementation might benefit such patients, Anderson et al. measured the effect of six months' treatment with zinc (30 mg daily), chromium (400 µg daily) or a combination of both on indicators of oxidative stress and glucose homeostasis in 110 adults.

Indicators of oxidative stress improved significantly in all three supplemented groups, but not in those on placebo. Glucose homeostasis did not change. No adverse effects were reported.

Conclusion

Patients with type 2 diabetes may benefit from supplementation with zinc and/or chromium.

Source

Anderson RA, Roussel A-M, Zouari N et al. Potential antioxidant effects of zinc and chromium supplementation in people with type 2 diabetes mellitus. J Amer Coll Nutr 2001; 20: 212–218.

Nutritional supplement enhances female sexual function

Intervention

In the USA, more women (43%) experience sexual dysfunction than men (31%). To investigate the effects of ArginMax for Women, a proprietary nutritional supplement containing L-arginine, multivitamins, minerals, and herbal extracts (ginseng, gingko, damiana), Ito et al. conducted a double-blind trial in 77 women who wanted to improve their sexual function. Thirty-four women took the supplement, 43 took a placebo. After four weeks, 73.5% of the supplemented women were more satisfied with their sex life, compared with 37.2% of those on placebo.

Conclusion

Nutritional supplementation appears to play a role in improving female sexual function, and warrants further study.

Source

Ito TY, Trant AS, Polan ML. A double-blind placebo-controlled study of ArginMax, a nutritional supplement for enhancement of female sexual function. J Sex Marital Ther 2001; 27: 541–549.