

A selection of recent findings in the field of nutrition

Plasma homocysteine as a risk factor for dementia and Alzheimer's Disease.

Alzheimer's Disease (AD) accounts for a substantial majority (70%) of all cases of dementia. Because individuals with history of stroke or with known cardiovascular risk factors are at increased risk of dementia and AD, it has been suggested that vascular factors may underlie AD. High level of homocysteine is associated with several cardiovascular diseases, which led to the hypothesis that it might be a risk factor for dementia and AD. If this hypothesis is substantiated, then it indicates that a modifiable risk factor (high homocysteine) could be influenced by supplementation with folic acid. This hypothesis was investigated by examining plasma total homocysteine levels in relation to newly diagnosed dementia and AD in an elderly cohort participating in the well known ongoing Framingham Study. A total of 1092 subjects without dementia (667 women and 425 men with a mean age of 76 years) constituted the population for this study. After a median follow-up of 8 years, dementia developed in 111 subjects (83 of which were diagnosed with AD). After adjusting for age, sex, apolipoprotein E genotype, vascular risk factors other than homocysteine, plasma levels of folate, and vitamins B12 and B6, a strong, graded association between plasma total homocysteine levels and the risk of dementia and AD was observed. An increment of 5 μmol per liter in plasma homocysteine increased the risk of AD by 40%. Furthermore, a plasma homocysteine level greater than 14 μmol per liter doubled the risk of AD. The findings of this study could be explained by the observation from other studies that hyperhomocysteinemia has been related to cerebral microangiopathy, endothelial dysfunction, impaired nitric oxide activity, and increased oxidative stress. These factors are associated with aging of the brain. Vitamin therapy (through supplementation or food fortification) with folic acid alone or in conjunction with vitamin B6 and B12 can reduce high homocysteine levels. The authors conclude, "An increased plasma homocysteine level is a strong, independent risk factor for the development of dementia and AD".

[Seshadri S, et al. *N Engl J Med* 2002;346:476-483]

Economic implications of hip fracture: health service use, institutional care and cost in Canada.

It is estimated that the yearly 24,000 hip fractures in Canada are mostly caused by osteoporosis. This figure is expected to double by 2040 due to the aging of the population particularly with the expected increase in the number of women 75 years or older who are at high risk for hip fractures. It is estimated that health and long-term care (LTC) costs of fractures due to osteoporosis in Canada is \$1.3 billion and most of the fractures are hip fractures. Hip fractures are associated with many complications and an excess mortality of 12-20 % in the first year. Despite the high burden of hip fractures, there is limited data about the level of health care use, institutionalization and the related cost in Canada. This one-year study assessed the health and institutionalized services used by 504 patients with hip fractures in the Hamilton-Wentworth region. The assessment included initial hospitalization, re-hospitalization, rehabilitation, LTC, home care and informal care to estimate overall the one-year cost of hip fractures. In this study, the overall average 1 year cost associated with hip fracture for all patients is estimated to be \$26,527. The economic implications of hip fractures varied based on a patient's place of residence, age and survival to 1 year. The cost reported in this study is expected to be conservative since a patient with hip fracture has a 20-fold increase in the risk for future fractures. Nevertheless using this figure means that the current annual cost of care associated with hip fractures in Canada is estimated to be \$650 million and unless current trends are reversed this figure is estimated to rise to \$2.4 billion by the year 2041. The authors stated "since osteoporosis is amenable to prevention, initiatives designed to prevent osteoporosis may alleviate the public and private burden associated with it".

[Wiktorowicz ME, et al. *Osteoporos Int* 2001;12:271-278].

Do adolescent vitamin-mineral supplement users have better nutrient intakes than nonusers? Observations from the CATCH tracking study.

Vitamin-mineral supplements are widely used by adults and contribute substantially to intakes of some nutrients. Little is known about supplement use in adolescents. Because puberty is associated with an increased need of nutrients such as calcium, iron, or other micronutrients, some adolescents are expected to benefit from these supplements. This article describes the use of vitamin-mineral products among eighth grade students participating in a large study in the USA. This study investigates whether supplement users have higher intakes of micronutrients and whether they differ in demographic indicators, nutrition awareness, and health behaviors than nonusers. In this study, 20.1% of the students reported supplement use and no significant differences were noted by gender, however, supplement use was

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higher among whites than among other race/ethnic groups. Among supplement users, nearly half were users of multivitamin or multimineral preparations. Single nutrients accounted for 35.6% of all supplements with vitamin C comprising two-thirds of these. The authors explain that multivitamin/multimineral preparations were more popular than single vitamins or minerals, because they generally provide levels close to the daily intake, lessening the potential risk of high intakes, which might be encountered with single nutrient preparations. Supplement users had significantly higher mean intakes from diet than nonusers for 16 of 20 nutrients assessed. Among users, supplements contributed to more than half of the total daily intakes of vitamin C and D and over one third of their intake of most other nutrients, however, mean intakes of calcium and zinc were still inadequate. Users had significantly higher mean total intake (from food and supplements) than nonusers for all micronutrients, however, among users, the total intake rarely exceeded the upper tolerable levels. Users had higher scores on health behavior for food choice and higher (but non significant) nutrition knowledge scores. The authors conclude that "vitamin-mineral supplement use is prevalent among eighth-grade students. Users have higher nutrient intakes from food, higher total intakes for several micronutrients, higher nutrition awareness, and differ in their demographic characteristics from nonusers".

[Dwyer JT, et al. *J Am Diet Assoc* 2001;101:1340-1346]

Decreased rate of coronary restenosis after lowering of plasma homocysteine.

Restenosis after coronary angioplasty remains an important limitation of this procedure and effective medications are not yet available. The authors of this study have previously reported an association between hyperhomocysteinemia and restenosis after coronary angioplasty. Hyperhomocysteinemia can be lowered by 25 to 30% with at least 500 µg of folic acid in combination with vitamin B12 and pyridoxine (B6). Therefore, the investigators hypothesized that lowering high homocysteine levels might decrease the rate of restenosis as well as major cardiac events. This prospective, double-blind, randomized trial used a combination (referred to as folate treatment) of 1 mg folic acid, 400 µg B12, and 10 mg B6 compared to placebo to investigate the above mentioned hypothesis in 205 patients for 6 months after undergoing coronary angioplasty. In this study, folate treatment significantly reduced homocysteine levels. Moreover, the luminal diameter was significantly larger in the folate treatment group. The rate of restenosis was nearly halved in the folate treatment group. There was a lower incidence of major adverse cardiac events at six months in the folate treatment group compared to placebo. No difference was seen between the two groups in the rate of mortality due to cardiac causes. The authors conclude "treatment with a combination of folic acid, vitamin B12, and pyridoxine significantly reduces homocysteine levels and decreases the rate of restenosis and the need for revascularization of the target lesion after coronary angioplasty. This inexpensive treatment, which has minimal side effects, should be considered as adjunctive therapy for patients undergoing angioplasty".

[Schnyder G, et al. *N Engl J Med* 2001;345:1593-1600]

Suggested Readings

Association of folate intake and serum homocysteine in elderly persons according to vitamin supplementation and alcohol use.

[Koehler KM, et al. *Am J Clin Nutr* 2001;73:628-637]

Association of the B-vitamins pyridoxal 5-phosphate (B6), B12, and folate with lung cancer risk in older men.

[Hartman TJ, et al. *Am J Epidemiol* 2001;153:688-694]

Antioxidants and fatty acids in the amelioration of rheumatoid arthritis and related disorders.

[Darlington GL, et al. *Br J Nutr* 2001;85:251-269]

Risk factors for age-related macular degeneration. Pooled findings from three continents.

[Smith W, et al. *Ophthalmology* 2001;108:697-704]

Vitamin supplement use and diabetes mellitus incidence among adults in the United States.

[Ford ES. *Am J Epidemiol* 2001;153:892-897]

Consumption of high doses of chlorogenic acid, present in coffee, or of black tea increases plasma total homocysteine concentrations in humans.

[Olthof MR, et al. *Am J Clin Nutr* 2001;73:532-538]