

A selection of recent findings in the field of nutrition

Intake of vitamin D and risk of type 1 diabetes: a birth-cohort study.

In vitro studies showed that vitamin D acts as an immunosuppressive agent and in animal studies, vitamin D seems to prevent type 1 diabetes. These studies were further supported by two human studies, one of which suggested that vitamin D supplementation during early childhood can prevent type 1 diabetes. The second study found an inverse relation between maternal use of cod liver oil during pregnancy and the occurrence of type 1 diabetes in their children. There is growing evidence that factors in early life can affect the risk of chronic diseases such as type 1 diabetes later in life. This birth-cohort study of all pregnant women due to give birth in 1966 in an area in Northern Finland were enrolled to ascertain whether dietary supplementation with vitamin D in infancy could reduce the risk of type 1 diabetes later in life (up to December, 1997). Frequency, dose of vitamin D supplementation data, and presence of suspected rickets data were collected in the first year of life. The daily doses of vitamin D supplementation were classified to; below 2000 IU, within 2000 IU, or above 2000 IU (recommended dose in Finland). Data on serum concentration of 25 (OH) D, were not available. In this study, vitamin D supplementation irrespective of dose was associated with a decrease in the occurrence of type 1 diabetes compared to those who did not supplement. The biggest reduction in risk of type 1 diabetes (80%) was observed among the children who regularly consumed at least the recommended daily dose of 2000 IU compared with those who regularly received less than the recommended amount. Furthermore, children suspected of having rickets during the first year of life had 3 times the risk of developing type 1 diabetes compared with those without such a suspicion. The authors suggest that because of vitamin D's immunosuppressive property, it can slow down or prevent type 1 diabetes which is considered to be an autoimmune disease. The authors believe, that "vitamin D might somehow inhibit the autoimmune reaction targeted towards the β cells of the pancreas". The findings of this study suggest that adequate vitamin D supplementation in infancy may reduce the risk of type 1 diabetes later in life.

[Hypponen E, et al. *Lancet* 2001;358:1500-1503]

Low-rate of adequate folic acid supplementation in well-educated women of high socioeconomic status attending a genetics clinic.

It is well recognized that the periconceptional intake of folic acid is associated with reducing the risk of neural tube defects (NTDs) and probably other birth defects. Therefore, optimizing folic acid intake prior to conception by consuming food fortified with folic acid, supplements containing folic acid or both is important. The authors of this research letter conducted a survey from April to July 1996 among women attending the genetic clinic at a pediatric hospital in Ottawa. This anonymous survey was completed by 342 women (69% of the women who were approached). Demographic characteristics and knowledge about folic acid were compared for women taking folic acid supplements at the optimal time (4 weeks before the last menstrual period to at least 8 weeks after the last menstrual period), those taking supplements but at a sub-optimal time to reduce birth defects, and those not taking any supplements. In this survey, 81% of the women were aware of folic acid and nearly 78% were taking at least 0.4 mg/d. However, only 26% of the pregnant women began folic acid supplementation at the optimum time to reduce the risk of NTDs. Unlike other reports, level of education did not correlate with successful folic acid supplementation. Women who took folic acid during a sub-optimal period were 4 times more likely to report that their physician was the primary source of information rather than the media. This highlights that physicians should emphasize the importance of the periconceptional use of folic acid. It was encouraging to note that women with optimal supplementation were 2.4 times more likely to have received their folic acid information from multiple sources. Since this survey was conducted, folic acid fortification of grains with modest amount (150 μ g/100g) became mandatory in Canada. Although, the effect of such fortification levels on the incidence of NTDs is not known in Canada, a 19% reduction in NTDs was recently reported from the US which uses a level similar to the Canadian level. Because optimum periconceptional folic acid intake is estimated to reduce the risk of neural tube defects by at least 50%, most health professionals are encouraging women of childbearing age to take a folic acid containing supplement (with at least 0.4 mg) in addition to what they achieve through diet to obtain the maximum protection against the occurrence of neural tube defects.

[Dawson LE, et al. *CMAJ* 2001;164(8): 1149-1150]

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Oxygenated carotenoid lutein and progression of early atherosclerosis. The Los Angeles Atherosclerosis Study.

High intake of fruits and vegetables is associated with reduced risk of cardiovascular disease and several cancers. Carotenoids are some of the many phytochemicals that are suggested to be contributing to the reduced risk of cardiovascular disease and cancer attributed to fruits and vegetables. This study comprised of 3 types of investigation to assess the protective effect of lutein (a major carotenoid) against early atherosclerosis. The 3 types of investigation comprised of: an epidemiological study of atherosclerosis progression as measured by change in carotid intima-media thickness (IMT) and plasma level of lutein; a coculture in vitro model of arterial wall oxidation using different concentration of lutein; and lutein supplemented in vivo mouse models of atherosclerosis in the aortic arch. The main findings from the 3 types of investigation were consistent with the hypothesis that increasing lutein intake is protective against the progression of early atherosclerosis. In the epidemiological arm of the study, there was an inverse association between plasma lutein and progression of IMT suggesting that lutein rich foods are protective against progression of early atherosclerosis. The other 2 studies suggested that the protective effect of lutein could be partially explained by its antioxidant property as well as the observation that LDL in the lutein supplemented mice was markedly resistant to oxidation which is believed to be an important step in atherogenesis. The authors conclude, "our findings in epidemiological, in vitro, and in vivo investigations suggest that lutein may be a potent protective factor against the progression of atherosclerosis in humans and animals. Furthermore, the findings from the coculture and mouse models indicate that this antiatherogenic effect was achieved with lowering of VLDL and IDL, rather than LDL, and via pathways that involve reduced inflammation and oxidative stress in the artery wall".

[Dwyer JH, et al. *Circulation* 2001;103:2922-2927]

Cost-effectiveness of vitamin therapy to lower plasma homocysteine levels for the prevention of coronary heart disease. Effect of grain fortification and beyond.

High homocysteine is identified as a risk factor for coronary heart disease (CHD) and mortality from CHD. Randomized clinical trials demonstrated that folic acid and vitamin B12 (cyanocobalamin) significantly lower homocysteine levels. In January 1998 it became mandatory in the US (followed a few months later by Canada) to fortify grain products with 140 µg of folic acid per 100 g of grain. This study examined the effect of grain fortification with folic acid on the occurrence of CHD. In addition the authors estimated the cost-effectiveness of additional vitamin supplementation with 1 mg of folic acid and 0.5 mg of B12 for CHD prevention. The outcomes of interest in this study were incidence of myocardial infarction, death from CHD, quality-adjusted life-years (QALYs) saved, and medical cost. The main findings of this analysis were that grain fortification with folic acid predicted a decrease in the occurrence of CHD by 8% in women and 13% in men and similar reductions were projected for CHD mortality. Compared with grain fortification alone, treating all patients with folic acid and B12 supplements would result in 310,000 fewer deaths and lower medical cost over a 10-year period. Over the same 10 year period, the preferred strategy was to provide vitamin supplementation in addition to grain fortification to all men 45 years of age and older. This would save 300,000 QALYs as well as more than \$2 billion US. For women without CHD, the preferred strategy was to treat all women older than 55 years with folic acid and B12 and this strategy was projected to save more than 140,000 QALYs over 10 years. The authors conclude, "folic acid and cyanocobalamin may be cost effective among many population subgroups and could have a major epidemiologic benefit for primary and secondary prevention of CHD if ongoing clinical trials confirm that homocysteine-lowering therapy decreases CHD events rates".

[Tice JA, et al. *JAMA* 2001;286:936-943]

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Suggested Readings

Household exposure to passive cigarette smoking and serum micronutrient concentrations.

[Alberg AJ, et al. Am J Clin Nutr 2000;72:1576-1582]

Effect of dietary patterns on serum homocysteine. Results of a randomized, controlled feeding study.

[Appel LJ, et al. Circulation 2000;102:852-857]

Vitamin K supplementation reduces serum concentrations of under- γ -carboxylated osteocalcin in healthy young and elderly adults.

[Binkley NC, et al. Am J Clin Nutr 2000;72:1523-1528]

Folate absorption in women with a history of neural tube defect-affected pregnancy.

[Boddie AM, et al. Am J Clin Nutr 2000;72:154-158]

Chemoprevention of gastric dysplasia: randomized trial of antioxidant supplements and anti-helicobacter pylori therapy.

[Correa P, et al. J Natl Cancer Inst 2000;92:1881-1888]

Influence of methylenetetrahydrofolate reductase genotype, age, vitamin B-12, and folate status on plasma homocysteine in children.

[Delvin EE, et al. Am J Clin Nutr 2000;72:1469-1473]

Low-density lipoprotein postsecretory modification, monocyte function, and circulating adhesion molecules in type 2 diabetic patients with and without macrovascular complication. The effect of α -tocopherol supplementation.

[Devaraj S, et al. Circulation 2000;102:191-196]

Effect of long-term supplementation with moderate pharmacologic doses of vitamin E are saturable and reversible in patients with type 1 diabetes.

[Englen W, et al. Am J Clin Nutr 2000;72:1142-1149]

Garlic consumption and cancer prevention: meta-analyses of colorectal and stomach cancers.

[Fleischauer AT, et al. Am J Clin Nutr 2000;72:1047-1052]

Interaction between vitamins C and E in human subjects.

[Hamilton IMJ, et al. Br J Nutr 2000;84:261-267]

Effect of early maternal iron stores on placental weight and structure.

[Hindmarsh PC, et al. Lancet 2000;356:719-723]

The economic burden of physical inactivity in Canada.

[Katzmarzyk PT, et al. CMAJ 2000;163:1435-1440]

Coffee consumption and the risk of coronary heart disease and death.

[Kleemola P, et al. Arch Intern Med 2000;160:3393-3400]

Serum selenium, serum-alpha-tocopherol, and the risk of rheumatoid arthritis.

[Knekt P, et al. Epidemiology 2000;11:402-405]

HDL-cholesterol-raising effect of orange juice in subjects with hypercholesterolemia.

[Kurowska EM, et al. Am J Clin Nutr 2000;72:1095-1100]

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Fruit and vegetable intake and risk of cardiovascular disease:the Women's Health Study.

[Liu S, et al. Am J Clin Nutr 2000;72:922-928]

Whole grain consumption and risk of ischemic stroke in women. A prospective study.

[Liu S, et al. JAMA 2000;284:1534-1540]

Serum folate and cardiovascular disease mortality among US men and women.

[Loria CM, et al. Arch Intern Med 2000;160:3258-3262]

Vitamin C status and mortality in US adults.

[Loria CM, et al. Am J Clin Nutr 2000;72:139-145]

Prospective study of serum selenium levels and incident esophageal and gastric cancers.

[Mark SD, et al. J Natl Cancer Inst 2000;92:1753-1763]

Adherence to the dietary guidelines for Americans and risk of major chronic disease in women.

[McCullough ML, et al. Am J Clin Nutr 2000;72:1214-1222]

Adherence to the dietary guidelines for Americans and risk of major chronic disease in men.

[McCullough ML, et al. Am J Clin Nutr 2000;72:1223-1231]

Total homocysteine and estrogen status indicators in the Third National Health and Nutrition Examination Survey.

[Morris MS, et al. Am J Epidemiol 2000;152:140-148]

Potential clinical and economic effects of homocyst(e)ine lowering.

[Nallamotheu BK, et al. Arch Intern Med 2000;160:3406-3412]

Vitamin D status: effect on parathyroid hormone and 1,25-dihydroxyvitamin D in postmenopausal women.

[Need AG, et al. Am J Clin Nutr 2000; 71:1577-1581]

Alcohol intake and bone metabolism in elderly women.

[Rapuri PB, et al. Am J Clin Nutr 2000;72:1206-1213]

Association of coffee consumption with gallbladder disease.

[Ruhl CE, et al. Am J Epidemiol 2000;152:1034-1038]

Vitamin D deficiency among older women with and without disability.

[Semba RD, et al. Am J Clin Nutr 2000;72:1529-1534]

Decline in prevalence of neural tube defects in a high-risk region of the United States.

[Stevenson, RE, et al. Pediatrics 2000;106:677-683]

Multivitamin use and mortality in a large prospective study.

[Watkins ML, et al. Am J Epidemiol 2000;152:149-162]

Intake of antioxidant vitamins and risk of death from stroke in postmenopausal women.

[Yochum LA, et al. Am J Clin Nutr 2000;72:476-483]

Dietary fat relation to risk of multiple sclerosis among two large cohorts of women.

[Zhang SM, et al. Am J Epidemiol 2000;152:1056-1064]

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