The Whitehall-Robins Supplement

A Selection of Recent Findings in the Field of Nutrition

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Reduction in Neural-Tube Defects after folic acid fortification in Canada.
The benefit of periconceptional folic acid supplementation to reduce the risk of neural-tube defects (NTDs) is well established. Based on this strong evidence, mandatory fortification of many cereals was enacted on January 1, 1998 in the United States. The Canadian milling industry started fortification early in 1997 to comply with the United Stated fortification requirements for imported flour. On November 11, 1998, fortification of white flour, enriched pasta, and cornmeal became mandatory in Canada. The required folic acid fortification levels in the United States and Canada was to increase folic acid intake by approximately 30 to 70% among women of childbearing age. Prior to fortification in Canada, the prevalence of NTDs was higher in eastern provinces than in western provinces. The investigators of this study assessed changes in the prevalence of NTDs before and after folic acid fortification in Canada. The study population comprised of live births, stillbirths, and termination of pregnancies due to fetal anomalies among women residing in seven Canadian provinces from 1993 to 2002. Utilizing published results of red cell folate levels, the study period was divided into pre-fortification, partial-fortification (early 1997-November 11, 1998), and full-fortification periods. In addition, the relationship between baseline NTDs rates in each province and the magnitude of the decrease after fortification was implemented was evaluated. During the study period, 2446 subjects with NTDs were documented among 1.9 million births. The prevalence of NTDs decreased from 1.58/ 1000 births pre-fortification to 0.86/1000 births post-fortification. This translates into a 46% reduction in NTDs rate. The magnitude of the decrease was proportional to the pre-fortification baseline rate in each province. Furthermore, geographical differences almost disappeared post-fortification. The rate reduction was greater for spina bifida (53%) than for anencephaly (38%) and cephalocele (31%). The authors conclude "Folic acid fortification with folic acid was associated with a significant reduction in the rate of neural-tube defects in Canada. The decrease was greatest in areas in which the baseline rate was high."
[De Wals P, et al. N Engl J Med 2007;357:135-142]

Magnesium intake and plasma concentrations of markers of systemic inflammation and endothelial dysfunction in women.
Magnesium is an essential nutrient with several dietary sources such as whole grains, green leafy vegetables, legumes and nuts. Several dietary surveys in North America reported that magnesium intake is inadequate, particularly among adolescent girls, women and the elderly. Magnesium intake might be associated with the pathogenesis of insulin resistance, type 2 diabetes, hypertension and cardiovascular disease. Also, cross sectional studies reported that magnesium intake is significantly correlated with features of the metabolic syndrome (insulin resistance syndrome), including adiposity, hyperinsulinemia, insulin resistance, hypertriglyceridemia, low HDL, and hypertension. The mechanisms for these reported beneficial effects of magnesium are not well delineated. There is growing recognition that systemic inflammation and endothelial dysfunction may be important components of the metabolic syndrome. The aim of this cross-sectional analysis was to investigate the relations between magnesium intake and plasma concentrations of inflammatory and endothelial biomarkers in women participating in a large ongoing cohort study. The measurements included C-reactive protein (CRP), interleukin 6 (IL-6), soluble tumor necrosis factor α receptor 2 (sTNF-R2), E-selectin, soluble intercellular adhesion molecule 1 (sICAM-1), and soluble vascular cell adhesion molecule 1 (sVCAM-1). Dietary magnesium intake was estimated from 2 semi quantitative food-frequency questionnaires administered 4 years apart. In this study, higher magnesium intake was associated with lower concentrations of CRP and E-selectin after controlling for age, BMI, smoking status, physical activity, alcohol consumption, and postmenopausal hormonal use. Women in the highest quintile of dietary magnesium intake (median intake of 382 mg/d) were 24% lower for CRP and 14% lower for E-slectin than those for women in the lowest quintile (230 mg/d). The authors conclude "Magnesium intake from diet is modestly and inversely associated with some but not all markers of systemic inflammation and endothelial dysfunction in apparently healthy women."
[Song Y, et al. Am J Clin Nutr 2007;85:1068-1074]

Calcium absorption in postmenopausal Chinese women: a randomized crossover intervention study.
Age adjusted rates of hip fractures are much higher in Caucasian populations than in Asian populations, however, calcium intakes in Asians are only half to three-quarters of that of their Western counterparts. The calcium intake of urban Chinese adults ranges from 350 to 500 mg/d. It remains unclear whether the differences in the fracture rates between the two populations could be partially explained by the discrepancies in the efficiency of their calcium utilization. Calcium absorption efficiency plays a key role in optimizing calcium utilization. There is suggested evidence that intestinal true fractional calcium absorption (TFCA) was 2-fold higher in the Chinese than in the Western populations. More than two thirds of the dietary calcium for US adults is derived from dairy products and less so from grains, vegetables and fruits. Dietary calcium in the Chinese population is mainly provided by vegetables, fruits, beans with lesser contribution from dairy products compared to Western populations. Calcium from different dietary sources varies in its bioavailability. The purpose of this study was to determine true calcium absorption, urinary calcium excretion, and to evaluate benefits to the calcium economy at double the current calcium intake consumed by most postmenopausal Chinese women. This study was a randomized crossover trial of healthy postmenopausal Chinese women aged 49 to 64 years. Subjects were randomly assigned to receive 0, 500 and 1000 mg/d of calcium carbonate for 5 weeks separated by 2-week washout periods. The main findings of this study demonstrated that postmenopausal Chinese women have a high level of calcium absorption efficiency. A minimum mean calcium intake of about 1,300 mg/d is required for a maximum benefit.
[Chen YM, et al. Br. J Nutr 2007; 97:160-166]

Maternal vitamin D intake during pregnancy and early childhood wheezing.
There is growing evidence that antenatal and early life exposures can influence the range of disorders later in life. Maternal diet during pregnancy might influence the development of asthma and allergy. Vitamin D deficiency is highly prevalent in many populations and current recommended intakes may be inadequate for optimum health, particularly during pregnancy and lactation. Vitamin D deficiency may be a contributing factor to the increase prevalence of atopic and autoimmune disorders. Vitamin D is important in immune function and development, and this could potentially have a role in the development of asthma and allergies. This study investigated whether maternal vitamin D intake in pregnancy is associated with decreased risks of wheezing symptoms in young children. A random sample of 2,000 healthy pregnant women was recruited while attending antenatal clinics at 12 wk gestation. Maternal vitamin D intake was ascertained from a food-frequency questionnaire completed at 32 wk of gestation. The main outcome measures were wheezing symptoms, spirometry, bronchodilator response, atopic sensitization, and exhaled nitric oxide in 5 years old children born to this cohort of women. In this study, low maternal dietary and total vitamin D intakes during pregnancy were associated with increased wheezing symptoms in children at the age of 5 years. The authors conclude "Increasing maternal vitamin D intakes during pregnancy may decrease the risk of wheeze symptoms in early childhood."
[Devereux G, et al. Am J Clin Nutr 2007;85:853-859]

Suggested Readings

Vitamin K: The coagulation vitamin that became omnipotent.
[Craneneburg ECM, et al. Thromb Haemost 2007; 98:120-125]

Vitamin D-deficiency rickets among children in Canada.
[Ward LM, et al. CMAJ 2007; 177:161-166]

Intakes of calcium and vitamin D and breast cancer risk in women.
[Lin J, et al. Arch Intern Med 2007; 167:1050-1059]

Homocysteine, B vitamins, and the incidence of dementia and cognitive impairment: results from the Sacramento Area Latino Study of Aging.
[Haan MN, et al. Am J Clin Nutr 2007; 85:511-517]

Optimal vitamin D status for colorectal cancer prevention. A quantitative meta-analysis.
[Gorham ED, et al. Am J Prev Med 2007; 32:210-216]

Trace element supplementation after major burns modulates antioxidants status and clinical course by way of increased tissue trace element concentrations.
[Berger MM, et al. Am J Clin Nutr 2007;85:1293-1300]

Dietary (n-3) fatty acids and brain development.
[Innis SM. J Nutr 2007; 37:855-859]

Calcium plus vitamin D supplementation and the risk of postmenopausal weight gain.
[Caan B, et al. Arch Intern Med 2007; 167:893-902]

Update: effects of antioxidant and non-antioxidant vitamin supplementation on immune function.
[Webb AL, et al. Nutr Rev 2007; 65: 181-217]

An overview of evidence for a causal relation between iron deficiency during development and deficits in cognitive or behavioral function.
[McCann JC, et al. Am J Clin Nutr 2007; 85:931-945]