# The Whitehall-Robins Supplement

## A Selection of Recent Findings in the Field of Nutrition

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**Association of vitamin B-6 status with inflammation, oxidative stress, and chronic inflammatory conditions: the Boston Puerto Rican Health Study.**

Vitamin B-6 functions as an essential cofactor for enzymes involved in various metabolic activities which include amino acid, fat, and glucose metabolism. PLP, also known as pyridoxal 5'-phosphate, is a phosphate ester derivative that is the biologically active form of vitamin B-6 and reflects long-term body storage. Previous studies have shown that low plasma PLP concentrations are linked to an increased risk of cardiovascular disease (CVD). These cardioprotective effects of vitamin B-6 on CVD are independent of homocysteine regulation, thereby suggesting that additional mechanisms may be involved. Recent data have shown that plasma PLP was adversely associated with inflammatory markers, which include C-reactive protein (CRP), fibrinogen, and blood cell count. In addition, low vitamin B-6 concentrations are commonly present in diseases with strong inflammatory markers. Health disparities have been well documented in the Puerto Rican population, which include high prevalence of depressive symptoms, cognitive impairment, type 2 diabetes, obesity, and hypertension compared with non-Hispanic whites and other Hispanic subgroups. It is therefore important to explore and identify factors that contribute to those disparities. This study comprised of 1222 self-identified Puerto Ricans ages 45-75 y who were living in Boston, Massachusetts (361 men and 861 women; mean ± SD age: 52 ± 7 y). Results indicated a strong dose-response relation of plasma PLP with plasma CRP. Increasing quartiles of PLP were significantly associated with lower CRP concentrations (geometric means: 4.7, 3.6, 3.1, and 2.5 mg/L; $p < 0.0001$) and with lower urinary 8-hydroxydeoxyguanosine (8-OHdG) concentrations (geometric means: 124, 124, 117, and 108 ng/mg creatinine; $p=0.025$). These negative associations persisted after plasma homocysteine was controlled for. Metabolic syndrome, obesity, and diabetes were also significantly associated with low plasma PLP concentrations ($p=0.011$, 0.0007, and 0.004, respectively). The authors conclude, "Low vitamin B-6 concentrations are associated with inflammation, higher oxidative stress, and metabolic conditions in older Puerto Rican adults. Our data suggest that vitamin B-6 may influence cardiovascular disease risk through mechanisms other than homocysteine and support the notion that nutritional status may influence the health disparities present in this population."
*[Shen J, et al. Am J Clin Nutr 2010; 91:337-342]*

**DHA supplementation decreases serum C-reactive protein and other markers of inflammation in hypertriglyceridemic men.**

Inflammatory processes are important contributors to the development of atherogenesis as well as to the vulnerability of atherosclerotic lesions to rupture. The most extensively studied biomarker of inflammation in CVD is C-reactive protein (CRP). A meta analyses of 22 published studies reported that the odds ratio for patients in the top one-third compared with the bottom one-third of serum CRP levels was 1.58, thereby concluding that it is an important factor in determining the risk for CVD and stroke. In addition to CRP, increases in the concentrations of other inflammatory markers also appear to contribute to the development of atherosclerosis. Previous studies have reported a link between docosahexaenoic acid (DHA) supplementation in healthy men with a reduction in the number of circulating neutrophils; however, the mechanism is not understood. Therefore in this study, an attempt was made to understand the role of DHA. Hypertriglyceridemic men aged 39-66 y, participated in a double-blind, randomized, placebo-controlled parallel study. They received no supplements for the first 8 d and then received either 7.5 g/d DHA oil or olive oil for 90 d. DHA supplementation for 45 and 91 d decreased the number of circulating neutrophils by 11.7 and 10.5%, respectively ($P<0.05$). It did not alter the circulating concentrations of other inflammatory markers tested within 45 d, but at 91 d it reduced concentrations of CRP by 15%, interleukin-6 by 23%, and granulocyte monocyte-colony stimulating factor by 21% and DHA increased the concentration of anti-inflammatory matrix metalloproteinase-2 by 7%. The mean size of VLDL particles was positively associated with plasma concentrations of neutrophils and CRP. The authors conclude, "DHA may lessen the inflammatory response by altering blood lipids and their fatty acid composition."
*[Kelley DS, et al. J Nutr 2009; 139:495-501]*

**Vitamin C intake and the risk of gout in men. A prospective study.**

Gout is the most common type of inflammatory arthritis in men. The identification of risk factors for gout that are modifiable with available measures is an important first step in the prevention and management of this common painful condition. Previous studies have suggested that vitamin C supplementation lowers serum uric acid levels via a uricosuric effect. These studies, however, were small, of short duration, and used exceptionally high doses of vitamin C (1-time ingestion of 3-12 g for several days). Furthermore, the relation of decreased serum uric acid levels through vitamin C supplementation with the risk of gout remains unknown. This effect, if confirmed, may have implications for the prevention and management of gout. This study prospectively examined the relation between vitamin C intake and the risk of incident gout in 46 994 male participants, with no history of gout at baseline, from 1986 through 2006. A supplementary questionnaire to ascertain the American College of Rheumatology criteria for gout was used and vitamin C intake was assessed every 4 years through validated questionnaires. Compared with men with vitamin C intake less than 250 mg/d, the multivariate RR of gout was 0.83 (95% CI, 0.71-0.97) for total vitamin C intake of 500 to 999 mg/d, 0.66 (0.52-0.86) for 1000 to 1499 mg/d, and 0.55 (0.38-0.80) for 1500 mg/d or greater ($P<0.001$ for trend). Compared with men who did not use supplemental vitamin C, the multivariate RR of gout was 0.66 (95% CI, 0.49-0.88) for supplemental vitamin C intake of 1000 to 1499 mg/d and 0.55 (0.36-0.86) for 1500 mg/d or greater ($P<0.001$ for trend). The authors conclude, "Higher vitamin C intake is independently associated with a lower risk for gout. Supplemental vitamin C intake may be beneficial in the prevention of gout."
*[Choi HK, et al. Arch Intern Med 2009; 169:502-507]*

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**Maternal vitamin D deficiency is associated with bacterial vaginosis in the first trimester of pregnancy.**
Bacterial vaginosis (BV) is a highly prevalent bacterial infection that is associated with adverse pregnancy outcomes. BV is a serious problem, because it is associated with a number of gynecologic conditions and adverse pregnancy outcomes. The relationship between BV and the risk of preterm birth is one of the strongest and most consistent associations. Vitamin D may contribute to the racial disparity in BV. In all stages of a woman's life, vitamin D deficiency is far more common in black females than in their white counterparts. Vitamin D deficiency has been associated with a wide range of immune disorders and chronic infections such as those due to mycobacteria, but to our knowledge, it has not been studied in relation to BV. The objective of this study was to examine the association between maternal vitamin D status and the prevalence of BV in early pregnancy. Women enrolled in a pregnancy cohort study at <16 weeks underwent a pelvic examination and provided a blood sample for determination of serum 25-hydroxyvitamin D [25(OH)D]. The mean unadjusted serum 25(OH)D concentration was lower among BV cases (29.5nmol/L; 95% CI: 27.1, 32.0) compared with women with normal vaginal flora (40.1 nmol/L; 95% CI: 37.0, 43.5; P<0.001). BV prevalence decreased as vitamin D status improved. Approximately 57% of the women with a serum 25(OH)D concentration <20 nmol/L had BV compared to 23% of women with a serum 25(OH)D concentration of >80 nmol/L. Compared with a serum 25(OH)D concentration of 75nmol/L, there were 1.65-fold (95% CI: 1.01,2.69) and 1.26-fold (1.01, 1.57) increases in the prevalence of BV associated with a serum 25(OH)D concentration of 20 and 50 nmol/L. The authors conclude, "Vitamin D deficiency is associated with BV and may contribute to the strong racial disparity in the prevalence of BV."
*[Bodnar LM, et al. J Nutr 2009;139:1157-1161]*

**Suggested Readings**

**Vitamin A and retinol intakes and the risk of fractures among participants of the Women's Health Initiative Observational Study.**
*[Caire-Juvera, G, et al. Am J Clin Nutr 2009; 89:323-330]*

**Neural tube defects and maternal folate intake among pregnancies conceived after folic acid fortification in the United States.**
*[Mosley BS, et al. Am J Epidemiol 2009; 169:9-17]*

**Nutritional quality of organic foods: a systematic review.**
*[Dangour AD, et al. Am J Clin Nutr 2009;90:680-685]*

**Position of the American Dietetics Association, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance.**
*[J Am Diet Assoc 2009; 109:509-527]*

**Maternal consumption of coffee and caffeine-containing beverages and oral clefts: A population-based case-control study in Norway.**
*[Johansen AMW, et al. Am J Epidemiol 2009;169:1216-1222]*

**Randomized, double-blind, placebo-controlled trial of iron supplementation in female soldiers during military training: effects on iron status, physical performance, and mood.**
*[McClung JP, et al. Am J Clin Nutr 2009; 90:124-131]*

**Body mass index, height, and risk of lymphatic malignancies: a prospective cohort study.**
*[Pylypchuk RD, et al. Am J Epidemiol 2009; 170:297-307]*

**Poor vitamin C status is associated with increased carotid intima-media thickness, decreased microvascualr function, and delayed myocardial repolarization in young patients with type 1 diabetes.**
*[Odermarsky M, et al. Am J Clin Nutr 2009; 90:447-52]*

**Impact of micronutrient deficiencies on obesity.**
*[Garcia OP, et al. Nutr Rev 2009; 67:559-572]*

**Choline in anxiety and depression: the Hordaland Health Study.**
*[Bjelland I, et al. Am J Clin Nutr 2009; 90:1056-1060]*


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