

# Higher Folic Acid Intake Related to Reduced Risk of Stroke

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Men and women who consume an average of 405 mcg per day of folic acid were shown to have a 20 percent lower risk of stroke and a 13 percent lower risk for all cardiovascular events (including heart attacks), compared to those consuming an average of 99 mcg of folic acid per day. These were the findings from the National Health and Examination Survey I (NHANES I) Epidemiologic Follow-Up Study published in *Stroke: Journal of the American Heart Association*. Study participants included 9,764 U.S. men and women, ages 25 to 74, who were surveyed for dietary intake of folic acid at baseline using a 24-hour dietary recall method. Over an average 19-year follow-up, 926 incident stroke events and 3,758 incident cardiovascular disease (CVD) events were documented in this population. This study showed that higher folic acid intake was associated with a significant reduction in stroke and cardiovascular disease events.

The preventive role of folic acid has been associated with homocysteine. Within all body cells, folic acid is required as a methyl donor (CH<sub>3</sub>) to convert homocysteine to methionine. Once formed, methionine acquires the adenosine ring from ATP to become S-adenosyl methionine (SAME).

SAME is the primary methyl donor for a multitude of important reactions that give rise to DNA bases (required to help prevent spinal birth defects in the fetus), creatine synthesis in the liver and in neurotransmitters in the brain. Through transmethylation, it participates in detoxification reactions in the liver and in intestinal epithelial cells. Thus, the body has an ongoing need to convert homocysteine to methionine to ensure that adequate concentrations of SAME are in place for these vital biochemical reactions to occur.

Once SAME gives up its methyl group in the above-noted reactions, it is quickly converted back to homocysteine, awaiting a methyl group from folic acid to be reconverted to methionine and SAME. If there is insufficient intake of folic acid, less homocysteine is converted to methionine, and this results in an intracellular build-up of homocysteine. As homocysteine builds up in the cell, it begins to leak through the cell membrane into the bloodstream. Within the bloodstream, it causes denuding of the endothelial lining of arteries; oxidizes LDL-cholesterol; produces vasoconstriction; and increases platelet coagulation. All of these effects are associated with an increased risk of ischemic stroke, myocardial infarction and other cardiovascular events.

Many studies have shown that elevated homocysteine levels are associated with a significant increase in risk of cardiovascular disease (CVD), and that approximately 10 percent of the attributable risk of heart disease is determined by homocysteine blood levels (it is advisable to have a blood level of homocysteine below nine micromoles per liter). Studies show that folic acid supplementation can reduce homocysteine levels in patients presenting with elevated homocysteine levels, considered to reduce risk of heart disease.

The NHANES I study provides further evidence that folic acid is a vital nutrient in the prevention of the nation's number-one killer disease: CVD. Unfortunately, cross-sectional nutrition surveys in the U.S. indicate that the average intake of folic acid among the adult population is only 190-210 mcg

per day. The body of evidence indicates that this is insufficient to prevent an undesirable build-up of homocysteine in the blood stream; to prevent spinal birth defects in women who may become pregnant; or to provide adequate folic acid concentrations necessary to prevent cancer and support health optimization.

It is difficult to ingest 400-600 mcg of folic acid per day from food without relying heavily upon wheat germ; wheat bran; cooked spinach; broccoli, beans; and collard greens. North Americans do not generally consume these foods in high enough quantities to derive the optimum benefits from folic acid. This is yet another reason to educate patients on the principles of a healthy diet, and to encourage them to use a high-potency multiple vitamin and mineral each day. The 400 mcg contained within a multiple vitamin may not appear to stand out when surrounded by antioxidants and other more high-profile ingredients, but this seemingly modest daily contribution of folic acid can be the difference between life and death for patients, family members, and friends who value your advice on matters of preventive health care.

### *Reference*

Bazzano LA, et al. Dietary intake of folate and risk of stroke in US men and women: NHANES I Epidemiologic Follow up Study. *Stroke* 2002;33(5):1183.

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### Silicon and Bone Density

A number of supplement manufacturers have begun adding silicon to formulations intended to help preserve bone density. It may appear in these formulations as silica (silicon dioxide), sodium metasilicate and silicic acid. The average intake from food is 20-50 mg per day in North America. Silicon has been shown to be highly bioavailable, and evidence continues to accumulate implicating its role in bone formation. Studies of silicon deprivation in growing animals conducted in the early 1970s showed reduced growth and marked defects of bone and connective tissue.

In addition, silicon supplementation of postmenopausal women with osteoporosis not only inhibits bone resorption, but increases trabecular bone volume and mineral density. These results are supported by the ovariectomized rat model of postmenopausal osteoporosis in which oral silicon completely abrogates the loss of bone mass. Jugdaohsingh, et al., recently showed that in osteoblastic cell lines and human bone marrow stromal cells (in vitro), that physiologic concentrations of orthosilicic acid increase the synthesis of bone markers, including type I collagen (the major organic component of bone matrix), and may also be involved in the mineralization of the matrix.

In support of this evidence, Asians and people of the Indian subcontinent have much higher silicon intakes than do Western populations, a result of higher intakes of plant-based foods. These populations also have a lower incidence of hip fractures than Western populations. Silicon has been shown to be very nontoxic, and when taken as a supplement with other bone support nutrients, may be an important mineral in the prevention of osteoporosis. It is found in bone; blood vessels; cartilage; tendons; skin; and hair, and is also the most abundant mineral in the earth's crust.

### *Reference*

Jugdaohsingh R, et al. Dietary silicon intake and absorption. *Am J Clin Nutr* 2002;75:887-93.

Please take time to listen to Dr. Meschino's interviews on ChiroWeb.com. The subjects of the first three are: *Combining Traditional, Complementary and Natural Interventions; The Benefits of Melatonin; and Using Natural Remedies to Manage Women's Health Issues*. Each interview is packed with important information available to you and your patients. You can listen to the interviews at <http://www.chiroweb.com/audio/meschino>. There is a link on the directory page for your feedback.

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