

Vitamin B12 Function May Be Diminished by Excessive Folate

BOSTON (December 18, 2007) — In a study of adults aged 20 and over, researchers at Tufts University showed that homocysteine and methylmalonic acid are at much higher levels in individuals who have a combination of vitamin B12 deficiency and high blood folate levels than in individuals who are also vitamin B12 deficient but have normal folate levels.

Homocysteine and methylmalonic acid, compounds used by enzymes that contain vitamin B12, accumulate in the blood in patients who are vitamin B12 deficient. “Finding that the combination of high blood folate levels and low vitamin B12 status is associated with even higher levels of these compounds is a strong indication that the high folate is interfering with the action of these B12-containing enzymes, thus resulting in the exacerbation or worsening of the vitamin B12 deficiency,” says corresponding author Jacob Selhub, Ph.D., director of the Vitamin Metabolism Laboratory at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University (USDA HNRCA).

In an earlier study, Selhub and co-authors Martha Savaria Morris, Ph.D., and Paul Jacques, D.Sc, also of the USDA HNRCA, have shown that the prevalence of anemia and cognitive impairment among U.S. elderly who are vitamin B12 deficient is much worse if this B12 deficiency is also accompanied by high blood folate rather than normal blood folate. This indicates that the worsening of the vitamin B12 deficiency, as indicated by higher homocysteine and methylmalonic acid due to high blood folate, is also manifested clinically through higher prevalence of anemia and cognitive impairment.

Results of the present study are published in the December 11 issue of the Proceedings of the National Academy of Sciences. Selhub and colleagues analyzed data from 10,413 adults who participated in two National Health and Nutrition Examination Surveys (NHANES). Slightly less than half of the participants (4,940) took part in phase 2 of the NHANES III, which was conducted between 1991 and 1994. The remaining 5,473 adults took part in NHANES conducted from 1999 to 2000 and from 2000 to 2002.

The authors intentionally used one NHANES survey conducted prior to 1998, the year the Food and Drug Administration required that all enriched cereal-grain products be fortified with folic acid, the synthetic form of folate, in order to help prevent birth defects in infants. “It is important to note that these adverse interactions between high folate blood levels and vitamin B12 deficiency were seen only in the study participants from the NHANES conducted between 1999 and 2002, after the fortification of flour and other cereals with folic acid,” says Selhub, who is also a professor at the Friedman School of Nutrition Science and Policy at Tufts University.

Folic acid is a synthetic form of the vitamin, which requires specific processing by the body for incorporation into the folate pool of the body. Naturally occurring folates, found in leafy vegetables, legumes and in many other fruits and vegetables, can be readily incorporated into the body’s folate pool and are believed to be beneficial even at higher

intakes. “There is no reason to avoid foods with naturally occurring folate and it essential to consume B12 containing products such as eggs, meat, milk and poultry and even supplements if necessary,” says Selhub. “The combination of high blood folate and normal vitamin B12 status is actually beneficial to health.”

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Selhub, J, Morris MS, Jacques PF. *Proceedings of the National Academy of Sciences*. 2007 (Dec. 11); 104 (50): 19995-20000.

The Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy at Tufts University is the only independent school of nutrition in the United States. The school's eight centers, which focus on questions relating to famine, hunger, poverty, and communications, are renowned for the application of scientific research to national and international policy. For two decades, the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University has studied the relationship between good nutrition and good health in aging populations. Tufts research scientists work with federal agencies to establish the USDA Dietary Guidelines, the Dietary Reference Intakes, and other significant public policies.

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If you are a member of the media interested in learning more about this topic, or speaking with a faculty member at the Friedman School of Nutrition Science and Policy at Tufts University, or another Tufts health sciences researcher, please contact Andrea Grossman at 617-636-3728 or Christine Fennelly at 617-636-3707.