

Food Fortification Not Enough to Prop Up Female Folate Levels

ATLANTA, Jan. 5 -- Despite fortification of the food supply with folic acid, serum folate levels have dropped en masse among women in recent years, researchers said.

Median serum folate concentrations among women of childbearing age decreased 16% from 1999 -- the year after fortification started -- to 2004, said Sheree L. Boulet, Dr.P.H., of the National Center on Birth Defects and Developmental Disabilities, and colleagues.

Red blood cell folate concentrations also decreased 8% in the same period, they wrote in the Jan. 5 issue of *Morbidity and Mortality Weekly Report*, a CDC publication.

Folic acid, the synthetic form of folate, is added to enriched cereal-grain products to help prevent neural tube birth defects (NTD) such as spinal bifida or anencephaly.

In an accompanying note, *MMWR*'s editors suggested that the results do not reflect that folic acid fortification does not work. A previous study found that serum folate levels increased from a mean of 4.8 ng/mL before fortification during 1988 to 1994 to about 13.0 ng/mL in 1999 to 2000 after it started, with similar increases in red blood cell folate concentrations.

The editors suggested that the finding reflects other changes that have occurred in the American population.

"More likely explanations include 1) changes over time in the proportion of women taking supplements containing folic acid, 2) decreased consumption of foods rich in natural folates or foods fortified with folic acid (i.e., enriched cereal-grain products), 3) variations in the amounts of folic acid added to enriched grain products since fortification was mandated, and 4) increases in risk factors associated with lower folate concentrations such as obesity."

The researchers compared National Health and Nutrition Examination Survey (NHANES) data for the periods 1999 to 2000, 2001 to 2002, and 2003 to 2004. Each included a nationally representative sample of the civilian, noninstitutionalized population. Members of these groups were individually interviewed and underwent a physical examination including blood sample collection.

They found that the median serum folate concentration among women ages 15 to 44 were:

12.6 ng/mL (95% confidence interval 11.7 to 13.5) in 1999 to 2000,

11.4 ng/mL (95% CI 11.1 to 12.0) in 2001 to 2002, and

10.6 ng/mL (95% CI 10.2 to 11.2) in 2003 to 2004.

Overall, this represented a significant decline ($P<0.001$).

The red blood cell folate concentrations likewise fell significantly ($P=0.028$). The findings were:

255 ng/mL (95% CI 240 to 270) in 1999 to 2000,

260 ng/mL (95% CI 250 to 272) in 2001 to 2002, and

235 ng/mL (95% CI 226 to 246) in 2003 to 2004.

While these levels are not below the 220 ng/mL recommended in the national health objective for the year 2010, the trend is heading that direction.

"Although non-Hispanic whites and Mexican Americans have met the *Healthy People 2010* objective for median [red blood cell] folate concentration since 1999 to 2000," the editors wrote. "If folate intake continues to decrease overall, median concentrations might decrease to less than 220 ng/mL."

The researchers found that the serum folate trend was significantly downward for all three ethnic populations considered ($P=0.008$ for non-Hispanic whites, $P=0.023$ for non-Hispanic blacks, and $P<0.001$ for Mexican Americans).

Interestingly, the editors noted that the largest decreases were among non-Hispanic white women, a population with historically higher levels of folate intake who now accounted for most of the decreases in the overall study population.

Future studies should link these findings to data from the National Birth Defects Prevention Network to see if the declines in folate levels have affected neural tube birth defect prevalence, they added.

The CDC recommends that all women of childbearing age capable of becoming pregnant should consume 400 μg of folic acid daily. Since fortification is not expected to provide the full daily requirement, women should consume a diet containing folate-rich or -fortified foods as well as dietary supplements, according to the CDC.

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