May 2012 Media Alert: *The Journal of Nutrition*

The following articles are being published in the May 2012 issue of *The Journal of Nutrition*, a publication of the American Society for Nutrition. Summaries of the selected articles appear below; the full text of each article is available by clicking on the links listed. Manuscripts published in *The Journal of Nutrition* are embargoed until the article appears online either as in press (Articles in Press) or as a final version. The embargoes for the following articles have expired.

National data support upward trend in folate status

Multinutrient-fortified rice may help alleviate vitamin B-12 deficiency and improve physical performance in malnourished children

Researchers identify method by which whole-grain intake can be assessed

National data support upward trend in folate status

Folate (referred to as *folic acid* when added to foods or dietary supplements) is an essential B vitamin needed for optimal growth and development. Folate is found naturally in many foods such as leafy greens, legumes, and many fruits. Folic acid has, since 1998, been added to all "enriched" cereal grain products in the United States. This public health measure was implemented largely to help lower the incidence of neural tube defects, such as spina bifida and anencephaly. However, some have argued that increasing folate intake in the population may have unintended consequences. As such, monitoring changes in folate intake and status is one critical step in making informed decisions concerning the effectiveness and safety of federally-mandated folic acid fortification of the U.S. food supply. Such monitoring is typically accomplished via the National Health and Nutrition Examination Surveys (NHANES), which for many years have assessed serum and red blood cell folate concentrations (measures of short- and long-term folate status, respectively). However, scientists at the U.S. Centers for Disease Control and Prevention (CDC) were required in 2007 to change the analytical method by which folate was measured. In response, scientists developed statistical methods by which serum and red blood cell folate concentrations from earlier surveys could be compared to those measured from 2007 onward. In two companion papers published in the May 2012 issue of *The Journal of Nutrition*, researchers from the CDC, U.S. Food and Drug Administration (FDA), National Institutes of Health Office of Dietary Supplements, and Loyola University describe the methods by which these comparisons should be made as well as laboratory method-adjusted trends in folate status from 1988-2010.

First, the researchers analyzed serum and red blood cell samples using both the previous and current laboratory methods. Because the current laboratory method is considered more accurate, mathematical equations were developed by which values obtained by the previous method could be "adjusted" and

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compared to the values obtained by the current method. Then, after adjusting the older data to match the current laboratory method, trends in folate status in the U.S. population from pre- to post-fortification were assessed using samples collected in NHANES cohorts.

The researchers found a sharp increase in blood folate concentrations immediately subsequent to mandatory folic acid fortification of enriched foods, followed by a slight decrease during the 12-year post-fortification period. Whereas up to 24% of the population might have been considered at risk for folate deficiency prior to folic acid fortification, <1% would currently be categorized as such.

References Pfeiffer CM, Hughes JP, Lacher DA, Bailey RL, Berry RJ, Zhang M, Yetley EA, Rader JI, Sempos CT, Johnson CL. Estimation of trends in serum and RBC folate in the U.S. population from pre- to postfortification using assay-adjusted data from the NHANES 1988-2010. *Journal of Nutrition* 142:886-893, 2012. Pfeiffer CM, Hughes JP, Durazo-Arvizu RA, Lacher DA, Sempos CT, Zhang M, Yetley EA, Johnson CL. Changes in measurement procedure from a radioassay to a microbiologic assay necessitate adjustment of serum and RBC folate concentrations in the U.S. population from the NHANES 1988-2010. *Journal of Nutrition* 142:894-900, 2012.
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Multinutrient-fortified rice may help alleviate vitamin B-12 deficiency and improve physical performance in malnourished children

Whereas hunger (the body's response to consuming insufficient calories) is often presumed to be the most pressing nutritional concern worldwide, micronutrient deficiency may represent an even more dire situation. Indeed, chronic iron deficiency is considered the most prevalent nutrient deficiency worldwide, resulting in poor growth, cognitive deficits, and suboptimal work capacity. Because enhancing food consumption patterns is not always a viable option in areas where micronutrient deficiencies are endemic, public health measures to provide fortified foods have often been implemented. However, nutrients do not work in isolation of each other, and fortification of foods with *multiple* micronutrients is thought to be optimal in this regard. For instance, simply providing sufficient iron in the form of fortification may not decrease the risk of anemia in populations with a high incidence of concomitant folate deficiency. Additionally, choosing which food staple should be fortified, and finding ways to effectively add the fortificants are challenging. In an attempt to use rice, a commonly consumed grain in India, as the food vehicle for several commonly-deficient micronutrients, researchers from St. John's National Academy of Health Sciences (Bangalore, India), Sight and Life (Basel, Switzerland), and DSM Nutritional Products (Basel, Switzerland) conducted a controlled nutritional intervention trial among Indian school children. Their results are published in the May 2012 issue of *The Journal of Nutrition*.

This study was carried out in 4 urban elementary schools situated in southern India. A total of 258 children were assigned randomly to 1 of 3 treatments: high-iron, multinutrient-fortified rice (12.5 mg iron/100 g rice); low-iron multinutrient-fortified rice (6.25 mg iron/100 g rice); and unfortified rice (control). To produce the experimental rice, natural rice was mixed with extruded rice "kernels" made from rice flour to which vitamin A, thiamin, niacin, vitamin B-6, vitamin B-12, folic acid, and zinc had been added. Children were provided with daily lunch servings of their assigned rice 6 days/week for 6 months. Micronutrient status, cognitive outcomes (e.g. attention and concentration), physical performance (endurance), illness, and measures of growth were assessed at baseline and the end of the study.

Whereas all 3 groups began the study at similar levels, those in both fortified rice groups had significantly improved vitamin B-12 status and physical performance by the end of the intervention compared to the control group.

No differential changes in hemoglobin levels or other differences were detected among the study groups. The researchers concluded that use of multiple micronutrient-fortified rice may help improve vitamin B-12 status and physical performance in at-risk school children. Longer-term studies will be needed to determine whether this intervention can correct other nutrient deficiencies, such as that of iron, as well.

Reference Thankachan P, Rah JH, Thomas T, Selvam S, Amalrajan V, Srinivasan K, Steiger G, Kurpad AV. Multiple micronutrient-fortified rice affects physical performance and circulating plasma vitamin B-12 and homocysteine concentrations of Indian school children. *Journal of Nutrition* 142:846-852, 2012.
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Researchers identify method by which whole-grain intake can be assessed

The 2010 Dietary Guidelines for Americans recommends that we consume at least half of all grains as "whole grains," defined as being constituted from the ratios of the original components of the natural grain (the bran, germ, and endosperm). This is mainly because epidemiologic studies suggest that increasing whole-grain intake is related to lower risks for cardiovascular disease and type II diabetes. And choosing whole grains rich in dietary fiber has additional benefits. However, estimating whole-grain consumption can be difficult, making research in this area challenging. This is due to a combination of factors such as people's inability to categorize what they eat and technical limitations to dietary intake questionnaires and food composition databases. Thus, the discovery of a biological marker (biomarker) that objectively estimates whole-grain intake is of interest to researchers. In response, researchers at the Swedish University of Agricultural Sciences (Uppsala, Sweden), Brigham and Women's Hospital/Harvard Medical School, the National University of Singapore, and Harvard University collaborated on a study designed to document whether whole-grain-associated compounds found in urine might be useful in this regard. You can read more about their study in the May 2012 issue of *The Journal of Nutrition*.

The researchers studied two compounds [3,5-dihydroxybenzoic acid (DHBA) and 3-(3,5-dihydoxyphenyl-1-propanoic acid (DHPPA)] that are produced in the body after whole grains are consumed. These substances are voided in the urine, and can therefore be detected in small "spot" urine samples. In this study, an offshoot of the Nurses' Health Study II, 104 women (25-42 years of age) provided detailed written information concerning whole-grain intake as well as a series of spot urine samples. The researchers then correlated urine concentrations of DHBA and DHPPA with reported whole-grain consumption to determine if the former could be used as a biomarker for whole-grain consumption.

Data indicated that urinary DHBA was not a reliable indicator of whole-grain intake. However, DHPPA was - especially if its content in multiple urine samples was averaged over time. The scientists concluded that "DHPPA in repeated samples may be useful for validating whole-grain intake and assessing compliance in whole-grain intervention studies." This may be especially important for researchers investigating the overall relations between whole-grain consumption and risk for chronic diseases and conditions such as obesity, cardiovascular disease, and type II diabetes.

Reference Landberg R, Townsend MK, Neelakantan N, Wun Q, Sampson L, Spiegelman D, van Dam RM. Alkylresorcinol metabolite concentrations in spot urine samples correlated with whole grain and cereal fiber intake but showed low to modest reproducibility over one to three years in U.S. women *Journal of Nutrition* 142:872-877, 2012.
For More Information To contact the corresponding author, Dr. Rikard Landberg, please send an e-mail to rikard.landberg@slu.se.

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