January 2012 Media Alert: *The Journal of Nutrition*

The following articles are being published in the January 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.

Researchers learn hepcidin likely involved in iron homeostasis during pregnancy

Controlled study finds consuming nopal, chia seeds, soy protein, and oats may help treat metabolic syndrome in Mexicans

Researchers review effects of algae-derived omega-3 fats on blood lipids

Researchers learn hepcidin likely involved in iron homeostasis during pregnancy

Although iron has long been known to be important for energy metabolism, poor iron status remains the most common nutritional deficiency worldwide. In addition to causing anemia, low iron levels in infants and children are linked to poor cognitive development and immune insufficiency. As such, iron supplementation is recommended during pregnancy, and researchers continue to investigate factors related to neonatal iron status. Scientists do not yet understand, however, the physiologic mechanisms regulating the transfer of iron from a pregnant mother to her fetus. This information is crucial to implementing dietary interventions to enhance iron nutriture of newborns. In a study published in the January 2012 issue of *The Journal of Nutrition*, a research team led up by Dr. Kimberly O'Brien at Cornell University studied whether variations in the hormone hepcidin might explain how much iron is transferred to the infant *in utero*. The hormone hepcidin, produced by the liver in response to iron excess, decreases dietary iron absorption. As such, most experts consider hepcidin to be the "master mind" in terms of orchestrating iron homeostasis. However, until this study was conducted, almost nothing was known about the role of hepcidin during pregnancy in humans.

Pregnant women were studied twice during their third trimester. On one day, subjects consumed a small amount of ground pork stably labeled with "heme" iron. On another day, they consumed the same amount of stably-labeled "non-heme" iron as ferrous sulfate (the same form found in prenatal supplements). Subjects were then followed until delivery, at which time a small sample of blood was taken from both the mother and the umbilical cord (representing infant blood). Measures of maternal and infant iron status were assessed (including hepcidin), as was the transfer of both forms of experimental iron from mother to infant.

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The results indicated that, compared to non-heme iron, heme iron is more efficiently transferred to the baby. Regardless of its form, however, the amount of iron transferred was inversely correlated with circulating levels of maternal hepcidin. Conversely, the amount of iron transferred was positively associated with infant iron status. Together, these results suggest that pregnant women with low iron stores are better able to transfer iron from either plant or animal sources to their developing fetuses than are their iron-sufficient counterparts. Further, animal-derived (heme) iron is more easily assimilated than that from plant-based sources. The authors conclude that maternal serum hepcidin and maternal/infant iron status may play important roles in modulating fetal uptake of iron. Further work is needed to understand how best to improve women's nutritional status during pregnancy to optimize neonatal iron stores at birth.

Reference Young MF, Griffin I, Pressman E, McIntyre AW, Cooper E, McNanley T, Harris ZL, Westerman M, O'Brien KO. Maternal hepcidin is associated with placental transfer of iron derived from dietary heme and nonheme sources. *Journal of Nutrition* 142:33-39, 2012.
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Controlled study finds consuming nopal, chia seeds, soy protein, and oats may help treat metabolic syndrome in Mexicans

The term *metabolic syndrome* describes a complex constellation of related conditions including elevated triglyceride levels, low high-density lipoprotein cholesterol (HDL-C), high blood sugar, hypertension, and abdominal obesity. Having this combination of physiologic risk factors significantly increases one's risk for several chronic diseases such as heart disease, stroke, and type 2 diabetes, the leading causes of death in many countries. Recent data collected by the U.S. Centers for Disease Control and Prevention estimate that about 35% of U.S. adults have metabolic syndrome, with the incidence quadrupling in individuals over the age of 60 years. Thus, finding ways to prevent and treat metabolic syndrome has become an important research topic worldwide. One approach to curbing this condition may be consumption of a diet rich in compounds that help regulate blood glucose, curb weight gain, and lower inflammation and oxidative stress. To test whether such a dietary pattern might be effective, a group of Mexican researchers studied the effects of a low-calorie diet supplemented with various functional foods common in the Mexican cuisine. You can read more about this study in the January 2012 issue of *The Journal of Nutrition*.

A total of 97 subjects (20-60 years of age) participated in this study; all were overweight or obese and had at least 3 criteria for metabolic syndrome. The study was conducted in two phases. In the first, subjects consumed a diet low in calories (500 kcal/day less than requirements), saturated fat, and cholesterol for two weeks. During the second phase, participants were randomly assigned to consume a beverage containing either (1) dehydrated nopal (prickly pear; shown to normalize blood sugar), chia seeds (high in omega-3 fatty acids), soy protein, and oats (collectively called the "dietary pattern") or (2) a calcium-rich placebo. These beverages were consumed twice daily for 2 months, during which time subjects continued to eat a reduced-calorie diet. Blood samples were collected at the beginning and end of the intervention period and analyzed for lipids, C-reactive protein (CRP; an inflammatory marker), and blood glucose. Blood pressure was also assessed.

As expected, subjects in both groups lost weight and body fat during the 2-month intervention. However, only subjects in the "dietary pattern" group experienced decreases in serum triglycerides, CRP, and blood glucose levels. The authors concluded that consumption of a diet high in nopal, chia seeds, soy protein, and oats may help treat metabolic syndrome. Importantly, these foods (which are common in the local cuisine) may be especially effective in Mexican populations.

About ASN

The American Society for Nutrition (ASN) is the preeminent professional organization for nutrition research scientists and clinicians around the world. ASN is dedicated to bringing together the top nutrition researchers, medical practitioners, policy makers and industry leaders to advance our knowledge and application of nutrition. Founded in 1928, ASN publishes *The American Journal of Clinical Nutrition* (AJCN), *The Journal of Nutrition* (JN), and *Advances in Nutrition* and provides a wide range of education and professional development opportunities to advance nutrition research, practice, and education. Visit ASN online at www.nutrition.org.

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Reference Guevara-Cruz M, Tovar AR, Aguilar-Salinas CA, Medina-Vera I, Gil-Zenteno L, Hernández-Viveros I, López-Romero P, Ordaz-Nava G, Canizales-Quinteros S, Pineda LEG, Torres N. A dietary pattern including nopal, chia seed, soy protein, and oat reduces serum triglycerides and glucose intolerance in patients with metabolic syndrome. *Journal of Nutrition* 142:64-69, 2012.
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Researchers review effects of algae-derived omega-3 fats on blood lipids

Cardiovascular disease is the leading cause of mortality in the United States, resulting in over 1.5 million deaths annually. Although the actual causes of cardiovascular disease are complex and multifactorial, alterations of blood lipid levels (dyslipidemia) are well recognized for placing individuals at increased likelihood of developing this condition. Consumption of long-chain, omega-3 fatty acids (also called n-3 fatty acids) such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from fish oil has been shown to help normalize dyslipidemia, thus decreasing one's risk. As such, the American Heart Association recommends that individuals without cardiovascular disease consume 2 servings of fish each week, contributing 0.25 g/d of EPA and DHA. Persons with cardiovascular disease are advised to consume even more. There is, however, some concern that both harvesting wild fish and raising fish via aquaculture may be ecologically unwise. Consequently, there is interest in whether consumption of omega-3 fatty acids produced by algae may have the same positive effect as fish oil on cardiovascular health. To help answer this question, researchers from the Cleveland Clinic, Harvard University, and Brigham and Women's Hospital reviewed the current body of scientific literature related this topic. Their conclusions can be found in the January 2012 issue of *The Journal of Nutrition*.

This study was conducted as a "meta-analysis," requiring the researchers to rigorously review all of the studies that had been published on the topic. Only randomized, controlled trials conducted between 1996 and 2011 were considered. Although 756 studies were initially identified, only 11 of them fit all of the researchers' criteria for inclusion; and all of these reports included only healthy individuals (persons without coronary artery disease). Relevant information, such as study design, sex distribution of participants, and dose of algal oil, was then extracted. In addition, the quality of each study, defined as the confidence that its design, conduct, analysis, and presentation limited bias in its results, was assessed using a validated scoring system. The collective information for all the studies was then evaluated to determine overall effects of algal oil consumption on blood lipid levels.

The results of the meta-analysis indicated that consumption of algal DHA (~1.68 g/d) lowers serum triglyceride levels while increasing both low-density lipoprotein cholesterol (LDL-C; "bad" cholesterol) and high-density lipoprotein cholesterol (HDL-C; "good" cholesterol) concentrations. Although lower triglyceride and LDL-C levels are associated with enhanced cardiovascular health, elevated LDL-C is linked with increased risk. As such, additional human intervention trials are needed to determine the long-term advantage (or disadvantage) of algal oil supplementation in terms of heart health.

Reference Bernstein AM, Ding EL, Willett WC, Rimm EB. A meta-analysis shows that docosahexaenoic acid from algal oil reduces serum triglycerides and increases HDL-cholesterol and LDL-cholesterol in persons without coronary heart disease. *Journal of Nutrition* 142:99-104, 2012.
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