



***The Journal of Nutrition* – September 2018  
Media Summaries**

The following articles are being published in the September 2018 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.

**Whole grains may be one of the most important food groups for the prevention of type 2 diabetes**

**Consuming iron-biofortified pearl millet improves both iron status and cognitive performance in Indian adolescents**

**Vitamin D status – Is there an association with early menopause?**

## Whole grains may be one of the most important food groups for the prevention of type 2 diabetes

Over the past 35 years, the prevalence of type 2 diabetes has steadily increased worldwide. Healthy lifestyle practices such as engagement in regular physical activity, abstaining from smoking, weight management, and consuming diets rich in whole grains are well associated with lower risk of type 2 diabetes. With respect to dietary practices, consumption of foods rich in whole-grains may be one of the most influential factors in diabetes prevention and management. Because whole grain foods differ in terms of nutrients, dietary fibers and bioactive components, the strength of this beneficial effect may vary according to the types whole grain food products consumed. A recent study conducted by Dr. Kyrø (Danish Cancer Society Research Center), Professor Landberg (Chalmers University of Technology) and colleagues, published in the September 2018 issue *The Journal of Nutrition*, addresses this important question – do whole-grain foods have similar protective effects on type 2 diabetes risk?

Data from the Danish Diet, Cancer, and Health cohort (55,465 participants aged 50-65 y at baseline), were utilized for this study. This large population-based prospective cohort utilized food frequency questionnaires to provide detailed information regarding dietary intake of whole-grain products. Measures of whole-grain consumption included whole-grain intake (grams per day), whole-grain types (wheat, rye, and oats; grams per day), whole-grain product intake (grams of product per day) and intake of whole-grain products (rye bread, whole-grain bread, and oatmeal/muesli). The National Diabetes Register was used to identify those that developed type 2 diabetes; 7417 cases identified during follow-up (15 y median).

The researchers reported that those with high whole-grain intakes (highest quartile compared to those in the lowest quartile) had lower risk of type 2 diabetes (34% and 22% lower risk of type 2 diabetes for men and women, respectively). Furthermore, consistent associations were found for all different cereals and whole-grain products tested with respect to lower risk of type 2 diabetes. This study provides further evidence of the robust association between diets rich in whole-grains and reduced risk of type 2 diabetes. The researchers concluded: “whole grains may be one of the most important food groups for the prevention of type 2 diabetes.”



**Reference** Kyrø C, Tjønneland A, Overvad K, Olsen A, Landberg R. Higher Whole-Grain Intake Is Associated with Lower Risk of Type 2 Diabetes among Middle-Aged Men and Women: The Danish Diet, Cancer, and Health Cohort. *Journal of Nutrition*.

2018: 1434-44, <https://doi.org/10.1093/jn/nxy112>

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## Consuming iron-biofortified pearl millet improves both iron status and cognitive performance in Indian adolescents.

Iron deficiency anemia, one of the most common diet-related micronutrient deficiency disorders, is particularly problematic in regions of the world where access to food and healthcare is limited. Chronic iron deficiency anemia can impair cognition, growth, and development in both children and adolescents. During pregnancy, impaired iron status increases risk of having low birth weight infants, which subsequently can compromise the health of future generations. In developed countries, a combination of dietary intervention and iron supplementation can effectively improve iron status. However, in impoverished regions of the world where iron deficiency anemia is most prevalent, these treatment options are largely unavailable. While food fortification efforts have been successful in many countries, those living in remote rural areas often have limited access to commercially fortified foods. Another approach, called nutrient biofortification, combats malnutrition by increasing the amounts of key essential micronutrients in staple foods either by plant breeding or mineral fertilization. To determine if iron status and measures of cognitive performance in school-going adolescents are positively affected by consumption of foods made with iron-biofortified pearl millet, Dr. Samuel Scott (The Pennsylvania State University) and colleagues (The Pennsylvania State University, The University of Oklahoma, Cornell University, and Shreemati Nathibai Damodar Thackersey Women's University, and International Food Policy Research Institute) conducted a 6-month randomized controlled efficacy trial.

Participants in this intervention study were Indian boys and girls (n=140) between the ages of 12-16 (y) from economically disadvantaged families and attending a rural boarding school. Study eligibility was based on overall health (absence of chronic disease or acute illness), not taking iron supplements or medications that interfere with iron absorption, and not severely anemic (hemoglobin < 8g/L). After baseline measures of iron status and cognitive function were obtained, children were randomly assigned to consume iron-biofortified or conventional pearl millet in the form of *bhakri* (a local flatbread consumed midday and evening) and *shev* (a savory snack). Measures were repeated at 6 mo and a total of 134 students completed the entire study (treatment = 88 and control = 52).

Compared with controls, participants consuming foods made with the iron-biofortified pearl milled had higher daily intakes of iron (19.6 vs. 4.8 mg/d). Those consuming foods made with iron-biofortified pearl millet had greater improvement in iron status compared to controls. Similarly, those in the treatment group had greater improvements in indices of reaction time, attention and memory compared with those consuming conventional pearl millet. The results of this study suggest that regular consumption of foods made with iron-biofortified food staples such as pearl millet offers a safe and effective means to ease the burden of iron deficiency anemia in poor, underserved regions of the world.



**Reference** Scott SP, Murray-Kolb LE, Wenger MJ, Udipi SA, Ghugre PS, Boy E, Haas JD. Cognitive Performance in Indian School-Going Adolescents Is Positively Affected by Consumption of Iron-Biofortified Pearl Millet: A 6-Month Randomized Controlled Efficacy Trial. *Journal of Nutrition*. 2018: 1462-71, <https://doi.org/10.1093/jn/nxy113>

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## Vitamin D status – Is there an association with early menopause?

Unlike other vitamins needed to keep us healthy, our bodies can make vitamin D. Sometimes considered to be a pro-hormone, vitamin D can be synthesized when skin is exposed to sunlight. However, vitamin D is also found in food, and is particularly abundant in fortified milk and other dairy products. The list of health benefits attributed to vitamin D is impressive, and includes reduced risk of bone loss (osteoporosis), type 2 diabetes, and certain types of cancer. Researchers now wonder if there is another possible health benefit associated with vitamin D – protecting ovaries from premature aging. Early menopause (cessation of ovarian function before 45 years of age) leaves women at greater risk for long-term health problems such as osteoporosis, cardiovascular disease, sleep disturbances, depression, anxiety, and memory loss. In addition to these adverse health outcomes, fertility drastically declines during the years leading up to early menopause, thus making it difficult for women to conceive. Approximately 10% of women experience early menopause, and some researchers believe that vitamin D may play a role. However, studies linking vitamin D status and accelerated ovarian aging have been inconclusive. A study conducted by Drs. Purdue-Smithe and Bertone-Johnson (University of Massachusetts), and colleagues (Harvard Medical School) provides further investigation as to whether there is an association between vitamin D concentrations and early menopause.

To evaluate the association between vitamin D status and risk of early menopause, researchers utilized data from the prospective Nurses' Health Study (NHS2). Questionnaires were used to collect information from female registered nurses (n = 29,611; sampled in 1996-1999) regarding lifestyle practices, medical conditions and menstrual history. Researchers used a nested case-control study design to evaluate associations of total vitamin D, free (unbound) vitamin D, and vitamin D-binding protein (VDBP) concentrations and risk of early menopause among NHS2 participants. Those experiencing natural menopause at age < 45 y (cases; n=328) were matched by age, smoking, parity, and other factors to those with menopause at age  $\geq$  48 y (controls; n=328).

Upon analysis, researchers did not find vitamin D concentrations (neither free nor total) to be associated with risk of early menopause. However, a modest positive association between high concentrations of VDBP (a multifunctional protein with vitamin D binding properties) and early menopause was observed, which may warrant further investigation. The researchers note that findings of an earlier study, which reported an inverse association of vitamin D intake from foods and risk of early menopause, might instead be explained by intake of other components of dairy foods, posing an interesting question to be answered with future research. Although vitamin D may not directly be associated with early menopause, its role in other aspects of reproductive health is indisputable.



**Reference** Purdue-Smithe AC, Whitcomb BW, Manson JE, Hankinson SE, Troy LM, Rosner BA, Bertone-Johnson ER. Vitamin D Status Is Not Associated with Risk of Early Menopause. *Journal of Nutrition*. 2018: 1445-52,

<https://doi.org/10.1093/jn/nxy129>

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