The Journal of Nutrition Media Alerts

The following articles are being published in the April 2017 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.

- Obesity, Mediterranean diet, and inflammation – how are they linked?
- Nordic and Mediterranean-type diets may benefit colorectal cancer survivors
- Higher dairy intake coupled with vitamin D supplementation associated with stronger bones in original Framingham cohort

Obesity, Mediterranean diet, and inflammation – how are they linked?

Cardiovascular disease is the number-one killer in most parts of the industrialized world. In the United States, heart disease is the primary cause of death for both men and women, and the US Centers for Disease Control and Prevention estimate that about 610,000 people die of heart disease every year - that’s 1 in every 4 deaths. In addition, stroke kills more than 130,000 Americans each year - that’s 1 out of every 20 deaths. Experts have long known about a multitude of cardiovascular risk factors, including being overweight, having high blood pressure, eating an unhealthy diet, and being physically inactive. Likely the most studied of these factors is diet – both what we eat and what we do not eat. Although the best diet likely depends on multiple factors, including the genes we inherit from our parents, it is clear that certain dietary patterns may be more beneficial than others. For instance, consuming a diet similar to that traditionally enjoyed around the Mediterranean Sea is associated with low risk of heart disease and stroke. In general, the Mediterranean diet emphasizes fruits, vegetables, fish, whole grains, limited meat, and healthy fats – with a healthy splash of wine. But it has been difficult for scientists to separate out potential direct benefits of the Mediterranean diet from the fact that obesity rates are low and physical activity high among people who eat it. Being able to do this is critical to understanding the true biology behind the association between diet and cardiovascular risk, and therefore what types of recommendations should be made to promote public health. To help disentangle these confounding factors, a research team led by Dr. Anwar T. Merchant (Arnold School of Public Health) and Dr. Yong-Moon Park (National Institute of Environmental Health Sciences) used a statistical technique referred to as “mediation analysis.” You can read more about their study and its findings in the April 2017 issue of The Journal of Nutrition.

The researchers were particularly interested in studying the possibility that consumption of a Mediterranean-like diet indirectly decreases inflammation and helps people regulate blood sugar via its direct impact on adiposity. To study this, they utilized data previously collected from 4700 healthy adults who had participated in the National Health and Nutrition Examination Survey between 1988 and 1994. Each person in the study had provided information about their typical dietary intake, and these patterns were given a score reflecting how well the foods fit a typical Mediterranean diet. Body weight and height were recorded, and blood samples were analyzed for substances related to blood sugar regulation and inflammation. Waist circumference, an indicator of abdominal obesity, was also measured.

As expected, study participants who consumed diets most similar to the Mediterranean pattern had the healthiest blood values, lowest risk for...
obesity, and smallest waist circumferences. Importantly, mediation analysis suggested that, in fact, the associations between diet and blood glucose as well as diet and inflammation could be explained by differences in waist circumference. Relationships with body mass index (weight divided by height squared) were not so strong. The researchers concluded that consumption of a Mediterranean-like diet might reduce insulin resistance and inflammation largely by reducing abdominal obesity (i.e., waist circumference). Understanding the physiology behind this finding will require further study.


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Nordic and Mediterranean-type diets may benefit colorectal cancer survivors

Of themany cancers affecting both men and women, colorectal cancer is the third most common type of cancer and the second leading cause of cancer-related death among Americans: over 136,000 people are diagnosed with colorectal cancer each year. Understandably, the majority of research conducted to date on this disease has focused on how to prevent and treat it. For instance, observational studies have suggested that risk for colorectal cancer may be lower in people who consume low levels of fat, red meat, refined sugar, and alcohol. Conversely, high intake of fiber, fruits, and vegetables may be protective. With increasing success in preventing and treating the disease, however, some researchers have begun to redirect their efforts toward finding ways to improve survival for people who have successfully completed colorectal cancer treatment. One such study, published in the April 2017 issue of *The Journal of Nutrition*, provides new evidence that diets featuring traditional Mediterranean or Nordic foods just might just fit this bill.

The study was led coordinately by Drs. Wolfgang Lieb and Sabrina Schlesinger (Christian-Albrechts-University of Kiel and Imperial College London). A total of 1404 adults who had been previously diagnosed with colorectal cancer were studied over a period of about 7 years. Diets were assessed using a food frequency questionnaire and categorized as to their resemblance to Mediterranean and Nordic consumption patterns. For instance, for the Mediterranean food intake pattern, diets higher in vegetables, fruits, nuts, legumes, cereals, and fish received a higher score and those with higher amounts of meat, poultry, and dairy foods a lower score. For the Nordic food intake pattern, diets high in cabbage, root vegetables, rye bread, oatmeal, apples, pears, fish, and shellfish got the highest scores. The researchers then investigated whether consumption of these two ethnic food patterns was related to the participants’ risk of death during the study.

Individuals who scored highest in terms of consuming a Mediterranean-like diet were 52% less likely to die during the study than those with the lowest scores. Similarly, consuming Nordic foods was associated with a 37% lower risk of death. The researchers concluded that consumption of either of these food patterns might improve survival in long-term survivors of colorectal cancer.


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Higher dairy intake coupled with vitamin D supplementation associated with stronger bones in original Framingham cohort

Maintaining a healthy skeleton as we age is important because weak and brittle bones can lead to more fractures, difficulty with mobility, and illness—all of which are associated with decreased quality of life and even early death. Many factors are related to risk of bone deterioration in older individuals, including unfortunate genetics and physical inactivity. But nutrition likely plays one of the most critical roles in this regard. For instance, because the bone’s architecture is largely composed of protein, consuming a diet with high-quality (complete) protein helps keep bones strong. In addition, getting adequate amounts of calcium and phosphorus is critical for maintaining bone density and strength. Vitamin D, which can be produced in the body if it is exposed to sufficient sunlight but is also found in
A limited number of foods, is also important because it stimulates dietary calcium absorption from the intestine. As such, protein- and mineral-rich dairy products, particularly if they are fortified with vitamin D, are generally considered some of the best foods to keep bones strong throughout the lifespan. In an article published in the April issue of *The Journal of Nutrition*, new research findings underscore the importance of vitamin D intake in terms of realizing the benefits of dairy intake on bone health in older individuals.

This research, led by Dr. Shivani Sahni (Institute for Aging Research, Hebrew SeniorLife, Israel Deaconess Medical Center, and Harvard Medical School), was one of the hundreds of projects associated with the Framingham Heart Study, initiated in 1948. This famous and important study, a joint project of the National Heart, Lung, and Blood Institute and Boston University, was originally designed to identify common lifestyle and biological factors contributing to cardiovascular disease by following its development over a long period of time in a large group of participants. Since its inception, however, the Framingham Study has expanded to explore many other conditions, including bone health and osteoporosis. Here, Dr. Sahni and colleagues report relationships among typical dairy food intakes, vitamin D supplementation, and changes in bone mineral density in a subset of the original Framingham participants now 67-93 years old.

When all the data were combined, the researchers found no association between dairy foods consumption and bone mineral density. However, when only vitamin D supplement users were included in the analysis, higher consumption of milk, yogurt, and cheese was in fact associated with denser bones. Higher dairy intake was also associated with lower risk of bone loss over the years. The researchers concluded that dairy intake remains important in maintaining bone health as we age, but the effects might only be realized if sufficient vitamin D is also consumed. Indeed, nutrients do not work by themselves in the body. Instead, many of them work in elegant and coordinated ways. This is one of the reasons why dietary variety is fundamental to optimal health.


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among the aliquots. There was significant variability in the concentration of all vitamins except for fat-adjusted vitamin A and E caused by the effects of circadian rhythm. Afternoon and evening breast milk samples were most representative of daily vitamin content. Supplementation induced an acute effect on the concentrations of thiamin, riboflavin, as well as vitamins B-6 and A between 2 and 4 hours after taking the vitamin. However, only 0.1 and 6.17% of the vitamins in the supplement were found to pass into the milk. The authors concluded that differences in vitamin content of breast milk from these Bangladesh mothers were small and that sampling milk from the afternoon or evening milk supply would provide the most representative vitamin content.

Reference

Food insecurity has a negative impact on subjective well-being among individuals, regardless of the income classification of the country where they reside

Quality of life is affected by multiple factors including physical health, psychological state, and relationships. Subjective well-being denotes satisfaction with one's life, and is one attribute contributing to individual perceptions of quality of life. Food insecurity is created through the lack of resources to acquire the desired quantity or quality of food. It includes components of food availability, access, utilization, and stability. Lack of quality food contributes to decrements in physical and psychological health, which would decrease the perceived quality of life. Globally, 805 million people are chronically undernourished, and are thus food insecure. However, it is not currently known if the associations between food insecurity and subjective well-being are similar throughout the world and across the 4 World Bank income classes of countries. The work published in the April issue of *The Journal of Nutrition* by Frongillo and colleagues addresses this question.

This study used data collected with an 8-item Food Insecurity Experience Scale (FIES) as part of the 2014 Gallup World Poll that was conducted in 147 countries. Phone interviews were conducted in 38 countries and face-to-face interviews were performed in 111 other countries with individuals that were over the age of 15. Well over 100,000 data points were available to assess daily experiences and indexes of well-being.

Food insecurity was associated with household income, shelter and housing, and employment status. When controlling for other measures of living conditions, food insecurity was associated with poor physical health and subjective well-being. The greatest association of subjective well-being with any factor measured was found for food insecurity. The association was found among individuals in all 4 World Bank income classes, with the greatest differences occurring in the higher-income classes. Data collected using the FIES was reliable at the country level, and had acceptable reliability at the individual level. The authors concluded these data suggest the FIES is a valid measure of food insecurity and the associations discovered using it support the expected negative impact that food insecurity has on subjective well-being.

Reference

Elevations in homocysteine induced by folate deficiency contribute to a positive feedback loop that promotes folate receptor expression

Folate deficiency is known to have a negative impact on fetal development. In addition, there is an increase in homocysteine levels with prolonged deficiency, and the combination can induce endothelial cell injury, inflammation and other negative health outcomes. Expression of folate receptor is elevated in response to folate deficiency; however, the mechanisms contributing to the upregulation of folate receptor α is not fully appreciated. Previous work suggests that homocysteine binds to heterogeneous nuclear ribonucleoprotein E1 (hnRNP-E1), effectively uncovering an mRNA binding site in hnRNP-E1. Binding of hnRNP-E1 with folate receptor a mRNA leads to an upregulation of these receptors expression. Once homocysteine binds to hnRNP-E1, it undergoes degradation with a half-life of 52 hours, indicating a need to synthesize new hnRNP-E1. It is not clear what regulates
the maintenance of hnRNP-E1 expression during periods of prolonged folate deficiency. A study conducted by Tang and colleagues addresses this void in our understanding of folate receptor expression regulators, and results of their work, along with a commentary by Mayanil are published in the April issue of The Journal of Nutrition.

Placental cells were cultured to determine if homocysteinylated hnRNP-E1 binds to hnRNP-E1 mRNA, and if this binding enhanced translation. Specificity of the proposed binding site was demonstrated by incorporating single nucleotide mutations in the putative binding sequences. The relevance of these outcomes were verified using an athymic mouse model in which HeLa tumor cells were implanted. Expression of both the folate receptor and hnRNP-E1 were monitored in the tumor xenografts developed in mice consuming a folate deficient diet.

The work demonstrated that elevated homocysteine levels led to a dose-dependent interaction between hnRNP-E1 and the hnRNP-E1 mRNA binding site. This interaction led to a proportional increase in the translation of hnRNP-E1 in placental cells. The approaches used to interfere with binding led to reduced synthesis of hnRNP-E1. Folate deficiency, in either placental cells or the mice, induced upregulation of both the folate receptor and hnRNP-E1. The authors concluded that these results demonstrate the presence of a positive feedback loop that amplifies transcription of hnRNP-E1 during prolonged folate deficiency in order to maximize folate receptor expression. Through this mechanism cells attempt to achieve more normal folate homeostasis.

Reference

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