

# ASN Publications

July 2016 Media Alert:  
*The Journal of Nutrition*

The following articles are being published in the July 2016 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.

[Evening exercise and a high-protein bedtime snack may support healthy aging](#)

[Halleluia! Drinking coffee associated with biomarker for longer life](#)

[Alternative Healthy Eating Index-2010 just as effective in predicting heart disease risk in Chinese as in US population](#)

## **Evening exercise and a high-protein bedtime snack may support healthy aging**

Due to advances in everything from food production to automobile safety, the average life expectancy for Americans is now nearly 80 years old. Consequently, understanding how best to enhance the quality of life as we age is more important than ever. One physiologic change that occurs as most people age is a loss of muscle mass, which can lead to weakness, falls, and hospitalization. As such, learning how to best maintain strong muscles is a focus for many clinicians, researchers, and older individuals. Recent studies have provided evidence showing the older population to be less sensitive to the anabolic properties of consuming a protein-containing meal, a phenomenon referred to as "anabolic resistance." In other words, whereas consuming a protein-rich meal signals muscle synthesis in young and middle-aged individuals, this happens less in the elderly. Studies show, however, that consuming protein before bedtime may be a nutritional intervention strategy that helps compensate for this anabolic resistance and, as such, supports muscle mass preservation. In a paper published in the July 2016 issue of *The Journal of Nutrition*, a research team led by Dr. Luc van Loon (Maastricht University) reports the results of a study in which they tested their hypothesis that adding moderate levels physical activity to one's evening routine can further augment the impact of pre-sleep protein consumption on overnight muscle protein synthesis in older males.

Their study was conducted as a randomized, controlled clinical intervention trial involving 23 healthy older men (mean age: 71 years). All of the subjects agreed to consume 40 grams of dairy-derived protein before going to sleep with or without having performed 1 hour of light exercise earlier that evening. By ingesting specifically produced intrinsically-labeled protein, the researchers were able to assess the impact of increased physical activity on muscle protein synthesis during overnight sleep.

Muscle protein synthesis rates were significantly higher in the men who both consumed the high-protein bedtime snack and exercised earlier that evening when compared to those who just consumed the pre-sleep snack, leading the research team to conclude that the combination of physical activity and pre-sleep protein ingestion may assist older

## Upcoming Events

**June 7-9.** [The Mary Frances Picciano Dietary Supplement Research Practicum](#). NIH campus, Bethesda, MD

**June 13-17.** [Short Course: The Mathematical Sciences in Obesity Research](#). University of Alabama at Birmingham

**July 19.** [JAM pre conference on gut microbiome](#).

Plans are underway for the 2016 Joint Annual Meeting to kick off with a pre-conference symposium on "Gut Microbiota, Diet, and Health." The all-day symposium will take place on Tues., July 19 in Salt Lake City, Utah. It will be hosted by ASAS and the American Society for Nutrition.

**July 25-29.** [Short Course: Strengthening Causal Inference in Behavioral Obesity Research](#). University of Alabama at Birmingham

## Journal Links

[The American Journal of Clinical Nutrition](#)

[The Journal of Nutrition](#)

[Advances in Nutrition](#)

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individuals to better preserve or increase their lean body mass.

**Reference** Holwerda AM, Kouw IWK, Trommelen J, Halson SL, Wodzig WKWH, Verkijk LB, van Loon LJC. Physical activity performed in the evening increases the overnight muscle protein synthetic response to presleep protein ingestion in older men. *Journal of Nutrition* 2016;146:1-8.

**For More Information** To contact the corresponding author, Dr. Luc van Loon, please send an e-mail to [l.vanloon@maastrichtuniversity.nl](mailto:l.vanloon@maastrichtuniversity.nl).

### **Halleluia! Drinking coffee associated with biomarker for longer life**

According to the US Department of Agriculture's Economic Research Service, the typical American adult consumes nearly 25 gallons of coffee each year. Indeed, coffee is the most widely consumed beverage worldwide, and although total consumption appears to be declining, total revenue from coffee sales continues to climb. Aside from its popularity as a morning starter and mid-day beverage, some researchers believe that coffee might actually be good for health, in large part due to its hefty complement of antioxidant compounds. Indeed, in many cultures, coffee is the primary source of dietary antioxidants which help protect cells from the damaging effects of free radicals and oxidation. A study published in the July 2016 issue of *The Journal of Nutrition*, provides evidence of this potential health benefit by investigating in 4780 US women the relationship between coffee consumption and telomere length, a biomarker of cellular aging.

The study was conducted by a team of researchers led by Dr. Immaculata De Vivo (Harvard University and Brigham and Women's Hospital) who were specifically interested in testing their hypothesis that women who consume the most coffee would show less evidence of oxidative stress than those consuming the least. Their measure of oxidative stress was telomere length in white blood cells. Telomeres are small segments of DNA found on the ends of chromosomes, and their length has been widely associated with increased longevity and lower risk of age-related chronic disease. In other words, longer telomeres are biomarkers for better overall health. For their study, the researchers investigated the association between coffee consumption (categorized as 0, <1, 1 to <2, 2 to <3, and  $\geq 3$  cups/day) and telomere length in women enrolled in the Nurses' Health Study, one of the world's largest prospective investigations into the risk factors for major chronic diseases in women.

After the data were adjusted for possible confounders (e.g., smoking), higher coffee consumption ( $\geq 2$  cups/day) was indeed associated with longer telomeres. This was particularly true for caffeinated coffee. The authors of the paper hope that future studies will be designed to delineate the physiologic mechanisms underpinning coffee's potential effect on telomere length because this information may help researchers discover new pathways by which drinking coffee influences health and wellbeing. In the meantime, don't hesitate to enjoy that second (or third) cup a joe.

**Reference** Liu JJ, Crous-Bou M, Giavannucci E, De Vivo I. Coffee consumption is positively associated with longer leukocyte telomere length in the Nurses' Health Study. *Journal of Nutrition* 2016;146:1-6.

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### **Alternative Healthy Eating Index-2010 just as effective in predicting heart disease risk in Chinese as in US population**

Heart disease remains the primary cause of death worldwide, and its risk is associated with a complex web of genetic and lifestyle factors, of which diet plays a prominent role. And although substantial research has been devoted to understanding how *individual* dietary factors, such as sodium and potassium, alter cardiovascular disease risk there is also growing evidence that dietary *patterns* might be at least as (if not more) important. This is because nutrients do not work in isolation, and the

to reach our membership.

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overall diet may be more important than the sum of its parts. As such, researchers have developed ways to score entire dietary patterns so that they can be studied in terms of relation to heart health. One such score, referred to as the Alternative Health Eating Index-2010, is based on the consumption of foods and nutrients predictive of low chronic disease risk, with higher scores being strongly associated with lower risk of major chronic disease including cardiovascular disease, diabetes, and certain forms of cancer in Americans. In a study published in the July 2016 issue of *The Journal of Nutrition*, Dr. Rob van Dam (National University of Singapore and National University Health System) asked whether this tool could also be used to assess dietary patterns of an adult Chinese population.

The researchers were particularly interested in whether a person's Alternative Health Eating Index-2010 score could predict risk of fatal and/or nonfatal acute myocardial infarction (heart attack). To do this, they used information collected previously in the Singapore Chinese Health Study, which followed a group of otherwise healthy Chinese adults for nearly 20 years during which time dietary patterns, illnesses, and death were recorded. Blood samples were collected and analyzed for biomarkers of cardiovascular disease, such as high-density lipoprotein cholesterol (HDL, the "good" cholesterol) and low-density lipoprotein cholesterol (LDL, the "bad" cholesterol). Diets were scored using the Alternative Healthy Eating Index-2010 system. Higher scores were assigned when a person's choices included more vegetables, fruits, whole grains, nuts and legumes, long-chain omega-3 fatty acids, and polyunsaturated fatty acids. Lower scores were assigned for high intakes of sodium, red meat, and sugar-sweetened beverages (including juices).

Study participants with the highest diet scores were 38% less likely to suffer an acute myocardial infarction during the study than those with the lowest scores, and 40% less likely to die from one. This finding didn't seem to be influenced substantially by other risk factors that the research team investigated. The researchers concluded that the Alternative Healthy Eating Index-2010 can be used for Asian populations as well as those consuming more western-style diets in terms of predicting risk for heart disease.

**Reference** Neelakantan N, Naidoo N, Koh W-P, Yuan J-M, van Dam RM. The Alternative Healthy Eating Index is associated with a lower risk of fatal and nonfatal acute myocardial infarction in a Chinese adult population. *Journal of Nutrition* 2016;146:1-8.

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#### ***The Journal of Nutrition: Editor's Picks***

[Not all snacking behaviors contribute to overweight conditions in US adolescents](#)

[Early life iron deficiency negatively impacts development in regions of the brain involved in learning and memory](#)

#### **Not all snacking behaviors contribute to overweight conditions in US adolescents**

*Obesity is a major health issue in the U.S., and the proportion of obese adolescents continues to increase. Development of effective counseling programs and public health strategies to address this problem is contingent upon understanding the factors contributing to obesity in our youth. Results from the study conducted by Larson and colleagues demonstrate how frequently adolescents participate in some form of snacking. The authors found that snacking behaviors were directly associated with reduced diet quality, such as reduced fruit and vegetable intake along with higher intake of energy dense foods including sugar sweetened beverages and fast foods. As anticipated, they discovered that consuming more energy dense snack foods was associated with a higher body mass index score. However, they also found that all other snacking*

*behaviors were associated with lower body mass index scores. The researchers concluded that snacking is a risk factor contributing towards poor diet quality, but that if snacks are not energy-dense foods they do not consistently contribute to overweight or obesity in U.S. adolescents.*

Prevention of obesity is a major challenge in the U.S., and both developing and targeting public health strategies to deal with this issue is critical. However, in order to design effective counseling programs and public health strategies we need greater understanding of the relationships among overall food intake, snacking behaviors, activity levels, intention to lose weight, and obesity. We know from multiple studies that a large proportion of adolescent dietary intake occurs with the consumption of foods and beverages during snacking. In fact, as much as 25% of the total energy intake for boys and girls from 12-19 is consumed as snacks. Yet, even with the existing literature, there remain gaps in our understanding of the underlying relationships between obesity and snacking behaviors. Larson and colleagues in the July 2016 issue of the Journal of Nutrition addressed this void in the literature by evaluating snacking behaviors in a large and ethnically diverse sample of adolescents.

Adolescents (n=2793, mean age of 14.4 years) involved in the EAT 2010 (Eating and Activity in Teens) study filled out classroom-administered surveys and food frequency questionnaires and were measured to collect physical data. The study population included students from 20 public middle and high schools located in ethnically and socioeconomically diverse communities. Approximately 71% of the participants qualified for school meal assistance and the population was about equally distributed between males and females and between ethnic/racial groups. The snacking behaviors studied included: 1) servings of energy-dense snack foods, 2) total number of snacks per day, 3) frequency of snacks prepared away from home, and 4) frequency of snacking while watching television.

Adolescents reported consuming 4 snacks per day, 2 servings of energy dense snack foods per day, and 3 snacks prepared away from home each week. A large proportion reported eating snacks while watching television with girls being more likely than boys to consume snacks while TV viewing. Black adolescents were more likely and Asian adolescents were less likely to snack while watching television than white adolescents. Not surprisingly, adolescents who were trying to lose weight snacked less. Fruit and vegetable intake was lower and consumption of sugar-sweetened beverages and fast foods was greater in adolescents who consumed more snacks. However, the researchers found that while adolescents who consumed more energy dense snack foods had a higher body mass index (BMI), those who ate more snacks including snacks away from home, did not have a higher BMI. The authors conclude from these observations that although snacking is a risk factor for a poor diet, that unless the snack foods are composed of energy dense foods, snacking does not consistently contribute to overweight in US adolescents.

**Reference** Larson NI, Miller JM, Watts AW, Story MT, Neumark-Sztainer DR. Adolescent snacking behaviors are associated with dietary intake and weight status. *Journal of Nutrition* 146:1-8, 2016.

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### **Early life iron deficiency negatively impacts development in regions of the brain involved in learning and memory**

*Brain growth and development occurs rapidly during the first year of life. Unfortunately, brain development can be impaired by iron deficiency and iron deficiency occurs in a large proportion of the world's population (~ 2 billion). Iron is necessary for energy metabolism, transmission of electrical signals, and formation of myelin that provides a protective external coating on nerves. The work reported in the current study used newborn piglets as a model of human brain development because the growth and development of the pig brain is similar to that of humans. They discovered that iron*

*deficiency has a negative impact on development of brain white matter regions, those known to be important for learning and memory. The authors conclude that early life iron deficiency negatively impacts the brain in a manner that may contribute to lasting deficits in cognitive ability.*

Iron deficiency occurs in nearly 2 billion people worldwide and is prevalent in both developing and industrialized nations. Children between birth and 5 years of age are most at risk of iron deficiency and its impact on health because of the rapid brain growth and development occurring at that time. The brain relies on iron for energy metabolism, transmission of electrical signals and the formation of myelin sheaths that develop around neurons. Disruption of normal neuronal development can lead to cognitive impairment and behavioral problems that can last throughout life. Prior work demonstrated that young adults whom were iron deficient infants had poor executive functions, pattern recognition, and math and writing abilities, as well as many other attributes we consider important for normal functioning. Leyshon and colleagues report in the July 2016 issue of the *Journal of Nutrition* on a study designed to evaluate the impact of iron deficiency on development of the white and gray matter regions of the brain and on brain metabolism using piglets. The piglet has similar growth and development patterns as humans, making them an effective experimental model to evaluate the impact of iron deficiency on brain development and function.

The experiment was conducted using male and female piglets that were assigned to either a control group that received a diet containing sufficient iron or a group provided a diet that contained only 10% of the iron in the control diet. Iron status was determined at postnatal ages of 1, 2, 3, and 4 weeks using blood samples. Brain area development was evaluated using magnetic resonance imaging (MRI) and brain metabolites were determined using magnetic resonance spectroscopy (MRS). Brain tissue samples were collected for histological analysis of the myelin coverings on neurons.

Hematocrit and hemoglobin were reduced in the piglets by 7 and 14 days of age, respectively. The analyses detected a significant reduction in the white matter present in several regions of the brain. The amount of gray matter was also affected, with some regions containing less and others containing more. Markers of microstructural integrity and health were also lower in some of the white matter regions. The detrimental effects on white matter development detected in the piglet brains are known to be important for learning and memory. The authors conclude from these data that early life iron deficiency negatively impacts brain development, and particularly so in white matter regions. They recommend continued work to identify effective therapies for iron repletion and recuperation of developmental losses caused by iron deficiency.

**Reference** Leyshon BJ, Radlowski EC, Mudd AT, Steelman AJ, Johnson RW. Postnatal iron deficiency alters brain development in piglets. *Journal of Nutrition* 146:1-8, 2016.

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