December 2016 Media Alert:
The Journal of Nutrition

The following articles are being published in the December 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.

Study finds intake of whole grains, but not fruit and vegetable, associated with lower risk for gum disease
Might your beverages impact risk of diabetes? New study suggests yes
Almonds - the next "super food?""

Study finds intake of whole grains, but not fruit and vegetable, associated with lower risk for gum disease

Periodontal disease, typically referred to as gum disease, is a potentially serious condition that can lead to infections and tooth loss. Common signs and symptoms include bad breath; red, swollen, or bleeding gums; painful chewing; tooth loss; sensitivity to heat or cold; and receding gums. Affecting nearly half of US adults, periodontal disease is more common as we age, in men, and those with lower incomes. The cause of gum disease is generally thought to be certain bacteria that live in the mouth. These micro-organisms produce a variety of substances that support the creation of plaque on teeth. Over time, plaque can promote inflammation around the gums and structures that support the teeth, so understanding factors that support healthy bacterial communities (rather than disease-promoting species) is relevant to oral health. In a paper published in the December 2016 issue of *The Journal of Nutrition*, researchers at the University of Pittsburgh, University of Puerto Rico, and National Institute of Dental and Craniofacial Research report their findings that consuming certain sources of dietary fibers (some of which are metabolized by bacteria in the gastrointestinal tract, including the mouth) may be related to a lower risk for periodontal disease in US adults.

This study was conducted using data collected in the National Health and Nutrition Examination Surveys (NHANES) between 2009 and 2012. A total of 6052 adult men and women were studied. Specifically, their consumption of whole grains, fruits, and vegetables (all good sources of fiber) was assessed using 24-hour dietary recall methodology, and periodontal disease was classified as severe, moderate, mild, or absent based on criteria supported by the Centers for Disease Control and Prevention (CDC) and the American Academy of Periodontology. Importantly, the researchers mathematically accounted for differences in sex, age, race and ethnicity, smoking, and income so that any relationships they uncovered between diet and gum disease could not be attributed to these potentially confounding variables.

Individuals consuming the lowest amounts of dietary fiber were 30% more likely to have moderate-to-severe periodontitis (inflammation causing gums to pull away from teeth) than those consuming the highest levels. This association appeared to be related to intake of whole grains, rather than from fruits and vegetables. The authors note that this is particularly interesting because whole grains also appear to be important for heart health-and other researchers have observed a relationship between gum disease and cardiovascular disease. As such,

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it is possible that whole grains may be an important lifestyle choice when it comes to lowering risks of both these chronic diseases. Whether this relationship is due to fiber or other nutrients in whole grains is yet to be determined, and this relationship and the potential interaction with the body's microbiome will require further study.

Reference

Nielsen SJ, Trak-Fellermeier MA, Joshipura K, Dye BA. Dietary fiber intake is inversely associated with periodontal disease among US adults. *Journal of Nutrition* 2016;146:2530-2536.

For More Information To contact the corresponding author, Dr. Samara Joy Nielsen, please send an e-mail to snielsen@pitt.edu.

Might your beverages impact risk of diabetes? New study suggests yes

Diabetes develops when the body is no longer able to use glucose (blood sugar) because either the pancreas stops making the hormone insulin, or cells which typically take up glucose from the blood stop responding to insulin's signal to do so. The latter situation is often referred to as 'insulin resistance' and can lead to type 2 diabetes which affects nearly 10% of the American population. Type 2 diabetes is particularly common in overweight and obese individuals, and its prevalence has dramatically increased over the last few decades. Many studies have shown that an unhealthy diet increases risk for type 2 diabetes, and some studies have particularly implicated sugar-sweetened beverages because they contribute excessive amounts of empty calories to the American diet. Meanwhile, some studies have also suggested that diet soda consumption may be statistically associated with greater insulin resistance, but these findings have been inconsistent. In an attempt to better understand this complex interaction, Dr. Nicola McKeown (USDA Human Nutrition Research Center on Aging at Tufts University) and colleagues analyzed data from the famous Framingham Heart study. Their study was published in the December 2016 issue of *The Journal of Nutrition*, and is described briefly here.

To test their overarching hypothesis that "long-term intake of sugar-sweetened beverages (but not diet soda) is associated with greater increases in insulin resistance and thus the development of prediabetes," they analyzed data collected from 1685 men and women over a period of about 14 years. Typical beverage consumption patterns were ascertained using multiple food frequency questionnaires. Onset of prediabetes and insulin resistance were determined via clinical examination, including measurements of fasting blood glucose and insulin concentrations.

After mathematically adjusting for a variety of potentially confounding variables such as body mass index (BMI, an indicator of body size), the researchers found that people who consumed the most sugar-sweetened beverages were the most likely to have developed prediabetes during the study. More specifically, people who drank the most had a 46% higher risk than did those consuming none. A similar deleterious relationship was observed between consumption of sugar-sweetened beverages and insulin resistance. Conversely, there was no discernable association between diet soda intake and prediabetes or insulin resistance. The scientists pointed out the observational nature of this study and whether the sugar-sweetened beverage relationship is driven by coincidence or causality needs to be elucidated in further studies.

Reference

Ma J, Jacques PF, Meigs JB, Fox CS, Rogers GT, Smith CE, Hruby A, Saltzman E, McKeown NM. Sugar-sweetened beverage but not diet soda consumption is positively associated with progression of insulin resistance and prediabetes. *Journal of Nutrition* 2016;146:2544-2550.

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Almonds - the next "super food?"

Nuts are a great source of many essential nutrients, including fiber, protein (and their constituent amino acids), healthy fats, and a host of vitamins and minerals. Indeed, nuts have likely been an important component of the human diet for millennia. Nonetheless, because they

are sometimes heavily salted and can contribute a substantial amount of calories when eaten in excess, nuts are sometimes considered to be more akin to snack foods rather than a staple food. Newly emerging evidence, however, suggests that nuts might play important roles in keeping us healthy. For instance, some studies suggest that eating nuts (particularly almonds, which have been extensively studied) helps people feel fuller for longer, therefore promoting smaller, less-frequent meals. Others have shown that the types of fats in almonds are especially helpful in terms of reducing body fat - particularly visceral fat which appears to be related to risk for heart disease. Almonds also contain relatively high levels of the amino acid arginine, which the body uses to produce nitric oxide - a substance critical for blood pressure regulation. In a study published in the December 2016 issue of *The Journal of Nutrition*, new research also suggests that inclusion of a modest amount of almonds in a typical weight-loss diet can increase the amount of fat a person loses and lower diastolic blood pressure.

The study, led by Dr. Richard Mattes (Purdue University), was carried out as a controlled, dietary intervention trial involving 86 healthy but overweight or obese adults who were randomized to consume one of two weight-loss diets: one containing 15% of its energy from almonds or one that had similar energy (calories) but no nuts. Weight-loss diets were consumed for 3 months. At the beginning and end of the study, a battery of outcomes was assessed including body weight and fat, blood pressure, waist circumference, blood lipids, serum glucose, and appetite.

Almond consumption (compared to eating no nuts) increased the amount of total and visceral body fat lost and resulted in a greater decrease in diastolic blood pressure, which is that experienced by blood vessels when the heart is at rest between beats. The researchers concluded that their findings lend credence to the possibility that moderate almond consumption may help reduce metabolic disease risk associated with obesity. Bring on the almonds!

Reference Dhillon J, Tan S-Y, Mattes RD. Almond consumption during energy restriction lowers truncal fat and blood pressure in compliant overweight or obese adults. *Journal of Nutrition* 2016;146:2513-2519.

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The Journal of Nutrition: Editor's Picks

Digital images improve estimation of portion sizes for many foods

Accurate estimations of intake are a critical element of conducting population-based studies that attempt to determine the relationship between diet and health. Portion size estimation remains problematic with current tools used to estimate intake. The automated self-administered 24-hour dietary recall system (ASA24) is a web-based tool that uses digital images to help responders estimate portion sizes. However, it is not known if this tool results in more accurate estimates than the automated multiple-pass method (AMPM) approach that relies on interviewer-assisted recalls. Work by Kirkpatrick and colleagues reported in the December 2016 issue of *The Journal of Nutrition* makes a direct comparison of the accuracy of portion size estimation between these two approaches.

Participants (n=81, 20-70 years old) for this study were identified from the Washington, DC area. The subjects were randomly assigned to complete either an ASA24 or AMPM recall the day after true intakes were measured for 3 meals. The two groups were matched by sex and age range. Results generated by the two reporting procedures were compared to the known portion sizes.

Differences between the true portion sizes and the ASA24 procedure were smaller than were obtained when the AMPM procedure was used. Approximately 92-100% of the estimates fell within the accepted limits

for agreement, with the category of food or drink as well as the recall procedure used, impacting the result. The AMPM procedure tended to overestimate portion sizes for most foods, with amorphous or soft foods, as well as those consumed in small quantities causing the greatest problems. In contrast, the ASA24 tended to underestimate portion sizes of some foods. The authors concluded that digital images used in these recall protocols should be tailored to the types and formats of foods if accurate estimates of portion sizes are to be obtained.

Reference

Kirkpatrick SI, Potischman N, Dodd KW, Douglass D, Zimmerman TP, Kahle LL, Thompson FE, George SM, Subar AF. The use of digital images in 24-hour recalls may lead to less misestimation of portion size compared with traditional interviewer-administered recalls. *Journal of Nutrition* 2016;146:2567-2573.

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Metabolic profiles of children with severe acute malnutrition remain different from controls even after nutritional stabilization

Marasmus and kwashiorkor, two forms of severe acute malnutrition (SAM), are still prevalent in the world. Over 18 million children suffer from these forms of malnutrition, and SAM contributes to approximately 45% of the deaths in children under 5 years of age. Mortality remains high for these children (10-30%), even for those who enter nutritional rehabilitation centers. Those who survive suffer from long-term impacts, such as growth and functional (physical and cognitive) deficits, and impaired cardiovascular capacity. There is limited information available to help understand the metabolic changes occurring with SAM. However, Di Giovanni and colleagues have started to address this void in our understanding by studying the metabolic profile of children with SAM and report their findings in the December 2016 issue of *The Journal of Nutrition*.

This observational study used children (9-59 months) undergoing in-patient treatment for SAM in Malawi. There were 21 admitted with kwashiorkor and 19 with marasmus that had medical complications that prevented their treatment as an outpatient. Outpatients were not included in the study, but community controls (n=157, 78 stunted and 79 non-stunted) were recruited from 6 villages. Blood was collected at the time of admission and 3 days after clinical stabilization of the SAM patients, as well as from the controls. The metabolomic analysis was conducted using mass spectrometry.

At the time of admission, the metabolic profile of the SAM patients with marasmus and with kwashiorkor differed, but after nutritional stabilization, there were no differences between the SAM patients. Most metabolites measured were lower in kwashiorkor patients, compared to those with marasmus. The metabolic differences indicate disturbances in metabolism of amino acids, acylcarnitines and phosphatidylcholines. The metabolic profile of SAM patients differed from the community controls at admission and after stabilization. The authors concluded that these observations indicate metabolic disturbances remain even though the patients were stabilized, which may explain the continued risk of mortality or other long-term consequences after release from the hospital.

Reference Di Giovanni V, Bourdon C, Wang DX, Seshadri S, Senga E, Versloot CJ, Voskuijl W, Semba RD, Trehan I, Moaddel R, Ordiz MI, Zhang L, Parkinson J, Manary MJ, Bandsma RHJ. Metabolomic changes in serum of children with different clinical diagnoses of malnutrition. *Journal of Nutrition* 2016;146:2436-2444.

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Seasonality of vitamin D concentrations is not associated with risk of influenza infections

Existing literature supports a role of vitamin D as a modulator of both the adaptive and innate immune systems. As such, vitamin D could be an important factor in the immune response to infections, such as influenza. Because vitamin D can be synthesized in vivo with sun

exposure, and thus there are seasonal variations in vitamin D levels, it is possible that lower vitamin D levels could contribute to seasonal patterns of influenza infections. To test this theory, Xu and colleagues determined vitamin D levels and confirmed influenza viral infections in children and adults in Hong Kong. The results of their study are reported in the December 2016 issue of *The Journal of Nutrition*.

This study was conducted using all inhabitants within 796 households (2690 adults and children). Each household included school-aged children, and the children were randomly allocated to receive a seasonal flu vaccine or placebo injection. Serum was collected just prior to vaccination, 1 month after vaccination and at the end of the study (~ 1 year). Daily records were used to monitor respiratory tract and systemic symptoms with follow up phone calls occurring every 2 weeks. Participants were asked to contact the research team in the event of symptoms so that nasal and throat swabs could be obtained to confirm influenza infections.

There were seasonal patterns in vitamin D levels, but they were not consistent with the seasonal pattern of influenza activity. Baseline vitamin D levels were not associated with influenza infections in the unvaccinated subjects. There was also no association between the baseline vitamin D levels and antibody titers before the influenza vaccinations or to the antibody response after receiving the vaccination. There was a tendency for low levels of vitamin D to be associated with influenza-like illnesses. The authors concluded that the seasonality of vitamin D levels are not associated with either the seasonality of or risk of acquiring influenza infections.

Reference Xu C, Fang VJ, Perera RAPM, Kam AM-S, Ng S, Chan Y-H, Chan K-H, Ip DKM, Peiris JSM, Cowling BJ. Serum 25-hydroxyvitamin D was not associated with influenza virus infection in children and adults in Hong Kong, 2009-2010. *Journal of Nutrition* 2016;146:2506-2512.

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