October 2016 Media Alert:
The Journal of Nutrition

The following articles are being published in the October 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 links consumption of an energy-dense diet to increased breast cancer risk
Complex sugar in breastmilk lowers bacterially-induced inflammation common in infants
Study finds more mental disorders in children whose families canâ€™t meet their food needs

Study links consumption of an energy-dense diet to increased breast cancer risk

Breast cancer is the most common type of cancer among US women, with nearly 245,000 new cases diagnosed and 40,000 resultant deaths occurring every year. Although the causes of breast cancer are inarguably complex, consuming a diet naturally high in fiber and water-including a variety of fruits and vegetables-may influence a woman's chances of being diagnosed during her lifetime. In addition, obese women are much more likely than healthy-weight women to develop the disease. However, it is difficult to separate out the independent effect of diet from that of obesity because the two are so inextricably linked. In other words, obese women tend to follow dietary patterns that are predictably different from those consumed by leaner women. However, in a study published in the October 2016 issue of *The Journal of Nutrition*, Dr. Terryl Hartman from Emory University (Atlanta) and colleagues utilized data from a very large cohort of postmenopausal women to mathematically separate out independent contributions of diet and obesity on breast cancer risk. Their findings suggest that, after controlling for a list of important confounding factors, women who consume diets with the highest levels of energy density (calories per gram of food) may be more likely than those who eat diets with the low energy densities to be diagnosed with breast cancer.
This study analyzed data from the Cancer Prevention Study (CPS)-II, a prospective cohort study initiated and maintained at the American Cancer Society. In 1999, approximately 57,000 breast-cancer-free postmenopausal women with an average age of 68 years completed a detailed survey documenting dietary and lifestyle characteristics. From these surveys, Hartman and her team estimated the energy density of each woman's diet. Breast cancer diagnosis was then assessed in each participant until 2011, and the probability of diagnosis during the study was related back to the energy density of each woman's dietary choices. The researchers found that, compared to those eating the least-energy-dense diets, women consuming diets with the highest energy densities were 20% more likely to be diagnosed with breast cancer during the study. This relationship did not seem to be modified by body mass index (an indicator of obesity), age, or physical activity level. The scientists posit that their findings support the importance of fruits and vegetables and other low-energy-dense foods that simultaneously support both a

Upcoming Events

September 16. Big Data, Consumer Technology, and the Obesity Epidemic: Emerging Science and Ethical Considerations. The New York Academy of Science in New York City.

September 27. Driving Action and Progress on Obesity Prevention and Treatment. National Academy of Sciences, Washington, D.C.

September 28-29. National Institutes of Health Iron Workshop.
Natcher Conference Center, National Institutes of Health, Bethesda, MD

September 29-30. 11th Annual Obesity Summit.
InterContinental Hotel, Cleveland, OH

October 3-4. The Probiotics Congress USA. San Diego Marriott La Jolla

October 3-4. The 4th Microbiome R&D and Business Collaboration Forum. San Diego Marriott La Jolla

November 11-12. International Symposium: Prevention Models of Obesity and Cardiovascular Diseases. Vienna, Austria

November 14-16. AICR 2016 Research Conference on Nutrition, Physical Activity, Obesity, and Cancer. North Bethesda, MD
Contact: research@aicr.org

November 29-December 2. Nutrition Society of Australia 40th Annual Sciencific Meeting.
Crown Melbourne, Australia

Journal Links

The American Journal of Clinical Nutrition

The Journal of Nutrition

Advances in Nutrition

healthy body weight and reduce the risk of breast cancer.

Reference

Hartman TJ, Gapstur SM, Gaudet MM, Shah R, Flanders WD, Wang Y, McCullough ML. Dietary energy density and postmenopausal breast cancer incidence in the Cancer Prevention Study II nutrition cohort. *Journal of Nutrition* 2016;146:2045-50.

For More Information To contact the corresponding author, Dr. Terryl Hartman, please send an e-mail to tjhartm@emory.edu.

Complex sugar in breastmilk lowers bacterially-induced inflammation common in infants

Breastfeeding (as opposed to formula feeding) provides partial protection against a variety of diseases during early life, including diarrhea caused by Campylobacter jejuni (C. jejuni). This is important, particularly in nonindustrialized regions of the world, because prolonged and repeated bouts of diarrhea can lead to severe dehydration, malnutrition, and even death. The mechanisms whereby breastfeeding helps prevent C. jejuni infection remain unclear, although immune cells and their products (e.g., antibodies) found in breastmilk may play a role. Human milk also contains a group of complex sugars, collectively called the human milk oligosaccharides (HMO), that seem to be important in this regard. One of the HMO referred to as 2'-FL (technically, 2'-fucosyllactose) may be particularly relevant, because higher levels of 2'-FL in a woman's milk has been associated with lower incidence of C. jejuni infection in her infant. This relationship has been difficult to study, however, because of course scientists cannot ethically infect infants with this pathogen and there exists no good animal model in which C. jejuni infection results in human-like diarrhea - at least until Dr. David Newburg and colleagues at Boston College and Virginia Polytechnic Institute and State University developed a complementary system of cultured cells and antibiotic-treated mice. You can read more about the potential of their approach for studying how 2'-FL influences infant health in the October 2016 issue of *The Journal of Nutrition*.

Newburg (who has been studying HMO for decades) and coworkers first investigated what happens when specialized cells isolated from the human cervix and intestine are infected with C. jejuni and treated with 2'-FL. They found that HMO treatment decreases infection rates and lowers inflammation in both cell types. Next they treated mice with a cocktail of antibiotics to remove practically all (or most) of the bacteria that typically reside in their gastrointestinal tracts, and investigated the effect of C. jejuni exposure with and without 2'-FL treatment on infection, diarrhea, and intestinal inflammation. As with their cell culture work, the research team found consistent, positive benefits of 2'-FL.

The scientists concluded that their findings not only provide a powerful new animal model in which effects of HMO on C. jejuni infection can be tested, but also powerful evidence that 2'-FL may be important in this regard. They urge additional studies designed to shed light on how this human milk constituent might be used to prevent and possibly treat C. jejuni infection in both animal models and, eventually, infants.

Reference Yu Z-T, Nanthakumar NN, Newburg DS. The human milk oligosaccharide 2'-fucosyllactose quenches Campylobacter jejuni-induced inflammation in human epithelial cells HEp-2 and HT-29 and in mouse intestinal mucosa. Journal of Nutrition *Journal of Nutrition* 2016;146:1980-90.

For More Information

To contact the corresponding author, Dr. David Newburg, please send an e-mail to dnewburg1@gmail.com.

Study finds more mental disorders in children whose families can't meet their food needs

Poverty is associated with a complex and interwoven web of negative outcomes, such as low dietary quality, increased rates of obesity, poor health, low levels of education, and high levels of stress. Rates of mental disorders are also higher in low-income communities, families, and individuals. What causes this is also multifaceted, but there is some evidence that poor nutrition may, at least in part, be to blame. This

Nutrition Today is a partner publication of ASN.

Media Requests

To arrange an interview with an ASN Spokesperson, please email media@nutrition.org

Archive of Press Releases

Advertise with ASN

Advertising opportunities with ASN include the ASN monthly e-newsletter, medical nutrition e-newsletter, on-site convention newspaper, and job board. Visit our advertising page to learn about all available opportunities to reach our membership.

Contact ASN

9211 Corporate Blvd.
Suite 300
Rockville, MD 20850
info@nutrition.org
240-428-3650

relationship may be especially important during childhood when nutrient requirements are relatively high and many mental disorders begin to manifest. To investigate this possibility, a research team led by Dr. Michael Burke (U.S. Department of Agriculture and University of South Carolina) analyzed a large, nationally-representative dataset obtained by interviewing parents of ~17,000 children (4-11 years old) and ~14,000 adolescents (12-17 years old) and their families. Their results, which show an association between rates of food insecurity and mental disorders in both groups, are published in the October 2016 issue of *The Journal of Nutrition* and described briefly here.

To test their hypothesis that more severe household food insecurity is associated with higher risk of mental disorders in children and adolescents, they used the National Health Interview Survey (NHIS) data collected between 2011 and 2014. Food insecurity is defined by the U.S. Department of Agriculture as the limited or uncertain availability of nutritionally adequate and safe foods, or limited or uncertain ability to acquire acceptable foods in a socially acceptable way. In particular, the researchers investigated whether variation in mental disorder risk was correlated with severity of household food insecurity. Importantly, they statistically controlled for a list of confounding variables including child's sex, caregiver's education level, race and ethnicity, and self-perceived health status, and family structure and income.

The researchers found that as severity of household food insecurity worsened, so did the chances of that household having a child or adolescent with a mental disorder. Compared with food-secure households, children and adolescents in extremely food insecure households were 255 and 344% more likely, respectively, to have a mental disorder. Burke and his team concluded that their results provide indirect evidence that improving household food security status may reduce mental disorders among youth in the U.S. However, correlation does not necessarily infer causality, so additional studies will be needed to determine if this association is actually causal in nature or due to other coincidental factors linked to both food security and mental health, such as exposure to violence.

Reference Burke MP, Martini LH, Çayir E, Hartline-Grafton HL, Meade RL. Severity of household food insecurity is positively associated with mental disorders among children and adolescents in the United States. *Journal of Nutrition* 2016;146:2019-26.

For More Information To contact the corresponding author, Dr. Michael Burke, please send an e-mail to michael.burke@fns.usda.gov.

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

Cellular aging is enhanced by processed meat, but not unprocessed red meat
New equations may permit measurement of vitamin A status in individuals and populations using a single blood sample

Cellular aging is enhanced by processed meat, but not unprocessed red meat

Chromosome ends contain telomeres, which are repetitive nucleotide sequences and during cell division telomere length become shorter. Therefore, it has been suggested that telomere length is a biomarker of cellular aging. Some studies have demonstrated an association between telomere shortening and cardiovascular disease and diabetes. The relationship between telomere length and various cancers are less clear, yet shorter telomeres have been associated with bladder, gastric, and ovarian cancer, to name a few. The data indicate that telomere length is influenced primarily by genetic factors, yet there is growing evidence to suggest that lifestyle factors capable of promoting oxidative stress and inflammation, such as diet, may also contribute to telomere shortening. Some studies have demonstrated an increase in oxidative stress and inflammatory markers with elevated intakes of processed meat. However, it was not known if consumption of processed meat would influence telomere length. Fretts and colleagues describe the relationship between consumption of processed and unprocessed red meat and telomere length in the October 2016 issue of *The Journal of*

Nutrition.
The study population was from the Strong Heart Family Study, which included 2846 individuals from 13 American Indian communities found in Arizona, North Dakota, South Dakota, and Oklahoma. This longitudinal, cross-sectional study was designed to identify genetic factors that influence cardiovascular risk in American Indians. Participants completed a 119-item Block Food-Frequency Questionnaire, which provided an estimate of past-year consumption of processed meat and unprocessed red meat. Blood samples were used to determine leukocyte telomere length.
The data suggest that after adjusting for age, sex, site, education, smoking, alcohol use, physical activity and other dietary factors there is a negative association between telomere length and processed meat consumption. Each additional serving of processed meat was associated with shorter telomeres in leukocytes. However, there was no association found between consumption of unprocessed red meat and telomere length in these subjects. The conclusions drawn by the authors are that consumption of processed meat may contribute towards several age-related diseases in part because of its impact on telomere maintenance.
Reference Fretts AM, Howard BV, Siscovick DS, Best LG, Beresford SAA, Mete M, Eilat-Adar S, Sotoodehnia N, Zhao J. Processed meat, but not unprocessed red meat, is inversely associated with leukocyte telomere length in the Strong Heart Family Study. *Journal of Nutrition* 2016;146:2013-18.
For More Information To contact the corresponding author, Amanda M. Fretts, please send an email to eamfretts@u.washington.edu.

New equations may permit measurement of vitamin A status in individuals and populations using a single blood sample

Vitamin A deficiency is the third most common nutritional deficiency in the world. Vitamin A is critical for vision, fetal development, and appropriate immune function. A variety of plant-based, food-based and supplementation approaches are employed to reduce vitamin A deficiency. Vitamin A can be provided as the preformed molecule in animal based foods or as the pre-cursor molecule ß-carotene. Determining whether populations or individuals are vitamin A replete or deficient is dependent upon blood levels that are then used in prediction equations to estimate vitamin A body stores. The equations currently used were developed in 1989 and include factors of absorption and retention, equilibration of isotopically labeled vitamin A in plasma, catabolism and the time after dosing of the isotope when the samples are collected. Two papers by Green and colleagues published in the October 2016 issue of *The Journal of Nutrition* attempt to improve upon the existing equations. Their goal was to increase the efficacy of deficiency detection in both populations and individuals, which would improve the targeting of supplementation and intervention strategies. The experiments utilized data collected during a 2-wk kinetic study that included young, healthy adults of European ancestry with moderate vitamin A intakes. The men and women participating in the study were provided a dose of isotopically labeled preformed vitamin A and a dose of labeled ß-carotene. Samples were collected at baseline, and at 2, 4, 6, 8, 10, and 12 hours after dosing, as well as at 1, 2, 7, and 14 days after dosing. Parameters included in the prediction equations were determined using a compartmental model.
Plasma levels of retinol-activity were accurately predicted using the equations developed. Importantly, vitamin A status was predictable for the mean of the group studied, as well as for the individuals. A simplified equation was developed that could be used to accurately predict the vitamin A status of an individual from a single sample collected at one time point (4 days after the dose was delivered). In addition, the group determined that the efficiency of ß-carotene conversion to vitamin A in this group was only 13.5%, which is much less than the values used by FAO/WHO and by the US National Academy of Medicine. Observations reported in these two papers led the authors to conclude that it is possible to accurately assess vitamin A status and efficacy in intervention studies using a single blood sample collected after a dose of the radiolabeled compounds. An editorial written by Quadro published in the

same issue raises the question of whether the new models and equations provided by the Green group may be a new "gold standard" for vitamin A assessment. Although Quadro agrees that the new information is significant in the advancement of the approaches used for this work, he did not conclude that the new methodologies reflect an end to the search for an optimal approach.

References Green MH, Ford JL, Green JB, Berry P, Boddy AV, Oxley A, Lietz G. A retinol isotope dilution equation predicts both group and individual total body vitamin A stores in adults based on data from an early postdosing blood sample. *Journal of Nutrition* 2016;146:2137-2142.

Green MH, Ford JL, Oxley A, Green JB, Park H, Berry P, Boddy AV, Lietz G. Plasma retinol kinetics and ÃY-carotene bioefficacy are quantified by model-based compartmental analysis in healthy young adults with low vitamin A stores. *Journal of Nutrition* 2016;146:2129-36.

For More Information To contact the corresponding author, Georg Lietz, please send an email to georg.lietz@ncl.ac.uk.

Quadro L. A gold standard to accurately assess vitamin A status: Are we there yet? *Journal of Nutrition 2016;*146:1929-30.

For More Information To contact the corresponding author, Loredana Quadro, please send an email to quardro@aesop.rutgers.edu.