



June 2023

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Dietary Patterns

Dietary Guidelines Meet NOVA: Developing a Menu for a Healthy Dietary Pattern using Ultra-Processed Foods

Julie M. Hess, Madeline E. Comeau, Shanon Casperson, Joanne L. Slavin, Guy H. Johnson, Mark Messina, Susan Raatz, et. al. *JNutr*. June 23, 2023. doi.org/10.1016/j.tjnut.2023.06.028. [Article link](#)

Significance: A proof of concept study found healthy dietary patterns can be developed with over 90% of energy source from UPF or NOVA 4 foods, with an HEI score of 86, and met adequate nutrient contents except for Vitamins D and E and Choline.

Background: A proposed topic for the 2025 Dietary Guidelines for Americans (DGA) Scientific Advisory Committee to address is the relationship between dietary patterns with ultra-processed foods (UPF) and body composition and weight status. Implementing the NOVA system, the most commonly applied framework for determining whether a food is “ultra-processed,” in dietary guidance could omit several nutrient-dense foods from recommended healthy diets in the DGA.

Objective: The purpose of this proof-of-concept study was to determine the feasibility of building a menu that aligns with recommendations for a healthy dietary pattern from the 2020 DGA and includes $\geq 80\%$ kcal from UPF as defined by NOVA. To accomplish this objective, we first developed a list of foods that fit NOVA criteria for UPF, fit within dietary patterns in the 2020 DGA, and are commonly consumed by Americans. We then used these foods to develop a 7-day, 2000 kcal menu modeled on MyPyramid sample menus and assessed this menu for nutrient content as well as for diet quality using the Healthy Eating Index-2015 (HEI-2015). **Results:** In the ultra-processed DGA menu that was created, 91% of kcal were from UPF, or NOVA category 4. The HEI-2015 score was 86 out of a possible 100 points. This sample menu did not achieve a perfect score due primarily to excess sodium and an insufficient amount of whole grains. This menu provided adequate amounts of all macro- and micronutrients except vitamin D, vitamin E, and choline. **Conclusions:** Healthy dietary patterns can include most of their energy from UPF and still receive a high diet quality score and contain adequate amounts of most macro- and micronutrients.

Carbohydrates

New Metrics of Dietary Carbohydrate Quality

Denise Tan, Adam Drewnowski, Kim-Anne Lê. *Curr Opin Clin Nutr Metab Care*. 2023 Jul 1;26(4):358-363. doi: 10.1097/MCO.0000000000000933. [Article link](#)

Significance: A new ratio-based carbohydrate quality scoring method built on high fiber and whole grain content and low free sugar content was proposed, enabling better identification of food products with higher nutritional quality, and associated with improved diet quality and health outcomes.

Purpose of Review: The aim of this study was to introduce novel metrics of dietary carbohydrates quality relevant for products and diets. **Recent Findings:** Carbohydrate quality has long been associated with a low glycemic index. More recently, novel metrics of carbohydrate quality featuring variations of total carbohydrates-fibers-free sugars ratios have been applied to carbohydrate-rich foods, including grains, beans, vegetables, and fruit. High scoring products had higher levels of health-promoting nutrients (protein, dietary fiber, iron, magnesium, zinc, potassium, selenium, and various B-vitamins) and lower levels of nutrients of public health concern (total sugar, added/free sugars, and fat profile). Cross-sectional studies also found variants of carbohydrate quality metrics to be associated with better markers of cardiometabolic disease, including lower levels of blood triglycerides:high-density lipoprotein cholesterol ratio, homeostatic model assessment of insulin resistance, and SBP. **Summary:** New ratio-based carbohydrate quality metrics are built around high fiber and whole grain content, combined with a low free sugar content. Such metrics allow the identification of food products of higher overall nutritional quality, and are associated with improved diet quality and certain health outcomes.

Protein

Perspective: Developing a Nutrient-Based Framework for Protein Quality

Shavawn M Forester, Emily M Jennings-Dobbs, Shazia A Sathar, Donald K Layman. *J Nutr.* 2023 Jun 8;S0022-3166(23)72409-7. doi: 10.1016/j.tjnut.2023.06.004. [Article link](#)

Significance: The essential amino acids 9 (EAA9) scoring framework has been validated against the PDCASS system and can be a valuable tool for protein quality assessment, having the advantage of being additive and personalization for age and metabolic conditions.

The future of precision nutrition requires treating amino acids as essential nutrients. Currently, recognition of essential amino acid requirements is embedded within a generalized measure of protein quality known as the PDCAAS (Protein Digestibility-Corrected Amino Acid Score). Calculating the PDCAAS includes the FAO/WHO/UNU amino acid score, which is based on the limiting amino acid in a food, that is, the single amino acid with the lowest concentration compared to the reference standard. That "limiting" amino acid score is then multiplied by a bioavailability factor to obtain the PDCAAS, which ranks proteins from 0.0 (poor quality) to 1.0 (high quality). However, the PDCAAS has multiple limitations: it only allows for direct protein quality comparison between 2 proteins, and it is not scalable, transparent, or additive. We therefore propose that shifting the protein quality evaluation paradigm from the current generalized perspective to a precision nutrition focus treating amino acids as unique, metabolically active nutrients will be valuable for multiple areas of science and public health. We report the development and validation of the Essential Amino Acid 9 (EAA-9) score, an innovative, nutrient-based protein quality scoring framework. EAA-9 scores can be used to ensure that dietary recommendations for each essential amino acid are met. The EAA-9 scoring framework also offers the advantages of being additive and, perhaps most importantly, allows for personalization of essential amino acid needs based on age or metabolic conditions. Comparisons of the EAA-9 score with PDCAAS demonstrated the validity of the EAA-9 framework, and practical applications demonstrated that the EAA-9 framework is a powerful tool for precision nutrition applications.

Nutritional Interventions: Dietary Protein Needs and Influences on Skeletal Muscle of Older Adults

Wayne W Campbell, Nicolaas E P Deutz, Elena Volpi, Caroline M Apovian. *J Gerontol A Biol Sci Med Sci.* 2023 Jun 16;78(Supplement 1):67-72. doi: 10.1093/gerona/glad038. [Article link](#)

Significance: A narrative review found that the nutritional needs and therapeutic use of protein to support muscle size and function in older adults may vary by quantity, quality and dietary pattern of protein intakes, depending on individual metabolic state, hormonal and health status.

Background: This narrative review describes foundational and emerging evidence of how dietary protein intakes may influence muscle-related attributes of older adults. **Methods:** PubMed was used to identify pertinent research. **Results:** Among medically stable older adults, protein intakes below the recommended dietary allowance (RDA) (0.8 g/kg body weight [BW]/d) exacerbate age-related reductions in muscle size, quality, and function. Dietary patterns with total protein intakes at or moderately above the RDA, including one or preferably more meals containing sufficient dietary protein to maximize protein anabolism, promote muscle size and function. Some observational studies suggest protein intakes from 1.0 to 1.6 g/kg BW/d may promote greater muscle strength and function more so than muscle size. Experimental findings from randomized controlled feeding trials indicate protein intakes greater than the RDA (averaging ~1.3 g/kg BW/d) do not influence indices of lean body mass or muscle and physical functions with non-stressed conditions, but positively influence changes in lean body mass with purposeful catabolic (energy restriction) or anabolic (resistance exercise training) stressors. Among older adults with diagnosed medical conditions or acute illness, specialized protein or amino acid supplements that stimulate muscle protein synthesis and improve protein nutritional status may attenuate the loss of muscle mass and function and improve survival of malnourished patients. Observational studies favor animal versus plant protein sources for sarcopenia-related parameters. **Conclusions:** Quantity, quality, and patterning of dietary protein consumed by older adults with varied metabolic states, and hormonal and health status influence the nutritional needs and therapeutic use of protein to support muscle size and function.

Low- and No-Calorie Sweeteners

Artificially Sweetened Beverages and Health Outcomes: An Umbrella Review

Cristina Diaz, Leandro F M Rezende, Angelo Sabag, Dong Hoon Lee, Gerson Ferrari, Edward L Giovannucci, Juan Pablo Rey-Lopez. *Adv Nutr.* 2023 Jul;14(4):710-717. doi: 10.1016/j.advnut.2023.05.010. [Article link](#)

Significance: ASBs intakes had been associated with a higher risk of obesity, T2D, all-cause mortality, hypertension, and cardiovascular disease incidence. A recent quality assessment of systematic reviews using AMSTAR-2 showed lack of clarity on funding sources, and predefined study protocols to guide authors. More cohort and clinical studies are needed to understand ASBs impact on health.

The consumption of artificially sweetened beverages (ASBs) is increasing in some countries. However, some meta-analyses have found that habitual consumers of ASBs (compared with low or no consumption) had an increased risk on some health outcomes. We performed an umbrella review of meta-analyses to grade the credibility of the evidence of claimed observational associations between ASBs and health outcomes. Data were searched in Web of Science, Embase, and PubMed for systematic reviews published up to 25 May 2022, examining association between ASBs and any health outcomes. Certainty of the evidence for each health outcome was obtained based on statistical results of tests used in umbrella reviews. The AMSTAR-2 tool (16 items) was used to identify high-quality systematic reviews. Answers of each item were rated as yes, no, or partial yes (for a partial adherence to the standard). We included data from 11 meta-analyses with unique population, exposure, comparison group, outcome obtained from 7 systematic reviews (51 cohort studies and 4 case-control studies). ASBs were associated with higher risk of obesity, type 2 diabetes, all-cause mortality, hypertension, and cardiovascular disease incidence (supported by highly suggestive evidence). Evidence for other outcomes (colorectal cancer, pancreatic cancer, gastrointestinal cancer, cancer mortality, cardiovascular mortality, chronic kidney disease, coronary artery disease, and stroke) was weak. Results of the quality assessment of systematic reviews using AMSTAR-2 showed some notable deficiencies: unclear sources of funding of eligible studies and lack of predefined study protocols to guide authors. The consumption of ASBs was associated with a higher risk of obesity, type 2 diabetes, all-cause mortality, hypertension, and cardiovascular disease incidence. However, further cohort studies and clinical trials in humans are still needed to understand the impact of ASBs on health outcomes.

Toxicological and Pharmacokinetic Properties of Sucralose-6-acetate and its Parent Sucralose: *In Vitro* Screening Assays

Susan S. Schiffman, Elizabeth H. Scholl, Terrence S. Furey, H. Troy Nagle. *Jrnl Tox & Env. Health.* 29 May 2023. doi.org/10.1080/10937404.2023.2213903. [Article link](#)

Significance: Recent studies using *in vitro* screening assays for toxicological and pharmacokinetic properties and effects on gene expression, found significant safety and health concerns for sucralose-6-acetate, and the potential impact on regulatory status.

The purpose of this study was to determine the toxicological and pharmacokinetic properties of sucralose-6-acetate, a structural analog of the artificial sweetener sucralose. Sucralose-6-acetate is an intermediate and impurity in the manufacture of sucralose, and recent commercial sucralose samples were found to contain up to 0.67% sucralose-6-acetate. Studies in a rodent model found that sucralose-6-acetate is also present in fecal samples with levels up to 10% relative to sucralose which suggest that sucralose is also acetylated in the intestines. A MultiFlow® assay, a high-throughput genotoxicity screening tool, and a micronucleus (MN) test that detects cytogenetic damage both indicated that sucralose-6-acetate is genotoxic. The mechanism of action was classified as clastogenic (produces DNA strand breaks) using the MultiFlow® assay. The amount of sucralose-6-acetate in a single daily sucralose-sweetened drink might far exceed the threshold of toxicological concern for genotoxicity (TTC_{genotox}) of 0.15 µg/person/day. The RepliGut® System was employed to expose human intestinal epithelium to sucralose-6-acetate and sucralose, and an RNA-seq analysis was performed to determine gene expression induced by these exposures. Sucralose-6-acetate significantly increased the expression of genes associated with inflammation, oxidative stress, and cancer with greatest expression for the metallothionein 1 G gene (MT1G). Measurements of transepithelial electrical resistance (TEER) and permeability in human transverse colon epithelium indicated that sucralose-6-acetate and sucralose both impaired intestinal barrier integrity. Sucralose-6-acetate also inhibited two members of the cytochrome P450 family (CYP1A2 and CYP2C19). Overall, the toxicological and pharmacokinetic findings for sucralose-6-acetate raise significant health concerns regarding the safety and regulatory status of sucralose itself.

Cognitive Health

A Combined DHA-rich Fish Oil and Cocoa Flavanols Intervention does not Improve Cognition or Brain Structure in Older Adults with Memory Complaints: Results from the CANN Randomized, Controlled Parallel-Design Study

David Vauzour, Andrew Scholey, David J White, Neal J Cohen, Aedín Cassidy, Rachel Gillings, Michael A Irvine, et. al. *AJCN*. 2023 Jun 12;S0002-9165(23)65970-2. doi: 10.1016/j.ajcnut.2023.06.008. [Article link](#)

Significance: A randomized placebo-controlled trial in older adults with impaired cognitive functions given DHA-rich fish oil (providing 1.1 g/d DHA and 0.4 g/d EPA) and a flavanol-rich dark chocolate (providing 500 mg/d flavan-3-ols) found no improvement of cognitive impairment after 12 months of intervention.

Background: There is evidence that both omega-3 long-chain PUFAs (EPA and DHA) and cocoa flavanols can improve cognitive performance in both healthy individuals and in those with memory complaints. However, their combined effect is unknown. **Objective:** To investigate the combined effect of EPA/DHA and cocoa flavanols (OM3FLAV) on cognitive performance and brain structures in older adults with memory complaints. **Methods:** A randomized placebo-controlled trial of DHA-rich fish oil (providing 1.1 g/d DHA and 0.4 g/d EPA) and a flavanol-rich dark chocolate (providing 500 mg/d flavan-3-ols) was conducted in 259 older adults with either Subjective Cognitive Impairment (SCI) or Mild Cognitive Impairment (MCI). Participants underwent assessment at baseline, 3 and 12 months. The primary outcome was number of false positives on a picture recognition task from the Cognitive Drug Research (CDR) computerized assessment battery. Secondary outcomes included other cognition and mood outcomes, plasma lipids, brain derived neurotrophic factor (BDNF) and glucose levels. A subset of 110 participants underwent structural neuroimaging at baseline and at 12-months. **Results:** 197 participants completed the study. The combined intervention had no significant effect on any cognitive outcomes, with the exception of reaction time variability ($p=0.007$), alertness ($p<0.001$) and executive function ($p<0.001$), with a decline in function observed in the OM3FLAV group (118.6 (25.3) at baseline versus 113.3 (25.4) at 12m for executive function) relative to the control, and an associated decrease in cortical volume ($p=0.039$). Compared with the control group, OM3FLAV increased plasma HDL-cholesterol, total-cholesterol ratio ($p<0.001$) and glucose ($p=0.008$) and reduced TG concentrations ($p<0.001$) by 3m which were sustained to 12m, with no effect on BDNF. Changes in plasma EPA and DHA and urinary flavonoid metabolite concentrations confirmed compliance to the intervention. **Conclusions:** These results suggest that co-supplementation with omega-3 PUFA and cocoa flavanols for 12 months does not improve cognitive outcomes in those with cognitive impairment.

Lipids

The Potential Cardiometabolic Effects of Long-Chain ω -3 Polyunsaturated Fatty Acids: Recent Updates and Controversies

Jae Hyun Bae, Hyunjung Lim, Soo Lim. *Adv Nutr*. 2023 Jul;14(4):612-628. doi: 10.1016/j.advnut.2023.03.014. [Article link](#)

Significance: This review provides current research updates on safety, benefits, and controversies surrounding cardiometabolic effects of long-chained omega-3 vs polyunsaturated fatty acids.

Various health-related effects of long-chain (LC) ω -3 PUFAs, EPA, and DHA have been suggested. LC ω -3 PUFAs reduce TG concentrations and have anti-inflammatory, immunomodulatory, antiplatelet, and vascular protective effects. Controversially, they might help in restoring glucose homeostasis via the gut microbiota. However, previous studies have not shown the clear benefits of LC ω -3 PUFAs for CVDs. REDUCE-IT and STRENGTH-representative randomized controlled trials (RCTs) that examined whether LC ω -3 PUFAs would prevent major adverse cardiovascular (CV) events (MACE)-showed conflicting results with differences in the types, doses, or comparators of LC ω -3 PUFAs and study populations. Therefore, we performed a meta-analysis using major RCTs to address this inconsistency and assess the clinical and biological effects of LC ω -3 PUFAs. We included RCTs that involved ≥ 500 participants with ≥ 1 y follow-up. Of 17 studies involving 143,410 people, LC ω -3 PUFA supplementation showed beneficial effects on CV death (RR: 0.94; 95% CI: 0.88, 0.99; $P = 0.029$) and fatal or nonfatal MI (RR: 0.83; 95% CI: 0.72, 0.95; $P = 0.010$). RCTs on EPA alone showed better results for 3-point MACE, CV death, and fatal or nonfatal MI. However, the benefits were not found for fatal or nonfatal stroke, all-cause mortality, and hospitalization for heart failure. Of note, studies of both the EPA/DHA combination and EPA alone showed a significant increase in risk of new-onset atrial fibrillation. Thus, well-designed studies are needed to investigate the underlying mechanisms involved in the distinct effects of EPA compared with DHA on cardiometabolic diseases. This review discusses the potential benefits and safety of LC ω -3 PUFAs from a cardiometabolic perspective focusing on recent updates and controversies.

Sodium

Dietary Sodium/Potassium Intake and Cognitive Impairment in Older Patients with Hypertension: Data from NHANES 2011-2014

Chengkun Kou, Xu Zhao, Xin Fan, Xin Lin, Qiongying Wang, Jing Yu. *J Clin Hypertens*. 2023 Jun;25(6):534-544. doi: 10.1111/jch.14667. [Article link](#)

Significance: A cross-section designed analysis of elderly subjects with hypertension from the 2011-2015 NHANES, found that both excessive and low sodium intakes were associated with impaired processing speed, attention sustainability, and working memory. No association was observed between dietary potassium intake and cognition.

This study aimed to assess the relationship between dietary sodium/potassium intake and cognition in elderly individuals with hypertension. We designed a cross-sectional study based on the 2011-2014 National Health and Nutrition Examination Survey (NHANES) 2011-2014. A multivariable-logistic regression analysis was performed to analyze the relationship between sodium/potassium intake and cognitive impairment. Restricted cubic spline (RCS) based on regression analysis to assess the nonlinear dose-response relationship between dietary sodium intake and cognitive performance. Out of the 2276 participants included in this study, 1670 patients had hypertension. Compared with the lowest quartile of dietary sodium intake, the lowest weighted odds ratio of cognitive impairment in DSST was observed in Q4 (OR = 0.45, 0.29-0.70), and a similar trend was observed in AFT (OR = 0.34, 0.18-0.65). After adjusting the covariates, the lowest weighted multivariable-adjusted OR of cognitive impairment in DSST were also observed in Q4 (OR = 0.47, 0.26-0.84) compared with the lowest quartile of dietary sodium intake. The RCS results showed that dietary sodium intake was U-shaped and associated with the risk of cognitive impairment in the DSST (Pnon-linearity = 0.0067). In addition, no significant association was observed between dietary potassium intake and different dimensions of cognitive performance. In conclusion, excessively high and low low dietary sodium were associated with impairment of specific processing speed, sustained attention, and working memory for elderly patients with hypertension in the United States. However, no association was observed between dietary potassium intake and cognition.

Gut Microbiome

Methods in Nutrition & Gut Microbiome Research: An American Society for Nutrition Satellite Session

Riley L. Hughes, Cara L. Frankenfeld, Daryl M. Gohl, Curtis Huttenhower, Scott A. Jackson, Doris Vandeputte, Emily Vogtmann, et. al. *Nutrients*, May 24, 2023, 15(11), 2451; doi.org/10.3390/nu15112451. [Article link](#)

Based on an IAFNS' [Gut Microbiome Committee](#) and ASN Oct. 13, 2022, scientific session.

Significance: This report summarized findings from a 2022 scientific workshop reviewing current methods in nutrition and gut microbiome research including best practices, tools and standards needed for comparability of methods and results. Learnings from this workshop will increase the accuracy, precision, and comparability of microbiome research and provide a deeper understanding of the associations between the human microbiome and health.

The microbial cells colonizing the human body form an ecosystem that is integral to the regulation and maintenance of human health. Elucidation of specific associations between the human microbiome and health outcomes is facilitating the development of microbiome-targeted recommendations and treatments (e.g., fecal microbiota transplant; pre-, pro-, and post-biotics) to help prevent and treat disease. However, the potential of such recommendations and treatments to improve human health has yet to be fully realized. Technological advances have led to the development and proliferation of a wide range of tools and methods to collect, store, sequence, and analyze microbiome samples. However, differences in methodology at each step in these analytic processes can lead to variability in results due to the unique biases and limitations of each component. This technical variability hampers the detection and validation of associations with small to medium effect sizes. Therefore, the American Society for Nutrition (ASN) Nutritional Microbiology Group Engaging Members (GEM), sponsored by the Institute for the Advancement of Food and Nutrition Sciences (IAFNS), hosted a satellite session on methods in nutrition and gut microbiome research to review currently available methods for microbiome research, best practices, as well as tools and standards to aid in comparability of methods and results. This manuscript summarizes the topics and research discussed at the session. Consideration of the guidelines and principles reviewed in this session will increase the accuracy, precision, and comparability of microbiome research and ultimately the understanding of the associations between the human microbiome and health.

Emerging Science Areas

Emerging Areas: Nutrition & Memory

Multivitamin Supplementation Improves Memory in Older Adults: A Randomized Clinical Trial

Lok-Kin Yeung, Daniel M Alschuler, Melanie Wall, Heike Luttmann-Gibson, Trisha Copeland, Christiane Hale, Richard P Sloan et. al. *AJCN*. 23 May 2023. DOI: 10.1016/j.ajcnut.2023.05.011. [Article link](#)

Significance: A randomized control trial study involving over 3,500 older adults from the Cocoa Supplement and Multivitamin Outcomes Study found that daily multi-vitamin supplementation improved memory performance above placebo by the equivalent of 3.1 years of age-related memory change measured by ModRey immediate recall.

Background: Maintenance of cognitive abilities is of critical importance to older adults, yet few effective strategies to slow cognitive decline currently exist. Multivitamin supplementation is used to promote general health; it is unclear whether it favorably affects cognition in older age. **Objectives:** To examine the effect of daily multivitamin/multimineral supplementation on memory in older adults. **Methods:** The COcoa Supplement and Multivitamin Outcomes Study Web (COSMOS-Web) ancillary study (NCT04582617) included 3,562 older adults. Participants were randomly assigned to a daily multivitamin supplement (Centrum Silver) or placebo and evaluated annually with an Internet-based battery of neuropsychological tests for 3 years. The prespecified primary outcome measure was change in episodic memory, operationally defined as immediate recall performance on the ModRey test, after 1 year of intervention. Secondary outcome measures included changes in episodic memory over 3 year of follow-up and changes in performance on neuropsychological tasks of novel object recognition and executive function over 3 years. **Results:** Compared with placebo, participants randomly assigned to multivitamin supplementation had significantly better ModRey immediate recall at 1 year, the primary endpoint ($t(5889) = 2.25$, $P = 0.025$), as well as across the 3 year of follow-up on average ($t(5889) = 2.54$, $P = 0.011$). Multivitamin supplementation had no significant effects on secondary outcomes. Based on cross-sectional analysis of the association between age and performance on the ModRey, we estimated that the effect of the multivitamin intervention improved memory performance above placebo by the equivalent of 3.1 year of age-related memory change. **Conclusions:** Daily multivitamin supplementation, compared with placebo, improves memory in older adults. Multivitamin supplementation holds promise as a safe and accessible approach to maintaining cognitive health in older age.

Engage with IAFNS

The Science and Implementation of the Low FODMAP Diet

July 12, 2023

Virtual, Event

This webinar will delve into the 3 phases of the FODMAP diet, provide helpful hints for success, grocery shopping tips and also particular nutrients that may be of concern with long-term implementation.

[Read more.](#)

Optimizing Cognitive Function with Foods, Nutrients and Dietary Patterns: The Science and the Translation

August 8, 2023

Virtual, Event

The 2020 Dietary Guidelines Advisory Committee (DGAC) addressed several questions related to neurocognition but was faced with “considerable variation in testing methods, inconsistent validity and reliability of cognitive testing methods, and differences between dietary patterns and cognitive outcomes examined,” precluding the ability to develop dietary recommendations. This webinar will focus on the science and translation of optimizing cognitive function with food.

[Read more.](#)

What's In Food? How USDA's FoodData Central and the Global Branded Food Products Database Supports Nutrition Research

August 30, 2023

Virtual, Event

The USDA Global Branded Food Products Database (GBFPD) is a component of USDA's FoodData Central and the result of a Public-Private Partnership between USDA, IAFNS, GS1 US, 1WorldSync, NielsenIQ Label Insight and the University of Maryland.

[Read more.](#)