

November 2024

www.iafns.org



Carbohydrates

Are People Consuming the Diets They Say They Are? Self-Reported vs Estimated Adherence to Low-Carbohydrate and Low-Fat Diets: National Health and Nutrition Examination Survey, 2007-2018

 This research was supported by the IAFNS [Carbohydrates Committee](#)

Corina Kowalski, Dakota Dustin, Alaa Ilayan, LuAnn K. Johnson, Martha A. Belury, Zach Conrad. *JAND*, Nov. 2024. doi.org/10.1016/j.jand.2024.07.006. [Article link](#)

Background; Mischaracterization of dietary intake by patients and study participants is a common problem that presents challenges to clinical and public health approaches to improve diet quality, identify healthy eating patterns, and reduce the risk of chronic disease. **Objective:** This study examined participants' self-reported adherence to low-carbohydrate and low-fat diets compared with their estimated adherence using up to 2 24-hour recalls. **Design:** This cross-sectional study acquired data on dietary intake from respondents in the National Health and Nutrition Examination Survey, 2007-2018. **Participants/Setting:** This study included 30 219 respondents aged 20 years and older who had complete and reliable dietary data and were not pregnant or breastfeeding. **Main Outcome Measures:** The main outcome was prevalence of self-reported and estimated adherence to low-carbohydrate or low-fat diet patterns. **Statistical Analyses Performed:** Self-reported adherence to low-carbohydrate or low-fat diets was evaluated using responses to questionnaires. Estimated adherence to these diets was assessed using data from up to 2 24-hour recalls and usual intake methodology developed by the National Cancer Institute. **Results:** Of the 1.4% of participants who reported following a low-carbohydrate diet, estimated adherence (<26% energy from carbohydrates) using 24-hour recalls was 4.1%, whereas estimated adherence among those that did not report following a low-carbohydrate diet was <1% (P value for difference = .014). Of the 2.0% of participants who reported following a low-fat diet, estimated adherence (<30% energy from fat) was 23.0%, whereas estimated adherence among those who did not report following a low-fat diet was 17.8% (P value for difference = .048). **Conclusions:** This research demonstrates that most individuals mischaracterized their diet pattern when compared with up to 2 24-hour recalls. These findings emphasize the need for clinicians and public health professionals to be cautious when interpreting individuals' self-reported diet patterns and should aim to collect more detailed dietary data when possible.

Low Carbohydrate Diets, Glycaemic Control, Enablers and Barriers in the Management of Type 1 Diabetes: A Mixed Methods Systematic Review

Janine Paul, Rati Jani, Sarah Thorning, Mila Obucina, Peter Davoren & Catherine Knight-Agarwal. *Diabetology & Metabolic Syndrome*, Vol. 16, Article: 261, 2 Nov. 2024. doi.org/10.1186/s13098-024-01496-5. [Article link](#)

Background: Medical nutrition therapy is fundamental for diabetes management, however there is a lack of evidence supporting an ideal recommended carbohydrate intake for maintaining optimal glycaemia in individuals living with type 1 diabetes (T1D). Adults with T1D are increasingly drawn to very low carbohydrate (≤ 50 g/day or $< 10\%$ total energy intake) and low carbohydrate diets (< 130 g/day or $< 26\%$ total energy intake) because of the reported positive impact on both physical health and psychological well-being. Current evidence regarding the effectiveness on glycaemia and the lived experience by adults with T1D when using these diets is limited. This mixed methods systematic review was undertaken to examine the effectiveness of very low and low carbohydrate diets on HbA1c and explore the lived experience of adults with T1D who have followed these dietary regimens. **Methods:** Seven databases (MEDLINE, Embase, CINAHL, Cochrane CENTRAL, Informit Health Collection, Web of Science, and PsycInfo) were searched from inception to 1 October 2023. Quality assessment of the included studies was undertaken using the JBI's critical appraisal checklists. Separate quantitative and qualitative synthesis was performed, and findings were integrated for the purpose of comparison and complementarity. **Results:** Seventeen studies of varying methodologies were included. Findings from quantitative research were inconclusive in determining the effectiveness of very low and low carbohydrate diets on HbA1c levels. Qualitative data synthesis identified four themes [1) Motivation to follow the diet, 2) Health benefits of the diet, 3) Challenges of the diet, and 4) Limited information (participants knowledge, information sources) about the diet] that influenced adherence to very low and low carbohydrate diets. Through the integration of results from selected studies, it was evident that there were conflicting outcomes between quantitative and qualitative studies. **Conclusions:** There is little evidence to indicate that very low and low carbohydrate diets improve HbA1c in adults with T1D. However, this goes against the reported lived experiences of participants. This review highlights the insufficiency of robust evidence on this topic. Future research involving larger participant samples over longer durations are needed to provide more definitive evidence in relation to the efficacy of these diets and into the enablers and barriers experienced when using a very low or low carbohydrate diet in order to provide support to adults with T1D.

Dietary Patterns

What are Healthy Diets? Joint Statement by the Food and Agriculture Organization of the United Nations and World Health Organization

WHO Publication, 2024. ISBN: 978-92-4-010187-6. [Article link](#)

Healthy diets promote health, growth and development, support active lifestyles, prevent nutrient deficiencies and excesses, communicable and noncommunicable diseases, foodborne diseases and promote wellbeing. The exact make-up of a diet will vary depending on individual characteristics, preferences and beliefs, cultural context, locally available foods and dietary customs. However, the basic principles of what constitutes healthy diets remain the same. In this document the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) have formulated principles of what constitute healthy diets, underpinned by guidelines and other normative elements developed by the two Organizations. The principles provide the basis for the design of policies aimed at improving diet and for the assessment of the healthiness of diets.

Protein

Effects of Extracted Pulse Proteins on Lipid Targets for Cardiovascular Risk Reduction: Systematic Review and Meta-Analysis of Randomized Controlled Trials

Shuting Yang, Songhee Back, Shannan M. Grant, Sabrina Ayoub-Charette, Victoria Chen, Erika J. Lin. *Nutrients*, 1 Nov. 2024, 16(21), 3765. doi.org/10.3390/nu16213765. [Article link](#)

Background: Many clinical practice guidelines recommend dietary pulses for the prevention and management of cardiovascular disease and diabetes. The impact of extracted pulse proteins remains unclear. We therefore conducted a systematic review and meta-analysis of randomized controlled trials of the effect of extracted pulse proteins on therapeutic

lipid targets. **Methods and Findings:** MEDLINE, Embase, and the Cochrane Library were searched through April 2024 for trials of ≥ 3 -weeks. The primary outcome was low-density lipoprotein-cholesterol (LDL-C). The secondary outcomes were other lipid targets. Independent reviewers extracted data and assessed the risk of bias. Subgroup analyses included by pulse type and the certainty of evidence was assessed using GRADE. **Results:** Seven included trials (14 trial comparisons, $n = 453$) with a median of 4-weeks duration and dose of 35 g/day showed that extracted pulse proteins decreased LDL-C by -0.23 mmol/L (95% confidence interval: -0.36 to -0.10 mmol/L, $p < 0.001$). Similar effects were observed for non-high-density lipoprotein-cholesterol and apolipoprotein B. No interactions were found by pulse type. Subgroup analyses revealed effect modification by sex, with greater proportions of females seeing greater reductions. GRADE was generally moderate. **Conclusions:** Extracted pulse proteins likely result in moderate reductions in LDL-C and other lipid targets. Future studies on various types of extracted pulse proteins including assessments by sex are warranted.

Refining Ounce-Equivalents Using the EAA-9 Approach for Protein Scoring and Dietary Guidance

Shavawn M. Forester, Emily M. Reyes, Donald K. Layman. *JAND*, Nov. 26, 2024. [Article link](#)

Background: The USDA Protein Food Ounce-equivalents are designed to identify plant sources of protein foods and provide serving size substitutions. While the ounce-equivalent concept is simple, it fails to generate equivalent exchanges for protein or essential amino acids (EAAs). **Objective:** To accurately define the EAA content of USDA protein food ounce-equivalents, to develop a more accurate food exchange list, and to evaluate the EAA-9 protein quality framework as a tool for determining precise EAA-equivalent substitutions. **Design:** The USDA National Nutrient Database (SR Legacy) and the EAA-9 protein quality model were used to evaluate the validity of the USDA Protein Food ounce-equivalents for creating equivalent protein and EAA substitutions. The EAA-9 framework then established EAA-9 Equivalence serving sizes to meet EAA requirements. **Main Outcomes:** EAA composition in protein foods was assessed. EAA-9 Equivalence servings were developed. **Analysis Performed:** EAA composition was calculated for USDA protein food ounce-equivalents. EAA-9 scores were calculated for protein foods and compared using an egg's EAA composition as a standard. MyPlate Kitchen Recipes were used to apply USDA protein food ounce-equivalent exchanges and EAA-9 equivalence servings. **Results:** The USDA protein food ounce-equivalents are not equivalent in protein or EAAs with the disparity ranging from one ounce-equivalent of chicken breast with 9.1 g of protein and 4.0 g of EAAs to one ounce-equivalent of almonds with 3.0 g of protein and 0.9 g of EAAs. Using the USDA serving of one egg as a standard for comparing protein food groups, less than 15% of beans, peas, and lentils and 0% of nuts and seed ounce-equivalents achieve the EAA composition of an egg. EAA-9 Equivalence servings are truly equivalent, with each serving providing a reliable and interchangeable protein source. The EAA-9 Equivalence servings have been calculated and are now available for all USDA SR Legacy foods with a complete EAA profile, offering a resource for exchanges that ensure EAA requirements are met. **Conclusions:** Creating ounce-equivalent substitutions for protein foods requires creating food exchanges that assure EAA requirements are met. The USDA Protein Food ounce-equivalents provide inadequate guidance for balancing EAA requirements.

Food Classification

The Critical Need for a Robust Research Agenda on Ultra-Processed Food Consumption and Cancer Risk

Erikka Lofffield, Steven C. Moore, Susan T. Mayne. *PLoS Medicine*, Nov. 19, 2024. doi.org/10.1371/journal.pmed.1004482. [Article link](#)

Ultra-processed food consumption has increased worldwide, but associations with cancer risk remain unclear and potential underlying mechanisms are speculative. A robust, multidisciplinary, research agenda is needed to address current research limitations and gaps.

Food Processing According to the NOVA Classification is Not Associated with Glycemic Index and Glycemic Load: Results from an Analysis of 1995 Food Items

Anthony J Basile, Anaissa Ruiz-Tejada, Alex E Mohr, Angel C Morales, Ellinor Hjelm, Jennie C Brand-Miller, Fiona S Atkinson, et. al. *AJCN*, Vol. 120, Issue 5. Nov. 2024. doi.org/10.1016/j.ajcnut.2024.08.024. [Article link](#)

Background: Ultraprocessed foods (UPFs) comprise most calories in the United States diet. Glycemic index (GI) and glycemic load (GL) are measures of the quality and quantity of carbohydrates in food based on their effect on postprandial blood glucose. Diets high in UPFs and GI/GL are associated with chronic metabolic diseases but the relationship between

them is unclear. **Objectives:** Our objective was to examine the GI and GL of foods assigned to NOVA food processing groups. We hypothesized that GI and GL would be lowest in minimally processed foods (MPFs) compared to processed food (PRF) and UPF (with no difference between PRF and UPF). **Methods:** GI and GL values produced by healthy individuals for 1995 food items were collated from published sources. Food items were manually coded by processing levels according to NOVA classification. In addition, as the effects of processing on glycemic potential may vary between types of foods, food items were coded into 8 groups (beans, nuts, and seeds; beverages; dairy; fats and sweets; fruit; grains; fish, meat, and poultry; and vegetables). Multilevel linear modeling was used to determine significance with an α value of 0.05. **Results:** The effect of food processing on GI and GL was contrary to our hypothesis as means did not differ significantly across processing levels: GI—MPF: 54.1 ± 19.5 , PRF: 53.2 ± 18.9 , UPF: 49.3 ± 18.1 ($P = 0.712$); GL—MPF: 17.1 ± 10.3 , PRF: 15.8 ± 12.4 , UPF: 11.5 ± 7.9 ($P = 0.890$). Within food groups, there was no significant association between processing level and GI ($P = 0.184$), but GL was inversely associated with grains and vegetables ($P < 0.001$). **Conclusions:** Across analyzed foods, GI and GL do not differ between processing levels, whereas GL was lower in ultraprocessed grains and vegetables than MPF. Any potential adverse outcomes associated with UPF are unlikely to be related to effects on glycemia.

Low- and No-Calorie Sweeteners

A Receptor-Based Assay to Study the Sweet and Bitter Tastes of Sweeteners and Binary Sweet Blends: The SWEET Project

Christine Belloir, Mathilde Jeannin, Adeline Karolkowski, Corey Scott, Loïc Briand. *Chemical Senses*, 8 Nov. 2024. doi.org/10.1093/chemse/bjae041. [Article link](#)

Sweeteners are used in the food industry to provide sweetness similar to sugar and to decrease the caloric intake and risks associated with obesity. However, some sweeteners are characterised by bitter, metallic and other off-tastes. Sensory and cellular studies have demonstrated synergies between sweetener blends, which are responsible for enhancing sweetness. This study aimed to identify new sweetener blends that are able to enhance sweetness intensity without causing bitter off-taste using in vitro functional expression of taste receptors. The dose-response of the sweet taste receptor (TAS1R2/TAS1R3) was determined for sucrose and 9 sweeteners and was consistent with their sweetness potency. Stimulation of TAS1R2/TAS1R3 by 6 binary sweetener blends confirmed 3 known synergies determined by sensory analysis, including sucralose/acesulfame-K, rebaudioside A/erythritol and rebaudioside A/thaumatococin, and revealed 2 new synergies, known as, neotame/D-allulose and mogrosin V/thaumatococin. No synergy was observed for the rebaudioside M/mogrosin V blend, probably due to their common binding sites on the sweet taste receptor. The ability of the 9 selected sweeteners to activate the 25 human bitter taste receptors (TAS2Rs) was tested. The cellular based assay demonstrated that sucralose, acesulfame-K, rebaudioside A, mogrosin V and D-allulose activated at least 2 TAS2Rs. Sucralose, acesulfame-K and rebaudioside A exhibited lower EC50 values for TAS1R2/TAS1R3 than for TAS2Rs, which may explain their absence of bitter off-taste at low concentrations, unlike mogrosin V and D-allulose. Our data provide a receptor-based understanding of the complex synergies among sweetener blends and an effective approach for testing new sweeteners while avoiding the activation of TAS2Rs.

Cognitive Health

Association of Dietary Choline Intake with Incidence of Dementia, Alzheimer's Disease and Mild Cognitive Impairment: A Large Population-Based Prospective Cohort Study

Ying-ying Niu, Hao-yu Yan¹, Jian-feng Zhong, Zhi-quan Diao, Jing Li, Cheng-ping Li, Lian-hong Chen. *AJCN*, 7 Nov. 2024. DOI: 10.1016/j.ajcnut.2024.11.001. [Article link](#)

Objective: Explore the associations between dietary choline intake and the incidence of dementia, Alzheimer's disease (AD), mild cognitive impairment (MCI), and current cognitive performance in the UK Biobank cohort. **Methods:** Dietary choline intake was categorized into quartiles of consumption based on 24-hour dietary recalls, with units expressed as milligrams per day. Diagnoses of dementia, AD, and MCI were identified using ICD-9/10 codes. Current cognitive performance was assessed via the computerized touchscreen interface. After adjusting for sociodemographic factors, dietary and lifestyle behaviors, and comorbid conditions, Cox proportional hazards regression, logistic regression, and restricted cubic splines were used to analyze the association between choline intake and dementia or cognitive performance

Results: Among 125,594 participants (55.8% female), with a mean age of 56.1 years (range: 40 to 70 years) at baseline, and a median follow-up of 11.8 years, 1,103 cases of dementia (including 385 AD) and 87 cases of MCI were recorded. U-shaped associations were observed between choline intake and dementia and AD. Participants in the 2nd quartile of total choline intake had lower risks compared to those in the lowest quartile, with HR of 0.80 (95% CI: 0.67, 0.96) for dementia and 0.76 (0.58, 1.00) for AD. Moderate intake of choline derivative, including free choline (HR, 0.77; 95%CI, 0.65, 0.92), phosphatidylcholine (0.82; 0.68, 0.98), sphingomyelin (0.82; 0.69, 0.98) and glycerophosphocholine (0.83; 0.70, 1.00), were associated with a 17% to 23% lower odds of dementia. Additionally, moderate total choline intake was associated with an 8% to 13% lower odds of poor cognitive performance in visual attention (OR, 0.92; 95%CI, 0.86, 0.99), fluid intelligence (0.87; 0.82, 0.92), and complex processing speed (0.90; 0.84, 0.95). **Conclusions:** In conclusion, our findings suggest that moderate dietary choline intake, ranging from 332.89 mg/d to 353.93 mg/d, is associated with lower odds of dementia and better cognitive performance.

Lipids

Triglyceride-Rich Lipoproteins Cholesterol, 10-years Atherosclerotic Cardiovascular Disease Risk and Risk of Myocardial Infarction and Ischemic Stroke

Yi-Ping Jia, Jia-Min Wang, Jie-Qiong Lyu, Huan-Huan Yang, Meng-Yuan Miao, Xiaowen Wang, Zhong-Xiao Wan. *Jrnl. Lipid Res.* Vol. 65, Issue 11, Nov. 2024, 100653. doi.org/10.1016/j.jlr.2024.100653. [Article link](#)

Triglyceride-rich lipoproteins cholesterol (TRLs-C) has been associated with atherosclerotic cardiovascular disease (ASCVD), even among individuals with low-density lipoprotein cholesterol in the targeted range. We assessed the associations of TRLs-C with myocardial infarction (MI) and ischemic stroke (IS) and compared the associations with those for other traditional lipids (i.e., triglycerides and non-high-density lipoprotein cholesterol [non-HDL-C]). Included were 327,899 participants from the UK Biobank who were free of MI or IS and did not receive lipid-lowering treatment at baseline. Ten-year risk for ASCVD was estimated by the Pooled Cohort Equations and was grouped as low (<7.5%), intermediate (7.5% to <20%), and high risk ($\geq 20\%$). Multivariable Cox regression models were used to examine the associations of TRLs-C, triglycerides, and non-HDL-C with risk of MI and IS, overall and by the 10-years risk categories. During a median of 12.3 years of follow-up, 8,358 incident MI and 4,400 incident IS cases were identified. After multivariable adjustment, higher TRLs-C was associated with a higher risk of MI (p-trend <0.0001) but not IS (p-trend = 0.074), with similar associations for triglycerides and non-HDL-C. There were interactions between TRLs-C and 10-years ASCVD risk on risk of MI (p-interaction <0.0001) and IS (p-interaction = 0.0003). Hazard ratios (95% CIs) of MI comparing the highest with the lowest quartiles of TRLs-C were 2.10 (1.23–1.30) in the low-risk group, 1.52 (1.38–1.69) in the intermediate-risk group, and 1.22 (1.03–1.45) in the high-risk group. The corresponding estimates for IS were 1.24 (1.05–1.45), 0.94 (0.83–1.07), and 0.83 (0.67–1.04), respectively. Similar interactions with the 10-years ASCVD risk were observed for triglycerides and non-HDL-C on risk of MI and for triglycerides on risk of IS. Elevated levels of TRLs-C (or triglycerides or non-HDL-C) are associated with a higher risk of developing MI and IS (except non-HDL-C) predominantly among individuals who are typically classified as being low-risk. These findings may have implications for more detailed risk stratification and early intervention.

Sodium

Estimated Health Effect, Cost and Cost-Effectiveness of Mandating Sodium Benchmarks in Australia's Packaged Foods: A Modelling Study

Matti Marklund, Kathy Trieu, Leopold N Aminde, Linda Cobiac, Daisy H Coyle, Liping Huang, Bruce Neal, et. al. *The Lancet Public Health*, Vol. 9, Issue 11, Nov. 2024. doi.org/10.1016/S2468-2667(24)00219-6. [Article link](#)

Background: Excess dietary sodium is a leading cause of death and disability globally. Because packaged foods are a major source of sodium in many countries, including Australia, mandatory limits for sodium might improve population health. We aimed to estimate the long-term health and economic effect of mandating such thresholds in Australia. **Methods:** We used a multiple cohort, proportional, multistate, life table model to simulate the effect of mandating either the WHO global sodium benchmarks or the currently non-mandatory Australian Healthy Food Partnership (HFP) sodium targets. We compared maintaining the current sodium intake status quo with intervention scenarios, using nationally representative data on dietary intake, sodium in packaged foods, and food sales volume. Blood pressure and disease burden data were obtained from the Global Burden of Diseases, Injuries, and Risk Factors Study. The effect of sodium reduction on blood pressure and disease

risk was modelled on the basis of meta-analyses of randomised trials and cohort studies. Intervention and health-care costs were used to calculate the incremental cost per health-adjusted life-year (HALY) gained. Costs and HALYs were discounted annually at 3%. **Findings:** Compared with the status quo intervention, mandating the WHO benchmarks could be cost saving over the first 10 years (AUD\$223 [95% uncertainty interval 82–433] million saved), with 2743 (1677–3976) cardiovascular disease deaths and 43 971 (26 892–63 748) incident cardiovascular disease events averted, and 11 174 (6800–16 205) HALYs gained. Over the population's lifetime, the intervention was cost effective (100.0% probability). Mandating the HFP sodium targets was also estimated to be cost effective (100.0% probability), but with 29% of the health benefits compared with the WHO benchmarks. **Interpretation:** Our modelling study supports mandating sodium thresholds for packaged foods as a cost-effective strategy to prevent death and disease in Australia. Although making Australia's voluntary reformulation targets mandatory might save thousands of lives, mandating the WHO global benchmarks could yield substantially greater health gains

Gut Health

Associations Between Dietary Fibers and Gut Microbiome Composition in the EDIA Longitudinal Infant Cohort

Marianne K. Lalli, Tuuli E.I. Salo, Leena Hakola, Mikael Knip, Suvi M. Virtanen, Tommi Vatanen. *AJCN*, 15 Nov. 2024. DOI: 10.1016/j.ajcnut.2024.11.011. [Article link](#)

Background: The infant gut microbiome undergoes rapid changes in the first year of life, supporting normal development and long-term health. While diet shapes this process, the role of fibers in complementary foods on gut microbiome maturation is poorly understood. **Objectives:** We explored how the transition from human milk to fibers in complementary foods shapes the taxonomic and functional maturation of the gut microbiome within the first year of life. **Methods:** We assessed the longitudinal and cross-sectional development of infant gut microbiomes (N=68 infants) and metabolomes (N=33 infants) using linear mixed models to uncover their associations to dietary fibers and their food sources. Fiber intakes were assessed with 3-day food records (months 3,6,9,12) relying on CODEX-compliant fiber fraction values, and questionnaires tracked the overall complementary food introduction. Bacterial species were identified and quantified via MetaPhlan2 from metagenomic data, and metabolomic profiles were obtained using four LC-MS methods. **Results:** We identified 176 complementary food fiber-bacterial species associations. First plant-based fibers associated to microbiota compositions similar to breastfeeding, and further associated with aromatic amino acid metabolites, including 5-hydroxyindoleacetic acid (Total dietary fiber - Complementary foods (g) – $\beta=3.50$, CI 2.48–4.52, $p=6.53 \times 10^{-5}$). Distinct fibers from different food categories showed unique associations with specific bacterial taxa. Key species such as *Faecalibacterium prausnitzii*, associated with oat fibers (g/MJ, $\beta=2.18$, CI 1.36–2.84, $p=6.12 \times 10^{-6}$), reflective of maturing microbial communities. Fiber intake during weaning associated with shifts in metabolite profiles, including immunomodulatory metabolites, with fiber effects observed in a source- and timing-dependent manner, implicated in gradual microbiome diversification. **Conclusions:** Introducing complementary dietary fibers during the weaning period supports gut microbiome diversification and stabilization. Even minor dietary variations showed significant associations with microbial taxa and functions from the onset of weaning, highlighting the importance of infant dietary recommendations that support the gut microbiome maturation during early life.

Emerging Science Areas

Emerging Areas: Nutrition

Adipose Tissue Retains an Epigenetic Memory of Obesity after Weight Loss

Laura C. Hinte, Daniel Castellano-Castillo, Adhideb Ghosh, Kate Melrose, Emanuel Gasser, Falko Noé, Lucas Massier, et. al. *Nature*, Nov. 2024. doi.org/10.1038/s41586-024-08165-7. [Article link](#)

Reducing body weight to improve metabolic health and related comorbidities is a primary goal in treating obesity. However, maintaining weight loss is a considerable challenge, especially as the body seems to retain an obesogenic memory that defends against body weight changes. Overcoming this barrier for long-term treatment success is difficult because the molecular mechanisms underpinning this phenomenon remain largely unknown. Here, by using single-nucleus RNA sequencing, we show that both human and mouse adipose tissues retain cellular transcriptional changes after appreciable weight loss. Furthermore, we find persistent obesity-induced alterations in the epigenome of mouse adipocytes that negatively affect their function and response to metabolic stimuli. Mice carrying this obesogenic memory show accelerated

rebound weight gain, and the epigenetic memory can explain future transcriptional deregulation in adipocytes in response to further high-fat diet feeding. In summary, our findings indicate the existence of an obesogenic memory, largely on the basis of stable epigenetic changes, in mouse adipocytes and probably other cell types. These changes seem to prime cells for pathological responses in an obesogenic environment, contributing to the problematic 'yo-yo' effect often seen with dieting. Targeting these changes in the future could improve long-term weight management and health outcomes.

Emerging Science Area: Bioactives

An Upcycled Dietary Fiber Rich in Bioactives from Hemp Hulls Supports Digestive Comfort in Healthy Adults: Randomized, Placebo-Controlled Trial

B. Jan-Willem van Klinken, Christopher R. D'Adamo, Emily K. Pauli, Swati Kalgaonkar. *Bioactives Compounds in Health & Disease*. Vol. 7 No. 12 (2024) Dec. doi.org/10.31989/bchd.v7i12.1505. [Article link](#)

Background: Dietary fiber is a key component of a health-promoting diet, and it is acknowledged as a short-fall nutrient in most Western diets. Some sources of dietary fiber, such as hemp hull fiber, also include inherent small molecule bioactive that further promote health and well-being. While dietary fiber is a key component that supports digestive health, certain types of fiber can cause digestive discomfort. Digestive symptoms such as gas, bloating, belly pain, and the resulting decrease in digestive quality of life are common among adults. **Objective:** The aim of this study was to evaluate changes in digestive comfort, after consuming a proprietary dietary fiber supplement from hemp hull to a dietary fiber supplement made from inulin in individuals who currently experience digestive discomfort. **Methods:** This study was a completely virtual, double-blind, placebo-controlled, randomized clinical trial of healthy adults. The parallel arm study tested two fiber supplements at a practical dose yielding a "Good Source of Fiber" based on United States Dietary Reference Intakes (2.8 grams of fiber per day) and a digestible control (Maltodextrin) for six weeks. The study is registered at ClinicalTrials.gov: NCT06009614. **Results:** Five hundred seventy-nine randomized participants provided follow-up outcomes data. Digestion-associated quality of life questionnaire, belly pain, and gas and bloating scores were assessed and found to be superior after hemp hull fiber intake compared to inulin intake at multiple time points ($p < 0.05$). **Conclusion:** This study demonstrated that a practical dose of bioactive-rich fiber from hemp hull is well-tolerated, provides superior digestive comfort relative to both placebo and inulin fiber, and can aid in reaching total fiber intake goals.

Engage with IAFNS

IAFNS Science Innovation Showcase

December 10-12, 2024, Virtual Event

This science-first and science-focused event will bring together scientists from multiple sectors, at all stages of their careers. Attendees will have the opportunity to engage in dialogue and discussion on the data, the technology and science being applied across the food and beverage ecosystem. Join us to learn about next generation possibilities!

[Register here](#)

Working Group on Food Classification – Dialogue on the Codex Process with US Delegates to CCNFSDU and CCFL

January 13, 2025, Virtual Event

IAFNS will host two US Delegates to the Codex Committee on Nutrition & Foods for Special Dietary Use and the Codex Committee on Food Labeling.

[Learn more](#)



<https://www.linkedin.com/company/iafns-science>



<https://www.youtube.com/@IAFNS/videos>



www.iafns.org