IAFNS Working Group on Food Matrix Effects
Request for Pre-Proposals
November 2023

Evidence Map of the Relationship Between Processing-Induced Changes to the Food Matrix and Mechanisms Impacting Weight

The Institute for the Advancement of Food and Nutrition Sciences (IAFNS) is a non-profit, 501(c)(3) scientific organization that pools funding from industry collaborators and advances science through the in-kind and financial contributions from public and private sector participants.

The IAFNS Working Group on Food Matrix Effects enables stakeholders in the food & beverage ecosystem to focus on identifying the distinct impacts of processing and/or formulation (and any interactions) on specific validated biomarkers and health outcomes.

IAFNS adheres to rigorous procedures to maintain scientific integrity in all work we support. These requirements are described further in the attached TOP Guidelines and 9 Guiding Principles for Scientific Integrity addendums.

Pre-proposals meeting the following criteria may be invited to submit a full proposal (which would include detailed research plans that reflect the work to be completed, a budget, and timeline).

1. Team composed of persons with demonstrated expertise in food science, technology, and/or food development, and strong relevant publication record.

2. Rigorous and transparent research approach addressing the research objective.

3. Rough cost estimate and realistic timeframe.

Background
As obesity rates in the US continue to rise (CDC, 2023) bringing a concomitant increased risk of related non-communicable diseases (type 2 diabetes, metabolic syndrome, other adverse cardiometabolic outcomes), the search for causal mechanisms persists. Although there is general agreement that causes of obesity are complex, hypotheses around the role of certain industrially-processed foods and excess energy intake have been most recently highlighted.
Such foods have been termed “highly” or “ultra-processed” and are most commonly categorized using the NOVA (not an acronym) system (Pereira de Araujo et al. 2022).

Purported characteristics of some industrially-processed (specifically classified as “highly” or “ultra”-processed) foods that are associated with adverse health outcomes such as weight gain include changes to the food matrix. In a recent cross-sector roundtable organized by USDA, participants agreed that “research is needed to understand if changes in the food matrix affect digestive and metabolic responses as a food moves along the continuum from minimally processed to ultra-processed” (O’Connor et al. 2023).

Valicenti et al. (2023) conducted a scoping review of hypothesized mechanisms underlying the relationship between foods classified as NOVA 4 (ultra-processed) and weight-related outcomes. Several of the reported mechanisms may be altered by how or the degree to which food is processed, e.g. the ‘food matrix’ may be changed. To build clarity around the role of food matrix changes (due to industrial processing) in excess energy intake and weight, there is an opportunity to characterize the publicly available information related to these mechanisms. Food matrix has been defined as the chemical and physical properties of food, including molecular relationships that affect digestion and metabolism (Capuano et al. 2018).

This project aims to support the research need stated in O’Connor et al. (2023) to understand if changes in the food matrix - as a food moves along the continuum from minimally processed to ultra-processed - impact mechanisms related to weight gain as articulated in Valicenti et al. (2023). A secondary aim is to capture the impact of processing-induced food matrix changes on health-related markers including and beyond weight.

**Objective and Proposal Requirements**

This project aims to use evidence mapping to address the question: “How much and what type of information is available related to how process-related changes to the food matrix impact purported mechanisms related to energy intake from industrially-processed foods?”

Secondarily, the project aims to collate evidence on food matrix changes that may impact weight, as well as indicators or biomarkers with some relationship to weight, for example, glycemic response, insulin resistance, appetitive hormones, inflammatory markers, and energy availability. Food matrix changes could include e.g., impacts on fiber and other carbohydrate changes with processing; food form comparisons [whole food, juice, powder], food hardness, or heat-related effects, among others).

It is anticipated that this effort will provide clarity on how and in what depth the concept of the food matrix has been studied, to include in what specific foods and by what mechanisms of processing, as well as the breadth and depth of information related to effects on body weight.
Pre-Proposal Content

1. **Background:** Briefly describe the literature relevant to the project question and how the proposed review addresses hypotheses around industrial processing of food ingredients and end products on health, including on mechanisms/factors associated with body weight but also markers of health including: Glycemic response, insulin resistance, inflammatory markers, appetitive hormones, and energy availability.

2. **Research Approach:**
   - Specify the questions to be answered.
   - Research approach in broad terms, including the source of information, search methods, and how the information will be presented.

Additional notes for the approach:
• Due to the potential for some information to be from older sources, the search should not be limited by date.
• Resources beyond the peer-reviewed literature may be considered, such as books, book chapters, white papers, unpublished (dissertation) research or authoritative reports.
• In scope: Distinct effects of processing (e.g., extrusion, fermentation, heating/cooling, hydroxylation, particle size, purification, isolation, etc).
• Out of scope: Formulation effects (e.g., ingredients or additives; the ‘recipe’); toxicological or safety-specific endpoints.

3. Research Team: Principal investigator(s), co-investigators, key team members, and collaborators that may be affiliated but not part of the grant.
   • Describe the experiences that make you and your team a candidate for carrying out this project. In addition, the CV of the principal investigator(s) is required (not included in the page limit).
   • Demonstrated success publishing in this topic area in a quality peer-reviewed journal is a minimum criterion.

4. Potential Conflicts of Interest: List any potential conflicts of interest for all investigators, co-investigators, collaborators.
   • We suggest using the Conflict of Interest Guidelines as set forth by the American Society for Nutrition: https://nutrition.org/publications/guidelines-and-policies/conflict-of-interest/

5. Estimated timeline and budget: Timelines should include both a presentation of results to committee by webinar, a submit date for a final manuscript in a top tier peer-reviewed journal for publication, a mid-point virtual progress report, and a potential 1-hour public webinar to share the results with the IAFNS audience. Timeline from initiation to final manuscript draft should be in the range of 9-12 months.

   Please provide a proposed budget (a range is acceptable).
   • Note that IAFNS limits institutional overhead or indirect costs to 10% of total project costs.
   • Publication costs do not need to be included as IAFNS will support this separately.

6. References
Additional Considerations
In addition, as you prepare your pre-proposal, please note the following points:

- Attachments such as reprints of scientific papers and budgets are discouraged. This information will be required later if a full proposal is requested.
- There is no restriction regarding either the citizenship of applicants or the country where the research will be conducted. However, all submitted documents must be in English.
- Receipt of a research grant does not preclude the recipient from obtaining grant support in the same or similar area from other sources.
- Grants awarded under this program are typically approved for up to a one-year period. In exceptional cases, funding for an additional 6 months may be considered.

Page Limit: 3 pages, single spaced (not including PI’s CV)


Submission Instructions: Proposals (and questions) can be submitted to Marie Latulippe (mlatulippe@iafns.org).

Review Process: A review committee composed of scientists from academia, government, and industry will evaluate the pre-proposals. It is anticipated that applicants will be notified of the status of their pre-proposals within a few weeks. Pre-proposals will be assessed for 1) Impact relative to the stated project objectives, 2) Demonstrated expertise and publishing record for the PI and team, and 3) Reasonable range of time and budget. Successful pre-proposal applicants will be invited to submit full proposals to be considered for funding. Critiques of individual pre-proposals cannot be provided.

References


Addendum
IAFNS’s Guiding Principles for Funding Food Science and Nutrition Research

Background:
The scientific process requires open, transparent examination and honest interpretation of data, regardless of a researcher’s affiliation or source of funding. The following Guiding Principles address the potential influence of funding source on scientific research. All projects supported by IAFNS must adhere to these principles.

Guiding Principles for Funding Food Science and Nutrition Research:
In the conduct of public/private research relations, all relevant parties shall:
1. Conduct or sponsor research that is factual, transparent, and designed objectively; according to accepted principles of scientific inquiry, the research design will investigate an appropriately phrased hypothesis and/or question, rather than favor a particular outcome;
2. Require control of the study design, the research itself, and the interpretation of findings to remain with scientific investigators;
3. Not offer or accept remuneration geared to the outcome of a research project;
4. Prior to the commencement of studies, ensure that there is a written agreement that the investigative team has an obligation to attempt to publish the findings within some specified timeframe and the freedom to choose the journal to which the work will be submitted;
5. Require, in publications and conference presentations, full written or oral disclosure, as appropriate of all relevant relationships (financial and non-financial competing interests);
6. Not participate in undisclosed authorship arrangements in publications or presentations;
7. Guarantee accessibility to all data and control of statistical analysis by investigators and appropriate auditors/peer reviewers; when possible, encourage the practice of open science, including depositing data and methodology on a public repository;
8. Require that academic researchers, when they work in contract research organizations or act as contract researchers, make clear statements of their affiliation; require that such researchers publish under the auspices of the contract research organization;
9. Require, in publications and conference presentations, disclosure of whether the funder advised on the study design, conduct of research and/or the development of the manuscript.
Adoption of the Center of Open Science’s Transparency and Openness Promotion Guidelines by IAFNS

Background: The Center for Open Science's Transparency and Openness Promotion (TOP) Guidelines provide actionable steps for institutions to practice and promote transparent, reproducible, and rigorous research. IAFNS is a TOP Guidelines signatory. By becoming a signatory, IAFNS is supporting the principles expressed in the guidelines through their implementation by its funded researchers. The TOP Guidelines include eight modular standards for promoting transparent, reproducible and rigorous research, each with three levels of increasing stringency.

TOP Guidelines:

1. Data Citation Standards (Level 3): Cite shared data. Don’t publish until it is appropriately cited.
2. Data Transparency (Level 2): Data must be shared to the maximal extent allowed by ethical and legal constraints.
3. Analytic Methods (Code) Transparency (Level 2): Analytic methods (code) must be shared to the maximal extent allowed by ethical and legal constraints.
5. Design and Analysis Transparency (Level 2): The researcher must use reporting guidelines when writing up publications. Equator-network website provides a huge choice of standards for research designs. http://www.equator-network.org/ The researcher is asked to select one and register the standard you have selected.
6. Study Preregistration (Level 2): When the researcher preregisters his/her study in an independent, institutional registry (e.g., http://osf.io/, https://www.crd.york.ac.uk/prospero/, http://clinicaltrials.gov/), which is encouraged but not required, IAFNS will request a third party (e.g., Center for Open Science) verify that preregistration adheres to the specifications for preregistration before data collection.
7. Analysis Plan Preregistration (Level 2): When the researcher preregisters his/her study analysis plan in an independent, institutional registry (e.g., http://osf.io/, https://www.crd.york.ac.uk/prospero/, http://clinicaltrials.gov/), which is encouraged but not required, IAFNS will request a third party (e.g., Center for Open Science) verify for adherence to preregistered plan (deviations must be transparently reported) before data collection.
8. Replication (Level 1): IAFNS will occasionally put out a call for replication studies as part of our RFP process.