

Does the concept of “ultra-processed foods” help inform dietary guidelines, beyond conventional classification systems? Debate consensus

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ABSTRACT

The participants in this debate agree that food processing vitally affects human health, and that the extent of food processing significantly affects diet quality and health outcomes. They disagree on the significance of ultra-processing, as defined within the Nova food classification system. The YES position holds that the concept is well-founded, clear, and supported by a wealth of investigations, as demonstrated by systematic association between ultra-processed food (UPF) intake and various diseases and disorders, and the persistence of these associations with control for critical nutrients. The NO position argues that the concept of UPF is poorly defined; gives rise to misclassification of foods; is without clear mechanisms of action; and that the observed associations with obesity are likely confounded. The YES position argues that the Nova system is therefore crucial to inform dietary guidelines and also public policies designed to reduce production and consumption of UPFs, whereas the NO position argues that the system adds no value to conventional nutrient metrics and existing nutrient profiling systems, pointing instead to the need to develop an evidence-based system to characterize obesogenic foods. *Am J Clin Nutr* 2022;0:1–3.

Keywords: dietary guidelines, Nova food classification, ultra-processed food, nutrient-based food classifications, obesity, satiety, appetite regulation, confounding

Narrative Summary

The authors concurred that most forms of food processing are necessary and harmless (such as preservation of fruits out of season), or beneficial (such as various forms of fermentation). They also agreed that some processes are harmful (such as partial hydrogenation of oils that generates *trans* fatty acids and removal of fiber from grains). They further agreed that food classification systems based on certain characteristics of food processing, including the degree to which the food matrix is affected and the use of certain additives, can usefully distinguish categories of food with beneficial or harmful health outcomes. There was additional agreement on matters of fact (**Box 1**). But

the authors disagreed on the relevance, purpose, and meaning of these facts (**Box 2**). They also disagreed on the best ways forward (**Box 3**). In general, the debate revealed strong persistent differences in opinion, as related to the following: CAM holds that the concept of ultra-processing, as contained within the Nova food classification system, is well-founded, clear, supported by a wealth of investigations, and crucial to inform new dietary guidelines and other public policies and actions designed to reduce the production and consumption of ultra-processed foods (UPFs). In contrast, AA counters that the concept is muddled, and the investigations are confused. He cautions, based on his experience, against rushing to judgment on public health measures that may be faulty and counterproductive.

BOX 1

Points of agreement

- 1) Consumers and food producers need guidelines to select and produce healthy foods, meals, and diets. These need to be based on strong scientific evidence as it accrues and as circumstances change, and on knowledge from all relevant sources. Hence the relevance of this debate.

The authors reported no funding received for this study.

This article series is designed as an Oxford-style debate. As such, participants are required to argue pro- and con- positions, even when that opinion may differ from their own. The views expressed in this debate do not necessarily reflect the opinion of the participants, *The American Journal of Clinical Nutrition*, or the ASN.

CAM reports no conflicts of interest.

AA, an Associate Editor of *The American Journal of Clinical Nutrition*, was not involved in the editorial evaluation of this manuscript.

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Received August 15, 2022. Accepted for publication August 17, 2022.

First published online 0, 2022; doi: <https://doi.org/10.1093/ajcn/nqac230>.

- 2) Foods have been processed in many ways for thousands of years. Most forms of food processing are necessary for various reasons and are harmless (e.g., preservation of fruits out of season), or beneficial (e.g., various forms of fermentation). Some processes are harmful (e.g., partial hydrogenation of oils generating *trans* fatty acids, and removal of fiber from grains).
- 3) The extent of food processing significantly affects diet quality and health outcomes.
- 4) Food macronutrient composition influences the harmfulness of food processing, with processing of carbohydrates and partial hydrogenation of oils of special concern.
- 5) Classification systems based on certain characteristics of food processing, including the degree to which the food matrix is affected and the use of certain additives, can distinguish categories of food with beneficial or adverse health outcomes in a useful manner.
- 6) Robust and respectful discourse among opponents on controversies such as this regarding nutrition is critical to scientific and public health progress.

BOX 2

Continuing controversies

YES (CAM)

NO (AA)

How clear is the definition of UPF?

● UPFs are clearly and precisely defined within the Nova food system which, with its 4 groups, was established in its final form in 2014. It continues to be used consistently and uniformly by trained teams of investigators throughout the world; for development of official national dietary guidelines, and other applications (e.g., cell phone apps). Doubts about classification of specific food items usually relate to a lack of details of ingredients in the product, or inadequate knowledge of the Nova system. References used to support claims that Nova lacks clarity almost invariably have authors who are or have been employees of, consultants to, or funded by corporations that produce or market UPF.

● The definition of UPF is vague and contradictory and lacks nutritional rationale. UPFs are defined as industrial formulations with added ingredients that are not used in normal cooking. Most of the ingredients share no physiologic properties and are not associated with risk of weight gain and obesity. Moreover, there is no threshold for the amounts, so a food will be a UPF after addition of minor, irrelevant amounts of an ingredient that is present in much higher amounts in many healthful foods.

Does the concept of UPF inform dietary guidelines beyond nutrient-based food classifications?

(Continued)

YES (CAM)

NO (AA)

● Yes. Many cohort studies associate UPF consumption with various chronic disorders and diseases, and with all-cause mortality, after adjustment for relevant confounders and for critical nutrients. This finding shows that unbalanced dietary nutrient profiles is only 1 of the mechanisms that link UPFs to ill-health. Additional mechanisms are harmful characteristics in UPF products caused by food ultra-processing. These include high energy density and soft texture, inducing overconsumption; loss of the matrix of whole foods, high glycemic index, absence of valuable bioactive compounds such as phytochemicals; presence of xenobiotics; and addiction-like craving.

● No. Existing evidence does not show that the Nova classification and the notion of UPF inform dietary guidelines beyond information already available in conventional classification systems. None of the studies claimed to show such an effect have controlled for other well-established nutritional and other risk factors for weight gain and obesity.

Is there a need for public policies to reduce UPF consumption?

● Yes. The evidence linking UPFs to ill-health, with no independent well-designed study showing contrary findings, is voluminous and consistent. Supportive plausible physiologic, toxicologic, and behavioral mechanisms are abundant. Worldwide sales of these products are rapidly rising, and obesity and diabetes are now pandemics. All this amounts to a robust and reliable basis for dietary guidelines and statutory policies and actions designed to make whole and minimally processed foods and freshly prepared meals always available, attractive, and affordable, and to reduce the production and consumption of UPFs and to prohibit their promotion. The model with UPFs is tobacco control. Food is needed for health and life, but there is no need to consume UPF.

● No, not with the current definition. Even nutrition experts and medical doctors failed to classify 231 foods correctly, because only 4 foods were assigned to the same Nova group by all the evaluators. Thus, the risk of misclassification, even among nutrition and food scientists, is unacceptably high, and these results severely undermine the validity of the UPF concept, and many healthy foods and meals will be misclassified as UPFs

(Continued)

YES (CAM)

NO (AA)

Is the Nova classification future-proof to help supply a growing global population with healthy foods?

• National dietary guidelines now commonly recommend dietary patterns based on fresh and minimally processed foods, mostly plants, and freshly prepared meals made from these foods. These patterns depend on the hundreds of millions of family farmers that produce most of the world's food; diverse industries that manufacture minimally processed foods, processed culinary ingredients, and processed foods; and businesses that distribute and sell these foods and ingredients and freshly prepared meals. All these need formal statutory policies and actions that protect and promote healthy diverse dietary patterns (including those that are semi-vegetarian, vegetarian, or vegan), and that restrict and reduce UPF. This is vital and urgent in times of food shortages and price increases, mass migration and increasing populations, climate disruption, squandering of nonrenewable resources, destruction of biodiversity, and the toll and costs of pandemic obesity and diabetes.

• Today, we face increased demand to produce food in adequate quantities to feed the growing global population, and at the same time reduce carbon emissions. This must be done while still meeting the most important goals of nutrition, which are to promote health. More plant-based foods, animal food alternatives, and intelligent processing are part of the solution. Unfortunately, the Nova classification is counterproductive to this development because it classifies most novel foods, such as vegan and most plant-based milk alternatives, as UPFs. The same is the case for meat substitutes; as a result UPFs contribute ~40% of total energy intake in vegetarian and vegan diets. The healthiness of a food needs to be based on scientific evidence from assessment of the whole food and not from theoretical predictions based on single ingredients.

BOX 3

Research agenda to resolve debate

YES (CAM)

NO (AA)

None of the studies proposed next are reasons to postpone dietary recommendations to avoid UPFs, or to delay public policies and actions to reduce their production and consumption and prohibit their promotion.

Additional cohort studies on consumption of UPFs and ill-health in under-studied populations, health outcomes, and age groups (middle- and low-income countries particularly in Asia and Africa; gastrointestinal, liver, infectious, mental diseases; children and adolescents).

In view of the foregoing concerns, no more research resources should be spent using the current Nova definition of UPF. Future research to create a novel classification system "Nova 2.0" should follow evidence-based principles:

Identification of harmful processes and additives. A revised definition of UPFs needs to start with the identification of the harmfulness of single, specific ingredients using reliable health biomarkers, and by conducting dose–response relations to identify thresholds

(Continued)

YES (CAM)

NO (AA)

Randomized controlled trials on ultra-processed diets compared with non-ultra-processed diets and short-term health outcomes to assess the health effect of ultra-processed diets as actually consumed by populations. This could be done by comparing diets based on those of the lowest and highest quintiles of population UPF consumption.

Experimental and observational studies on plausible physiologic, toxicologic, and behavioral mechanisms underlying the association between UPF consumption and health outcomes, such as physical characteristics of UPFs, classes and combinations of additives, advanced glycation end-products, packaging materials, addictive properties. Studies on the benefits of minimally processed foods and freshly prepared meals and the dangers of UPF

Food systems and supplies, and dietary patterns, affect human health. They all have consequences for family and social life, autonomy, culture, agriculture, employment, security, resources, the living and physical worlds, and the biosphere. The benefits of minimally processed foods and freshly prepared meals, and the financial and all other costs and damage of UPFs, need urgent systematic examination with estimates included in new dietary guidelines. A UN Framework Convention on Healthy Food Systems and Diets can facilitate this work.

Subsequent studies should look at interactions between additives and processes and also study matrix effects. A comprehensive literature already exists on several ingredients and additives, and for most of these the totality of evidence does not support harmful health effects. Such additives should not be part of a novel classification system. By contrast, current literature supports adverse effects of added sugars, high-glycemic-index carbohydrates, *trans* fat, low content of fiber, etc., and these criteria should be included. Only when this fundamental work is done will there be a basis for developing a new set of classification systems, which must then be tested.

Formulation and testing of Nova 2.0

An international balanced panel of experts from food science, nutrition, and medicine should be gathered to draft the Nova 2.0 version, and subsequently there should be a hearing phase to receive suggestions for improvements. The panel should also produce a research plan for studies that needs to have its usefulness confirmed before being launched. Such a research plan should involve animal studies, mechanistic human studies, observational studies, and randomized controlled trials. Clear criteria for positive study outcomes should be defined, as well as the totality of evidence required to endorse the launch of UPF 2.0

The authors' responsibilities were as follows—both authors: contributed equally to this article and read and approved the final manuscript. AA reports no conflicts of interest related to the current topic. AA is a member of scientific advisory boards of Groupe Éthique et Santé (France), International Egg Nutrition Centre (United Kingdom), and Green Leaf Medical, Sweden; a member of the International Carbohydrate Quality Consortium; an associate editor of *The American Journal of Clinical Nutrition*; and a co-owner of various patents owned by the University of Copenhagen.