ALINEA
NUTRITION

AUGUST 2023

DEEPDIVE SUMMARIES

Food Texture or "Ultra" Processing: Which is More Important?

Teo PS, Lim AJ, Goh AT, R J, Choy JYM, McCrickerd K, Forde CG. Texture-based differences in eating rate influence energy intake for minimally processed and ultra-processed meals. Am J Clin Nutr. 2022 Jul 6;116(1):244-254.

Background

- In 2008, Professor Carlos Monteiro published a paper that suggested that processing, rather than foods or nutrients, explained the adverse health impacts of population diets.
- Ultra-processed foods [UPF] have been defined as *"formulations of ingredients, mostly of exclusive industrial use, typically created by series of industrial techniques and processes"*.
- However, open questions loom large. Is processing *per se* an issue, or do other factors provide more explanatory power as to the effects of UPF?

The Study

- The study was a crossover randomised trial in healthy young adults in Singapore, comparing food texture and food processing, with four conditions:
- 1) Soft-textured and minimally-processed; 2) Soft-textured and ultra-processed; 3) Hard-textured and minimally-processed; 4) Hard-textured and ultra-processed.
- The primary outcomes of the study were eating rate [ER] in grams per minute [g/min], energy intake rate [EIR] in calories per minute [kcal/min], and absolute food intake [grams and calories]..

Findings, Strengths & Limitations

- Food texture was associated with a significantly greater ER, independently of food processing. Both texture and processing were independently associated with EIR in calories/minute.
- The amount of food [grams] showed an independent effect of food texture, but not processing. Both texture and processing were independently associated with *ad libitum* energy intake.
- Strengths included the study preregistration, strong design, sample balanced for sex, and matched macronutrient content of meals. Limitations include the lack of generalisability beyond the young, lean, healthy sample, small sample size, and outcomes only from a single test meal.

Context

- Food texture explained differences in ER, rather than processing, with soft-textured foods resulting in ~35% greater ER, and EIR was 60% higher with soft-textured foods, across both levels of food processing.
- These findings suggest that food texture exerts a much greater effect on within-meal eating rate and energy intake, compared with energy density differences from ultra-processed foods.
- This indicates issues with the homogenous classification system of NOVA, as different foods exert differential effects relative to characteristics that are not capture by "processing" alone.

Application

- We should not assume that any food within this classification is inherently "unhealthy".
- Pragmatically apply prior nutrition knowledge on the characteristics of foods and nutrients we know to be beneficial. Quorn mince is not a BigMac.

High Artificial Sweeteners Intake and Type-2 Diabetes Risk

Debras C, Deschasaux-Tanguy M, Chazelas E, Sellem L, Druesne-Pecollo N, et al. Artificial Sweeteners and Risk of Type 2 Diabetes in the Prospective NutriNet-Santé Cohort. Diabetes Care. 2023 Jul 25:dc230206.

Background

- Most of the debate and controversy on artificial sweeteners [AS] has centred on animal toxicology studies, and the epidemiology of AS use and longer-term disease risk has mostly come bearing red flags [e.g., reverse causality].
- However, this perspective on the epidemiological research has been challenged by recent publications from the French NutriNet-Santé cohort, which presents itself as the most rigorous assessment to date of AS consumed through diet.

The Study

- The NutriNet-Santé cohort is a large prospective cohort of French adults participating in a web-based study of nutrition and health outcomes. The exposures for the present analysis were total AS from all dietary sources and all AS types, and additionally each of aspartame, acesulfame-K, and sucralose individually. The primary outcome was T2D incidence comparing Low- and High-consumers to Non-consumers.

Findings, Strengths & Limitations

- For total AS intakes, compared to Non-consumers of AS the High-consumers were associated with a 69% higher risk of T2D, and Low-consumers were associated with a 30% higher risk of T2D.
- Per 100mg/d increase in AS, total AS was associated with an 18% higher risk of T2D.
- Strengths included the average of five completed 24 h recalls included in the analysis, quantification of AS by laboratory analysis to validate the dietary assessment, and dose-response analysis. Limitations include the predominantly health-conscious cohort and ~62% classified as Non-consumers of AS, and very low T2D incident rates. .

Context

- The authors of the present study grasp at straws for a plausible mechanism, which is unsurprising given the lack of any strong evidential support that AS impair glucose tolerance to levels that would explain T2D risk.
- A review of chronic feeding studies ranging from 6–18-weeks duration in individuals with diabetes [both Type 1 and Type 2] found no effects of glucose metabolism with any of the AS analysed [aspartame, saccharin, sucralose].
- The World Health Organisation systematic review and meta-analysis on AS and health outcomes found that there were no significant effects on any measure of glycaemic control in 21 RCTs, but that cohort studies were associated with a 21% higher risk of elevated fasting plasma glucose.
- These differences in outcomes between the respective study designs are another reason to pause for caution in considering the findings from the present study.

Application

- The majority of human studies have found no effect of AS on glycaemic responses, intestinal sweet-taste receptors, or glucose regulatory hormones and uptake.
- For now, it would be prudent to continue to advise that individuals with high dietary added sugar intake may use artificially-sweetened food and beverage products to substitute for added sugars, and lower energy intake.

Diet and Cardiovascular Risk: Regional and National Income Differences

Mente A, Dehghan M, Rangarajan S, O'Donnell M...Yusuf S. Diet, cardiovascular disease, and mortality in 80 countries. Eur Heart J. 2023 Jul 21;44(28):2560-2579.

Background

- Within the global burden of CVD, dietary risks are ranked as the second biggest contributing risk factor.
- Worryingly, while many Western high-income countries exhibited a declining burden of CVD, certain high-income countries [HIC] are seeing a reversing of their trends.
- Further, low-middle income countries [LMIC] now exhibit the highest global burden of CVD.

The Study

- The Prospective Urban Rural Epidemiology [PURE] study is an ongoing multi-country study of 168,067 participants from cohorts in 21 countries across five continents. The countries range in income strata, including 17 LMIC and four HIC. For the present study, the researchers developed a diet pattern score based on six food categories: fruits, vegetables, legumes, nuts, fish, and dairy. The score was analysed for associations with cardiovascular diseases [CVD].

Findings, Strengths & Limitations

- Compared to the lowest diet scores, the highest were associated with an 18% risk of major CVD, 14% lower risk of MI, and 19% lower risk of stroke.
- In three additional included validation cohorts, compared to the lowest diet scores the highest PURE Healthy Diet Scores were associated with similar strengths of associations as the primary analysis in the PURE cohort.
- In the analysis combining participants from all four prospective cohorts, each 20% [quintile] increase in PURE Healthy Diet Scores was associated with an overall 6% lower risk of major CVD, MI, and stroke, respectively.
- Strengths include the adequate ~9yr follow-up, large number of events and very large sample size, use of several external validation cohorts, and statistical analysis adjusted for relevant potential confounders. Limitations include the lack of definition for "major CVD", use of median levels of intakes within a food group to score healthfulness of diet, and potentially outdated country income data.

Context

- The greatest magnitude of risk reduction was evident in LMIC, which also exhibited the lowest average PURE Healthy Diet Score.
- The analysis indicated that the lowest PURE Healthy Diet Scores correlated with the lowest estimated daily energy intakes, and intakes of each of the six food components of the diet score. This reflects the fact that the majority of data in PURE is derived from LMIC.
- The main relevance of the present study is how the global burden of CVD may be lowered through policies to improve nutritional adequacy in LMIC.

Application

- Studies like this reassure us that there are many paths to a health-promoting diet, while reminding us that those with the most to gain from dietary improvements are often those in the least advantageous circumstances.

"Personalised Nutrition" and Glycaemic Control: Where is the Evidence?

Kharmats AY, Popp C, Hu L, Berube L, Curran M, Wang C, Pompeii ML, Li H, Bergman M, St-Jules DE, Segal E, Schoenthaler A, Williams N, Schmidt AM, Barua S, Sevick MA. A randomized clinical trial comparing low-fat with precision nutrition-based diets for weight loss: impact on glycemic variability and HbA1c. Am J Clin Nutr. 2023 Aug;118(2):443-451.

Background

- The concept of "personalised nutrition" [PN] has leapt to the fore of nutrition science, with the promise that we can use patient data to design predictive interventions that are more individualised, and therefore more effective.
- Within the overall research area of PN, glycaemic control has been the predominant focus and primary outcome measure of all the landmark studies to date.
- However, whether the predictiveness of PN is more advantageous than standard dietary advice, is far from a proven case.

The Study

- The Personal Diet Study was a randomised controlled trial comparing two dietary interventions in participants with prediabetes or type-2 diabetes [T2D]: a Personalised Diet [PD] group based on predicted post-prandial glucose response from an algorithm vs. a Standardised Diet [SD] group with the aim of <25% energy from total fat. Both groups aimed for a 500kcal/d energy deficit, and the study lasted 20-weeks. The outcomes were the Mean Amplitude of Glycaemic Excursions [MAGE; a marker of glycaemic variability], and HbA1c..

Findings, Strengths & Limitations

- Over 6-months there were no significant differences in the MAGE between groups; the PD group showed an average monthly decrease of 0.79mg/dL while the SD group showed an average monthly decrease of 0.83mg/dL.
- There were no significant differences in HbA1c between groups; the PD group showed an average monthly decrease of 0.01%, while the SD group showed an average monthly decrease of 0.02%.
- Strengths include the study preregistration, good sample size relative to previous PN trials, and equal treatment for both intervention groups. Limitations include unequal balance of sex between groups, lack of accounting for physical activity, and limited generalisability from the highly educated, wealthy study sample.

Context

- The present study was the first intervention in a U.S. population following the validation of the Israeli cohort algorithm, and overall has produced underwhelming results.
- The primary outcome of the overall study was weight loss, which was reported in another publication; the SD group lost 4.3% of bodyweight over 6-months compared to 3.2% in the PD group.
- Overall, there is little evidential support for any inherent advantage of algorithm-based PN interventions for improving glycaemic control, particularly when stacked up against current knowledge of factors that influence post-prandial glucose responses, e.g., meal composition, meal timing, exercise, sleep, etc.

Application

- We are left with recommendations for overall glycaemic control, for example good sleep, exercise, having a breakfast meal, and daily energy load, that would already be in any nutrition professional's toolbox.