

Summary of a Workshop on

*The Scientific Basis for Communicating
Carbohydrate Quality*

Thursday, 2 February 2017

Joint Workshop Organized by

ILSI North America & Canadian Diabetes Association

Workshop Purpose

Facilitate exchange of scientific and technical information with stakeholders involved in evaluating science-based indices used in communicating physiologic effects of carbohydrates in foods.

Outcomes

Scientifically based summary statements for use in programs that communicate about carbohydrate quality, with the intent that future programs harmonize approaches by authoritative public health organizations in North America.

Outcomes will be directly relevant to Carbohydrate Quality programs being developed by the CDA.

Workshop Participants

Stakeholders to Identify Gaps and Opportunities

Alfred Aziz (Health Canada), Paula Trumbo (FDA)

Joanne Lewis (CDA), Sacha Uelmen (ADA)

Experts to Summarize Science

Tom Wolever (Univ Toronto and Glycemic Index Labs, Inc.), Alan Barclay (U Sydney), Joanne Slavin (U of Minnesota), Christine Pelkman (Campbell Soup)

Reactors to Stimulate Discussion

Kathy Usic (GI Foundation) & Cynthia Harriman (Whole Grains Council)

Chairs: John Sievenpiper (U Toronto) & YiFang Chu (PepsiCo)

Moderator: Barbara Lyle (ILSI North America)

Co-Sponsors: Joanne Lewis & Carolyn Gall Casey, Canadian Diabetes Association

Vision

Make healthy choices, easy choices
and
put healthy carbohydrates back on the plate.

This vision statement was expressed by workshop participants as a means to aid in the scientific discussion but was not intended as a consensus statement.

JOB TO BE DONE

For the General Population
&
Metabolically at Risk

Help consumers select better choices
among food sources of carbohydrates.

JOB TO BE DONE

For Persons Living with Diabetes

Assist persons living with diabetes select food sources of carbohydrates that help improve glycemic control and are consistent with dietary guidance.

For general population and metabolically at risk, any one of these three attributes helps consumers select food better quality food sources of carbohydrates.

**Quality
Carbohydrate**

**Whole Food
Ingredients
Credentials**

(whole grain, fruit,
vegetable, pulse, lean
dairy)

**Glycemic
response/index***

(i.e., meet a GI threshold or
meaningful % lower GR/GI
compared to a category
average)

“Source” Fiber

* See next page for discussion on glycemic response

These are Workshop Summary Statements
(Not scientific consensus statements)

**Additional
Nutrient
Disqualifiers/
Qualifiers**

There was considerable discussion of meaningful approaches to measuring post-prandial glycemic response to specific foods.

- It was agreed that both GI and direct post-prandial glycemic measures (both of which are relative measures) were applicable.
- For GI, a cut-point or threshold may be sufficient rather than providing specific index numbers, with 55 being a cut-point proposed.
- Post-prandial glycemic response (GR) was discussed as an equally viable approach. In deciding on a meaningful criteria for post-prandial GR, Health Canada's current draft guidance was referenced noting it requires a statistically significant decrease of a minimum 20% in the average incremental area under the response curve iAUC in comparison to the reference food.

For messaging diabetes, the food should meet and communicate glycemic response benefit and may additionally highlight fiber or whole food ingredient credentials to communicate quality more broadly (see next page).

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There was considerable discussion of whether and how carbohydrate quality criteria differ for messaging to those living with diabetes compared to general population and at risk.

- 1 expert suggested that low glycemic index be a required criteria for considering a food a quality carbohydrate.
- 1 expert noted that glycemic index, but also glycemic load is important since those with diabetes need to manage both available carbohydrates and quality of carbohydrates.
- 1 expert indicated that some persons living with diabetes manage available carbohydrate intake and therefore carbohydrate quality criteria should be the same as for general and at risk populations.

Moderator Notes

Additional points from the workshop discussion and open dialogue.

Scientific

- If **harmonizing** Canada and the US is an important objective, then programs developed with potential application to food labeling need to be based on evidence recognized in both countries (e.g., the US bases evidence on authoritative bodies such as the *US Dietary Guidelines for Americans*, National Academy of Sciences DRI's or credible peer-reviewed systematic evidence reviews.)
- **Systematic evidence reviews** by the USDA Nutrition Evidence Library on GI/GL and health outcomes would benefit from updating the reviews as one expert noted they miss critical literature from outside the search time frame. Existing reviews do not support benefits for body weight, cancer, cardiovascular disease, or type 2 diabetes.

Application

- Existing labeling regulations currently provide for fiber claims, contains/made with whole grain/nut/fruit/vegetable/etc. claims, and more than one glycemic response statements/claims on packages. **A differentiated and simplified carbohydrate program would communicate more holistically than any one of the three options already available.**
- **Iterative scenario testing** (propose, test, modify, then retest) is very helpful in the process of developing an approach. The Whole Grain Council can share with others what they learned in the process of developing the Whole Grain stamp.
- **Look for ways to simplify** (e.g., if two of the three primary criteria are met, then the inclusion/exclusion nutrient criteria may be unnecessary).
- If harmonizing a program with application to food labeling, keep in mind that **US food labels are for general healthy population** (at best, metabolically at risk). Products for persons with specific medical conditions are regulated according to other regulations. **Health Canada draft guidance on post-prandial glycaemia response is also intended for generally healthy adults.**

Consumer Perspective

- Consumer input early and frequently is critical in determining what and how to communicate.
- Consumers see foods with a wide range of communications about carbohydrate types and quality (fiber, whole grain, no added sugar, glycermic response). Is there a way to offer a simple assurance that is inclusive and holistic?
- Healthy, at risk, and persons living with diabetes may have the same or different needs and is important to understand.
- Consumers can help develop descriptive terms that mean something to them (e.g., Carbs to Enjoy).
- If a holistic multi-factor approach is used, how much supporting detail information do consumers want, if any - see examples below.

Better Carbohydrate

- ✓ Made with Whole Wheat
- ✓ Low Glycemic Response

Better Carbohydrate

- ✓ Half Serving of Fruit
- ✓ Source of Fiber

Better Carbohydrate

- ✓ Source of Fiber
- ✓ Low-fat dairy
- ✓ Low Glycemic Index

Detailed Overviews from Presentations

Gaps and Opportunities Details

Stakeholder Opportunities and Gaps - 1

Under Canadian legislation, nutrition and health claims on food labels and advertisement must be truthful and not misleading. In relation to carbohydrates, nutrient content claims are permitted for sugars and fibre. There are different levels of food health claims. Health claims related to diseases and conditions in Schedule A of the *Food and Drugs Act* are prescribed in regulation. All other health claims, while not prescribed, must also be substantiated by evidence as per Health Canada guidance documents. Claims related to carbohydrate quality may be relevant to the general population, sub-populations at risk of or with specific conditions, such as diabetes. Health Canada has accepted claims for the role of certain fibres in cholesterol lowering and reduction in post-prandial glycemia.

Opportunities to better characterize carbohydrate quality, its relation to health, and how to communicate this relationship to consumers should be sought.

Stakeholder Opportunities and Gaps - 2

Food labeling in the U.S. is intended for the general healthy population (at most for those at risk), but not those with an existing disease.

The term “healthy” is determined based on nutrient criteria, not food based criteria, e.g., 10%+ of a nutrient considered positive (including fiber as a nutrient of choice).

Two authoritative reports are particularly relevant to considering glycemic index as an indicator of carbohydrate quality in the US. Updated systematic evidence base reviews on healthy and at risk (but not diseased) are needed.

- 1) Dietary Reference Intakes (DRI's) for carbohydrates by the National Academy of Medicine (2002). In this report, they concluded that GI reduced risk of CVD among those with T2D, but with several reservations.
- 2) USDA Evidence Review Library informs the Dietary Guidelines for Americans (the latter of which is official US policy). See next slide for evidence reviews completed in 2010 on GI.

To demonstrate physiologic benefits of fiber, the new US labeling rules require that the response is not simply due to a reduction (replacement) of available carbohydrate. The benefit must be demonstrated to be from the addition of fiber.

Dietary guidance is for general population and focuses on foods and diet patterns.

USDA and HHS considered the evidence for glycemic index and glycemic load in systematic evidence reviews that informed the *2010 Dietary Guidelines for Americans* (see next page).



NutritionEvidenceLibrary.gov

United States Department of Agriculture

Updated systematic evidence base reviews on healthy and at risk (but not diseased) would be helpful in informing future dietary guidelines for North Americans. – See current NEL on next slide.

? [What is the relationship between glycemic index or glycemic load and body weight? \(DGAC 2010\)](#)

Strong and consistent evidence shows that glycemic index and/or glycemic load are not associated with body weight and do not lead to greater weight loss or better weight maintenance.

Grade: Strong

? [What is the relationship between glycemic index or glycemic load and cancer? \(DGAC 2010\)](#)

Abundant, strong epidemiological evidence demonstrates that there is no association between glycemic index or load and cancer.

Grade: Strong

? [What is the relationship between glycemic index or glycemic load and cardiovascular disease? \(DGAC 2010\)](#)

Due to limited evidence, no conclusion can be drawn to assess the relationship between either glycemic index or load and cardiovascular disease.

Grade: Limited

? [What is the relationship between glycemic index or glycemic load and type 2 diabetes? \(DGAC 2010\)](#)

A moderate body of inconsistent evidence supports a relationship between high glycemic index and type 2 diabetes.

Strong, convincing evidence shows little association between glycemic load and type 2 diabetes.

Grade: GI: Moderate; GL: Strong

Stakeholder Opportunities and Gaps - 3

Harmonize approaches used by authoritative organizations within North America in communicating about carbohydrate quality.

Provide a scale by which all consumers (general population, at risk, and those living with diabetes) can choose the most nutrient dense, minimally processed carbohydrate sources with the least effect on overall blood glucose.

The goal would be to ensure that the scale is both simple to navigate and easy to understand at all levels of health literacy across cultures and languages and is communicated via multiple channels of communication.

Current ADA guidelines for at risk and for those living with diabetes.

For good health, carbohydrate intake from vegetables, fruits, whole grains, legumes, and dairy products should be advised over intake from other carbohydrate sources, especially those that contain added fats, sugars, or sodium.

Opportunity: Do consumers need more information than these food-based recommendations to be effective?

Scientific Details

Statements do not Reflect Consensus

They are summaries from individual speakers

Scientific Summary Statements - 1

The overall glycemic response elicited by a meal is determined by the quality and quantity of the carbohydrate, fat, and protein consumed, methods of processing and cooking, and by other chemicals naturally present or added to foods.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 2

Glycemic index (GI) is an accurate and precise measure of carbohydrate quality. It is not a measure of quantity.

GI is defined by an ISO methodology that measures, in people without diabetes, the extent to which the available carbohydrate in carbohydrate foods raises blood glucose on a gram for gram basis relative to glucose.

A different method is used to measure GI in people with diabetes but the results obtained are similar to those obtained by the ISO method. GI is an independent determinant of the glycemic response elicited by individual foods and mixed meals.

The GI of meals and diets is calculated from the GI of the foods they contain.

GI is highly variable within person but the relative rank between foods is stable (so possibly GI is better to use as a ranking tool than quantifying to a specific number).

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 3

Compared to conventional diets, low GI diets help overweight and obese adults lose more body weight, body fat and BMI in the short-term (≤ 6 months).

Thomas DE, Elliott EJ, Baur L. “Low glycaemic index or low glycaemic load diets for overweight and obesity.” *Cochrane Database Syst Rev* 2007 Jul 18;(3):CD005105.

Larsen TM, Dalskov SM, van Baak M, Jebb SA, Papadaki A, Pfeiffer AF, et al. “Diets with high or low protein content and glycemic index for weight-loss maintenance.” *N Engl J Med* 2010 Nov 25;363(22):2102-13.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 4

Low GI and GL diets are associated with a decreased risk of type 2 diabetes in adults in observational studies.

Livesey G, Taylor R, Livesey H, Liu S. “Is there a dose-response relation of dietary glycemic load to risk of type 2 diabetes? Meta-analysis of prospective cohort studies.” *Am J Clin Nutr* 2013 Mar;97(3):584-96.

Bhupathiraju SN, Tobias DK, Malik VS, Pan A, Hruby A, Manson JE, et al. “Glycemic index, glycemic load, and risk of type 2 diabetes: results from 3 large US cohorts and an updated meta-analysis.” *Am J Clin Nutr* 2014 Jul;100(1):218-32.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements -5

Compared to conventional diets, low GI diets help people with diabetes reduce HbA1c by an additional 0.5% points.

Thomas D, Elliott EJ. “Low glycaemic index, or low glycaemic load, diets for diabetes mellitus.”
Cochrane Database Syst Rev 2009 Jan 21;(1):CD006296.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 6

Compared to conventional diets, high fiber low GI diets help people reduce their total and LDL cholesterol.

Goff LM, Cowland DE, Hooper L, Frost GS. “Low glycaemic index diets and blood lipids: a systematic review and meta-analysis of randomised controlled trials.” *Nutr Metab Cardiovasc Dis* 2013 Jan;23(1):1-10.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 7

Low GI and GL diets are associated with a decreased risk of heart disease in women in observational studies.

Mirrahimi A, de Souza RJ, Chiavaroli L, Sievenpiper JL, Beyene J, Hanley AJ, et al. “Associations of glycemic index and load with coronary heart disease events: a systematic review and meta-analysis of prospective cohorts.” *J Am Heart Assoc* 2012 Oct;1(5):e000752.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 8

Digestible carbohydrates (starches and sugars) should provide 45 - 65% of the calories in the diet.

Most of these calories should come from starches (which was noted to have a moderate or high glycemic index).

Dietary Guidelines for Americans, 2015-2020.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 9

Dietary fiber from grains, fruits, vegetables, and legumes is associated with decreased risk of coronary heart disease.

Adequate Intake (AI) for fiber is 14 g/1000 kcal, based on the median fiber intake level observed to achieve the lowest risk of CHD.

Dietary Guidelines for Americans, 2015-2020

Food and Nutrition Board Macronutrient Panel. “Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids” Institute of Medicine, 2002.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)

Scientific Summary Statements - 10

It is theoretically plausible to expect a low GI diet to reduce risk of Type II diabetes and CVD. However, the 2002 Dietary Reference Intake panel reviewed the existing evidence on carbohydrates and concluded:

“Due to a lack of sufficient evidence on the prevention of chronic diseases in generally healthy individuals, no recommendations based on glycemic index are made.”

Food and Nutrition Board Macronutrient Panel. “Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids” Institute of Medicine, 2002.

These are Summary Statements by Individual Scientists
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Science Translation

The over-riding dietary goal is to motivate toward fruits, vegetables, whole grains, and lean protein, consistent with dietary recommendations.

Consumers prefer positive attributes over negatives when making food choices.

Carbohydrate quality needs to be flexible and multifaceted to effectively communicate with consumer's highly personalized needs.

10 Key Trends in Food, Nutrition, & Health, 2017. *New Nutrition Business*.

These are Summary Statements by Individual Scientists
(Not scientific consensus statements)