

ICQC Scientific Consensus on Whole Grains

Introduction: The quality of carbohydrates (dietary fiber, whole grains, glycemic index and load) matters greatly to health and disease. In the first International Carbohydrate Quality Consortium (ICQC) meeting in Stresa we developed a consensus report on glycemic index (GI), glycemic load (GL) and glycemic response⁽¹⁾. ICQC decided to focus this second consensus document on the quality of grains, specifically on the benefits of whole grains, since grains are the major source of carbohydrates globally.

Definitions: Variable definitions have been used to define whole grains, most of which focus on retention of similar proportions of bran, germ, and endosperm in wholemeal/wholegrain flour, as in the original kernel. Further distinction should be made to separate intact kernels (i.e. intact, unmilled whole grains) from milled whole grains (i.e. whole grain flours and the products made from them) in standardizing research, translation, and health communications. Additional issues include the effects of processing on changes in micronutrient/phytochemical composition, bio-accessibility and bioavailability, as well as on contamination and on alterations in metabolic responses.

Points of Consensus:

- 1) Whole grains, as opposed to refined grains, provide important sources of many essential minerals and vitamins, dietary fiber, and phytochemicals which together or alone may offer health benefits.
- 2) Strong epidemiologic evidence supports that whole grain consumption is associated with reduced all-cause mortality, by reducing the risk of overweight and obesity, type 2 diabetes, cardiovascular disease and possibly colorectal cancer in diverse populations, although evidence for specific grains remains limited.
- 3) Evidence from short- to medium-term randomized controlled trials using milled whole wheat products does not support a direct effect on fasting blood glucose, insulin levels or blood cholesterol, although some trials show a reduction of post prandial blood glucose and/or

insulin responses in the short-medium term. For barley and oats, however, there are sufficient data indicating a beneficial influence on the above biomarkers, plus blood pressure.

- 4) Evidence from observational and randomized controlled trials suggests that a diet rich in whole grains is important in assisting weight control in overweight and obese individuals.
- 5) A high intake of dietary fibre, in particular cereal fibre from whole grains, has been associated with a reduced risk of colorectal cancer in European populations and the World Cancer Research Fund (WCRF) supports these findings.
- 6) Evidence is sufficient to support regular consumption of whole grains for the general population, as has been included in numerous national dietary guidelines. A very small percentage of people have a diagnosis of intolerance to gluten and other components of specific grains (celiac disease, wheat allergy, wheat sensitivity), and it is recommended that they avoid consuming these grain products.
- 7) Evidence from prospective cohort studies shows that increasing whole grain consumption from zero to about two servings/day (approximately 16g dry weight/serving) is associated with health benefits⁽²⁾; some small additional benefits are likely with higher intakes. Data on higher intakes are limited and an upper limit is not clear.
- 8) Current consumption of whole grains in many countries appears far below desirable levels, and in these areas, according to guidelines, higher intakes should be encouraged, especially by replacing refined grains without increasing total energy intake.
- 9) Multifaceted efforts to increase whole grain consumption are needed, which include increasing awareness about health benefits, information on whole grain content of foods, promotion in the general media, efforts by the food industry and food services to make whole grains desirable, enjoyable and affordable and to support a regulatory environment that promotes simple but evidence-based whole grain

labelling and on-pack promotion. Whole grain foods with low GI should be encouraged, particularly without increasing total dietary GL and energy intake.

- 10) Several research priorities remain. Additional randomized controlled trials on the health effects of whole grains are needed. They should focus on post prandial glucose and insulin responses, on other intermediate outcomes (e.g., biomarkers), and on clinical endpoints. Such trials should be considerably longer than most studies conducted so far. Epidemiologic research should include investigation of specific grains, distinction between intact whole grain, whole grain flour and refined grains and other aspects of processing, and dose-response relations with comprehensive health outcomes of interest. Research is needed on the most effective strategies to increase consumption of whole grains for optimal health in diverse cultures, including behavioral change, new food policies, culinary innovation, food reformulation, and improvements in agricultural practice.

References

1. Augustin LS, Kendall CW, Jenkins DJ *et al.* (2015) Glycemic index, glycemic load and glycemic response: An International Scientific Consensus Summit from the International Carbohydrate Quality Consortium (ICQC). *Nutrition, metabolism, and cardiovascular diseases : NMCD* **25**, 795-815.
2. USDA (2015) 2015-2020 Dietary Guidelines for Americans. <https://healthgov/dietaryguidelines/2015/guidelines/>.

Signed by:

ICQC Chairs: Willett WC, Harvard School of Public Health, Boston (USA)

Jenkins DJA, University of Toronto and St. Michael's Hospital, Toronto (Canada)

ICQC Members:

Aas AM, Oslo University Hospital (Norway)

Astrup A, University of Copenhagen (Denmark)

Augustin LSA, St. Michael's Hospital, Toronto (Canada); National Cancer Institute, Naples (Italy)

Barclay AW, University of Sydney (Australia)

Baer-Sinnott S, Oldways, Boston (USA)

Brand-Miller JC, University of Sydney and Charles Perkins Centre (Australia)

Brighenti F, University of Parma (Italy)

Bullo M, Rovira i Virgili University and CIBERObn Obesity and Nutrition, Tarragona (Spain)

Buyken A, University of Paderborn (Germany)

Ceriello A, Institut d'Investigacions Biomèdiques August Pi Sunyer (IDIBAPS) and Centro de Investigación Biomedica en Red de Diabetes y Enfermedades Metabólicas Asociadas (CIBERDEM), Barcelona (Spain); Department of Cardiovascular and Metabolic Diseases, IRCCS Multimedica Sesto San Giovanni, Milan (Italy)

Ha MA, Anglia Ruskin University (UK)

Kendall CWC, University of Toronto, University of Saskatchewan and St. Michael's Hospital Toronto (Canada)

La Vecchia C, University of Milan (Italy)

Liu S, Brown University, Providence (USA)

Livesey G, Independent Nutrition Logic (United Kingdom)

Poli A, President Nutrition Foundation of Italy (Milan)

Riccardi G, University of Naples Federico II (Italy)

Riserus U, Clinical Nutrition and Metabolism Unit, Uppsala University (Sweden)

Rizkalla SW, Institute Cardio-Metabolism and Nutrition, ICAN, Assistance Publique Hôpitaux de Paris, Pitié Salpêtrière Hospital, Paris (France)

Salas-Salvado J, Rovira i Virgili University and CIBERObn Obesity and Nutrition, Tarragona (Spain)

Sievenpiper JL, University of Toronto and St. Michael's Hospital, Toronto (Canada)

Trichopoulos A, University of Athens (Greece)

Usic K, Glycemic Index Foundation (Australia)

Wolever T, University of Toronto and St. Michael's Hospital, Toronto (Canada)

Invited experts:

Brouns F, University of Maastricht (Netherlands)

Harriman C, Oldways Boston (USA)

Vuksan V, University of Toronto and St. Michael's Hospital, Toronto (Canada)