

Australian Standard[®]

Glycemic index of foods



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- Australian Food and Grocery Council
- Australian Institute of Food Science and Technology Limited
- Australian Society for Microbiology Incorporated
- Consumers' Federation of Australia
- Department of Agriculture, Fisheries and Forestry (Commonwealth)
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Additional Interests:

- Department of Agriculture, Fisheries and Forestry (Commonwealth)
- Diabetes Australia — NSW
- Food Science Australia/CSIRO Health Sciences and Nutrition
- Food Standards Australia New Zealand
- Glycemic Index Limited
- International Diabetes Institute
- Juvenile Diabetes Research Foundation
- RMIT (Royal Melbourne Institute of Technology) University
- University of Sydney

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PREFACE

This Standard was prepared by the Standards Australia Committee FT-024, Food Products. The development of the Standard originated from a recognized need to standardize the determination of glycemic index (GI) of foods, particularly with its increasing use as a nutrition claim, illustrating the importance of GI within human nutrition.

The objective of this Standard is to establish the recognized scientific method as the standard method for the determination of the GI of foods.

This Standard is intended for use by—

- (a) food manufacturers;
- (b) accreditation bodies;
- (c) regulators;
- (d) educational institutes;
- (e) testing laboratories; and
- (f) research organizations.

This Standard is based on the publication FAO/WHO Joint Expert Consultation Carbohydrates in Human Nutrition. Geneva: Food and Agriculture Organization, Food and Nutrition; 1998.

Additional recommendations have been taken from:

- (i) *Original Communication—Determination of the glycemic index of foods: interlaboratory study*, TMS Wolever, HH Vorster, I Bjork, J Brand-Miller, F. Brighenti, JI Mann, DD Ramdath, Y Granfeldt, S Holt, TL Perry, C Venter and Xiaomei Wu, *European Journal of Clinical Nutrition* (2003) 57, pp 475–482;
- (ii) *Original Communication—Glycaemic index methodology*. F Brouns, I Bjorck, K Frayn, AL Gibbs, V Lang, G Slama and TMS Wolever. *Nutrition Reviews* (2005) 18, pp 145–171.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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FOREWORD

The glycemic index (GI) is a property of the carbohydrates in different foods, specifically the blood glucose raising ability of the digestible carbohydrates. It compares carbohydrates on a weight for weight basis in single foods or food items, in the physical state in which they are normally consumed [1]. Low GI foods are those containing carbohydrates that have less impact on blood glucose levels, because their digestion and absorption is slowed or because the sugars present (e.g. fructose, lactose) are inherently less glycemic. When combined in realistic meals, low GI foods produce less fluctuation in blood glucose and insulin levels than high GI foods. The clinical and practical value of the GI continues to be studied and there is growing consensus that there are benefits to health when low GI foods replace high GI foods in a balanced diet [2].

The GI is acknowledged by major diabetes associations, including Diabetes UK [3], Canadian Diabetes Association [4], Diabetes Australia [5] and the American Diabetes Association [6] as a useful tool for carbohydrate differentiation. Its application in other areas, such as weight management [7], sports performance [8], cardiovascular disease [9] and cancer prevention [10, 11] is the subject of ongoing research. The GI is also being examined in relation to diseases linked to insulin resistance, including the metabolic syndrome, polycystic ovary syndrome (PCOS) [12], non-alcoholic steatohepatitis (NASH), and in novel areas such as cognitive performance, memory and learning [13] and [14]. International tables of GI are in common use for research and clinical practice [15].

Historically, not all GI values on food labels have been reliable [16]. Some claims have been based on extrapolation or inappropriate methodology. There have been instances of deceptive practice, which have drawn the attention of the Australian Competition and Consumer Commission (ACCC). While a digestibility or hydrolysis index can be obtained by *in vitro* methods of assessing the rate of carbohydrate digestion [17], the results should not be referred to as GI values. The method set out in this Standard should be applied to ensure that GI values are determined by recognized methodology.

GI testing is appropriate only when the food in question contributes physiologically relevant amounts of digestible carbohydrate to a meal or diet. For the purposes of the Standard, the minimum amount is specified as 10 or more grams of glycemic carbohydrate per serving. Low-digestibility or non-digestible carbohydrates (resistant starch, some sugar alcohols, polydextrose etc.) must not be intentionally counted in the specified carbohydrate portion (50 g or 25 g) used in GI testing.

Small amounts of resistant starch may be inadvertently included because the methods of assay of starch are not yet adequate to clearly differentiate between digestible and non-digestible starch. Foods containing large amounts of low digestibility carbohydrates or resistant starch are not suitable for GI testing if the amounts consumed during the test are likely to provoke gastrointestinal discomfort.

Caution should be exercised in respect of GI labelling of foods containing significant amounts of low digestibility carbohydrates. By definition, a low GI food contains glycemic carbohydrate, i.e. 'providing carbohydrate for metabolism' [18]. Distinguishing between low GI carbohydrate-containing foods and sources of low digestibility carbohydrate is important in the management of diabetes, particularly for those using insulin and oral hypoglycaemic medication.

STANDARDS AUSTRALIA

Australian Standard Glycemic index of foods

1 SCOPE

This Standard sets out a method for determination of the glycemic index of carbohydrates in foods.

This Standard defines the glycemic index (GI), outlines qualifying factors and requirements for its application.

2 DEFINITIONS

For the purpose of this Standard the following definitions apply:

2.1 Blood glucose response

The change in blood glucose concentration over a two-hour period following the start of ingestion of the test or reference food.

2.2 Carbohydrate portion

The weighed portion of food containing either 50 g of glycemic carbohydrate or, if the portion size is unreasonably large, 25 g of glycemic carbohydrate.

2.3 Co-efficient of variation (CV)

A measure of the variability around the mean or average value. In the present context, %CV is calculated as the standard deviation (SD) \times 100 divided by the mean.

2.4 Glycemic (available) carbohydrates

Glycemic carbohydrate is total carbohydrate minus non-glycemic carbohydrate (see Clause 2.8).

Carbohydrates that are absorbed into the blood stream as carbohydrates and capable of increasing blood glucose levels when consumed.

NOTE: Some glycemic carbohydrates may be slowly absorbed and have minimal effect on blood glucose levels.

2.5 Glycemic index (GI)

The glycemic index is a property of the carbohydrates in different foods, specifically the blood glucose raising ability of the digestible carbohydrates in a given food. In common usage, this is referred to simply as the GI of the food. It is defined as the *incremental area under the (blood glucose response) curve* (IAUC) after consumption of the *carbohydrate portion* (see Clause 2.2) of a test food expressed as a percent of the average IAUC response to the same amount of carbohydrate from a *reference food* (see Clauses 2.11 and 5.4.1) taken by the same subject (see Clause 5.3) on a separate occasion.

NOTE: The italicized terms are defined because alternate interpretations may affect the final results obtained.

2.6 Incremental area under the curve (IAUC)

The area under the curve is calculated as the incremental area under the blood glucose response curve, ignoring the area beneath the fasting concentration.



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