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Food products — Determination of the glycaemic index (GI) and recommendation for food classification

Produits alimentaires — Détermination de l'index glycémique (IG) et recommandations relatives à la classification des aliments

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 26642 was prepared by Technical Committee ISO/TC 34, *Food products*.

Introduction

The development of this International Standard originated from a recognized need to standardize the determination of glycaemic index (GI) of foods for practice and research purposes, particularly with its increasing use as a nutrition claim, illustrating the importance of GI within human nutrition.

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

This International Standard is intended for use by:

a) food manufacturers;

b) accreditation bodies;

c) regulators;

d) educational institutes;

e) testing laboratories;

f) research organizations.

This International Standard is based on a Joint FAO/WHO Expert Consultation, *Carbohydrates in human nutrition* (Reference [6]).

Additional recommendations have been taken from References [1] to [3].

The 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 mass for mass basis in single foods or food items, in the physical state in which they are normally consumed (Reference [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 glycaemic. When combined in actual 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 (Reference [2]).

Historically, not all GI values on food labels have been reliable (Reference [4]). Some claims have been based on extrapolation or inappropriate methodology. While a digestibility or hydrolysis index can be obtained by *in vitro* methods of assessing the rate of carbohydrate digestion (Reference [5]), the results should not be referred to as GI values. The method set out in this International 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 this International Standard, the minimum amount is specified as 10 g or more of glycaemic carbohydrate per serving. Low-digestibility or non-digestible carbohydrates (resistant starch, some sugar alcohols, polydextrose, etc.) are not to 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 with foods containing significant amounts of low-digestibility carbohydrates. By definition, a low GI food contains glycaemic carbohydrate, i.e. “providing carbohydrate for metabolism” (Reference [6]). Distinguishing between low-GI carbohydrate-containing foods and sources of low-digestibility carbohydrate or low carbohydrate content is important.

Food products — Determination of the glycaemic index (GI) and recommendation for food classification

1 Scope

This International Standard specifies a method for the determination of the glycaemic index (GI) of carbohydrates in foods.

This International Standard defines the GI, outlines qualifying factors, and specifies requirements for its application.

This International Standard recommends criteria for classification of foods into low, medium and high GI.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
blood glucose response
change in blood glucose concentration over a 2 h period following the start of ingestion of the test or reference food

2.2
carbohydrate portion
weighed portion of food containing either 50 g of glycaemic carbohydrate or, if the portion size is unreasonably large, 25 g of glycaemic carbohydrate

2.3
coefficient of variation
CV
⟨positive random variable⟩ standard deviation divided by the mean

[ISO 3534-1:2006[11], 2.38]

NOTE In the context of this International Standard, the CV is expressed as a percentage, i.e the ratio of the standard deviation to the mean is multiplied by 100.

2.4
glycaemic carbohydrate
available carbohydrate
carbohydrate absorbed into the bloodstream as carbohydrate and capable of increasing blood glucose levels when consumed

NOTE 1 The glycaemic carbohydrate content is total carbohydrate content minus non-glycaemic carbohydrate (see 2.8) content.

NOTE 2 Some glycaemic carbohydrate can be slowly absorbed and have minimal effect on blood glucose levels.

2.5
glycaemic index
GI
property of the carbohydrate in different foods, specifically the blood glucose-raising ability of the digestible carbohydrates in a given food

NOTE 1 In common usage, this property 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 2.2*)* of a test food expressed as a percentage of the average IAUC response to the same amount of carbohydrate from a *reference food* (see 2.11 and 5.4.1) taken by the *same subject* (see 5.3) on a separate occasion.

NOTE 2 The italicized terms are defined because alternate interpretations may affect the final results obtained.

2.6
incremental area under the curve
IAUC
area under the curve calculated as the incremental area under the blood glucose response curve, ignoring the area beneath the fasting concentration

NOTE The IAUC can be calculated geometrically by applying the trapezoid rule (see Clause 7 for details).

2.7
***in vivo* GI testing**
glycaemic index testing carried out by the determination of glycaemic (blood glucose) responses in human volunteers

2.8
non-glycaemic carbohydrate
non-digestible carbohydrate including fibre
carbohydrate largely escaping digestion in the small intestine and not directly providing carbohydrate for metabolism

NOTE Non-glycaemic carbohydrate is, wherever possible, excluded from the determination of the carbohydrate portion for GI testing (see Table A.1).

EXAMPLE Partly or completely non-glycaemic carbohydrates include: hydrogenated mono- and disaccharides (synonyms include sugar alcohols, polyols); non-digestible oligosaccharides (fructooligosaccharides, oligofructose, inulin); galactooligosaccharides; and xylooligosaccharides. See Annex A.

2.9
outlier
member of a set of values which is inconsistent with the other members of that set

[ISO 5725-1:1994[12], 3.21]

EXAMPLE GI value for a particular subject that falls outside the range of $\overline{I}_G \pm 2s$, where $\overline{I}_G$ is the mean and s the standard deviation, of a group of 10 or more.

2.10
per serving
amount of a normal single serve of the test food as per common use

2.11
reference food
glucose, having by definition a GI of 100

2.12
test food
food whose GI value is being determined

3 Classification of GI

This International Standard recommends a classification of foods as low, medium or high GI (see Annex B).

4 Qualifying factors

The GI value of a food shall be applied only to the specific test food in the physical state in which it was consumed. The qualifying factors shall be:

a) only tested foods shall have a GI assigned;

b) the method by which glycaemic carbohydrate has been obtained, as well as the glycaemic carbohydrate content, shall be provided in the test report.

The GI of heterogeneous foods can only be determined by testing according to this International Standard and not by mathematical calculation of GI of individual ingredients or food items.

Small formulation changes and seasonal variations in ingredients do not dictate re-testing.

Re-testing may be required when the:

1) formulation of the product is changed by changing the macronutrient composition;

2) processing method changes;

3) concentration, osmolality, acidity or other physical or chemical factor changes.

5 Requirements

5.1 Ethics committee approval

The testing organization (laboratory) shall obtain written, ethics clearance from an appropriate human research ethics committee, and shall consider and address relevant issues raised in the national statement on ethical conduct of research involving humans and other relevant guidelines, available in the country. Individual countries should apply their own guidelines.

5.2 Testing facility

The testing organization shall have a food preparatory area separate from that in which blood is taken and appropriate instrumentation and consumables to analyse blood glucose content according to acceptable methodology (see 7.1).

5.3 Subjects

5.3.1 Inclusion and exclusion criteria

Selection of a minimum of 10 healthy subjects shall be made on the basis of:

a) no known food allergy or intolerance;

b) no medications known to affect glucose tolerance (excluding oral contraceptives) — stable doses of oral contraceptives, acetylsalicylic acid, thyroxin, vitamins and mineral supplements or drugs to treat hypertension or osteoporosis are acceptable.

Exclusion of subjects shall be made on the basis of:

1) a known history of diabetes mellitus or the use of antihyperglycaemic drugs or insulin to treat diabetes and related conditions;

2) a major medical or surgical event requiring hospitalization within the preceding 3 months;

3) the presence of disease or drug(s) which influence digestion and absorption of nutrients;

4) the use of steroids, protease inhibitors or antipsychotics (all of which have major effects on glucose metabolism and body fat distribution).

5.3.2 Management

On initial presentation, subjects shall be given:

a) a participant information and consent form;

b) details of the test protocol;

c) information on the risks involved in participation.

The testing organization shall obtain informed consent before the start of testing.

5.3.3 Test conditions

The subjects shall take no:

a) food or drink other than water for 10 h or more prior to the test;

b) alcohol on the previous evening;

c) vigorous exercise on the morning of the test.

5.4 Reference food

5.4.1 Acceptable reference foods

The acceptable reference foods shall be as follows:

a) anhydrous glucose powder (50 g);

b) dextrose (glucose monohydrate, 55 g);

c) commercial solution used for the oral glucose tolerance test containing glucose (50 g);

d) white bread or other specific carbohydrate food of consistent composition and GI.

5.4.2 Preparation

For anhydrous glucose [5.4.1a)], dissolve 50 g (or 25 g, see 2.2) of powder in 250 ml of water, refrigerate and use within 72 h.

The amount of glycaemic carbohydrate in the reference food shall equal that of the food test portion (see 2.2).

5.4.3 Use of an alternative reference food

The use of an alternative reference food [5.4.1d)] is acceptable provided its content of glycaemic carbohydrate is standardized and its GI relative to glucose has been established and verified as consistent by the laboratory using it.

Final GI values obtained using reference foods other than glucose shall always be expressed relative to glucose. For example, the GI of white bread, relative to glucose, is 71. Thus, if a test food elicits a glycaemic response of 80 % that of white bread, its GI value is $80 \times 0{,}71 = 56{,}8 \approx 57$ after rounding.

5.4.4 Test procedure

The reference food shall be tested in each subject at least two and preferably three times on separate days within the immediate 3 month period surrounding the testing of the product in accordance with Clause 6.

5.4.5 Results

The blood glucose response to the reference food shall be expressed as the IAUC.

The mean within-subject CV for the reference food for the group of subjects tested shall be $\leqslant$ 30 %.

If the mean CV is greater than 30 %, one outlying result for the reference test in each subject can be deleted, provided the subject has done the reference test three times.

5.5 Test food

5.5.1 Carbohydrate portion

The test food shall contain 50 g of glycaemic carbohydrate. The full amount should be consumable within the time frame of 12 min to 15 min (see 6.3).

With the exception of concentrated sources of glycaemic carbohydrates, foods containing less than 10 g glycaemic carbohydrate per regular serving should not be tested for their GI.

NOTE A carbohydrate portion of 25 g can be used for foods which have a lower concentration of carbohydrates, i.e. where the bulk of food providing 50 g is unreasonably large, for example fruits.

5.5.2 Preparation

Prepare the test food in accordance with the instructions on the food label. Where milk is normally added, e.g. breakfast cereals, use water instead.

IMPORTANT — Because the addition of milk influences the final GI of some products, but not others, the GI of breakfast cereals and powdered beverages needs to be determined with the addition of water and not milk.

5.5.3 Testing of multiple flavours of a single product

For products that are available in various flavours with essentially identical macronutrient composition, two flavours, e.g. strawberry, raspberry, may be tested within one group of subjects (at least five subjects test each flavour). The final GI value in 10 or more subjects is reported as the GI of both flavours. Notwithstanding this rule, if the two flavours produce statistically different GI values ($p < 0{,}05$), the individual flavours should be tested in 10 or more subjects.

6 Experimental procedure

6.1 Subjects shall arrive in the fasting state (see 5.3.1 and 5.3.3).

6.2 Two blood samples shall be taken in the fasting state and the average result shall be taken as the baseline blood glucose concentration, expressed in millimoles per litre. Taking two samples within 5 min is acceptable.

Blood glucose may be measured in capillary (finger prick) or venous whole blood or plasma.

The type of blood sampling should be consistent within any one series of testing.

Capillary blood is preferred because rapid changes in blood glucose immediately after a meal may be identified at finger sites better than at forearm sites. GI results derived from capillary blood glucose have been found to be less variable (i.e. interindividual variation is less) than those obtained via venous sampling. Differences between foods may be larger and easier to detect statistically using capillary blood glucose.

6.3 Subjects shall consume all the test food (5.5.2) or reference food (5.4.1) at an even pace within 12 min to 15 min. Test foods shall be served with a drink of 1 or 2 cups (250 ml to 500 ml) water, coffee or tea (with 30 ml milk and non-nutritive sweetener, if desired). Each subject should choose the drink they wish to have and be given the same type and volume of drink for all tests performed by that subject. During testing, subjects shall rest.

6.4 Blood samples shall be taken at 15 min, 30 min, 45 min, 60 min, 90 min, and 120 min, and assayed for glucose. Testing postprandial glucose in duplicate is not necessary but is an acceptable option if the laboratory desires.

7 Analysis

7.1 Analysis of blood samples

The blood glucose content shall be measured in capillary (finger prick) or venous whole blood or plasma by spectrophotometry or electrochemical detection-coupled enzyme systems (References [9] and [10]. The instrument should be calibrated. The laboratory's inter-assay CV (i.e. analytical variation) on standard solutions should be $< 3{,}6$ %. The laboratory's CV for 20 or more duplicate measurements of fasting glucose (i.e. minute-to-minute variation in human subjects) should also be reported. Generally this CV is < 5 %.

IMPORTANT — Many small glucometer devices used for self-blood glucose monitoring have published analytical CVs above 3,6 % and are therefore not suitable for GI testing (Reference [7]).

7.2 Analysis of test data

7.2.1 General

Test data shall be analysed geometrically by applying the trapezoid rule and the calculations shall be carried out as given below. A sample calculation is provided.

NOTE For more details, an example giving numbers, test data, reference data, and final GI value is shown in Annex C.

7.2.2 Calculation

Calculation of GI shall be as follows.

For an individual subject, the GI of the test food, $I_{G,t}$ is given by:

$$I_{G,t} = \frac{A_t}{\bar{A}_{ref}} \times 100$$

where

A_t is the IAUC of the test food;

$\bar{A}_{ref}$ is the average IAUC of the reference food.

The final GI of the test food is expressed as

$$\bar{I}_G \pm s_{\bar{I}_G}$$

where

$\bar{I}_G$ is the mean GI value of 10 or more subjects;

$s_{\bar{I}_G}$ is the standard error of the mean.

NOTE 1 GI should be expressed to the nearest whole number.

NOTE 2 It is incorrect to determine the final GI by taking the average IAUC of the test food in the 10 subjects and expressing this as a percentage of the average IAUC of the reference food.

Outliers (2.9) can be excluded from the calculation, but a minimum of 10 subjects should still be available for the tests to have statistical validity.

7.2.3 Plotting of graphs

7.2.3.1 General

The graphs shall be plotted showing the glucose responses of the test food and reference foods as given in 7.2.3.2 and 7.2.3.3.

7.2.3.2 Average blood glucose response curve

The average blood glucose response curve shall be plotted by calculating the mean blood glucose concentrations of all subjects at each time point.

7.2.3.3 Blood glucose response curve

The blood glucose response curve may be plotted as the absolute blood glucose values or the change in blood glucose values from the fasting value on the ordinate (i.e. fasting value is 0). In the latter case, blood glucose concentration is calculated by subtracting the fasting value. The glucose concentration at other time points is calculated by subtraction of the fasting value.

7.2.4 A sample calculation

7.2.4.1 Sample data

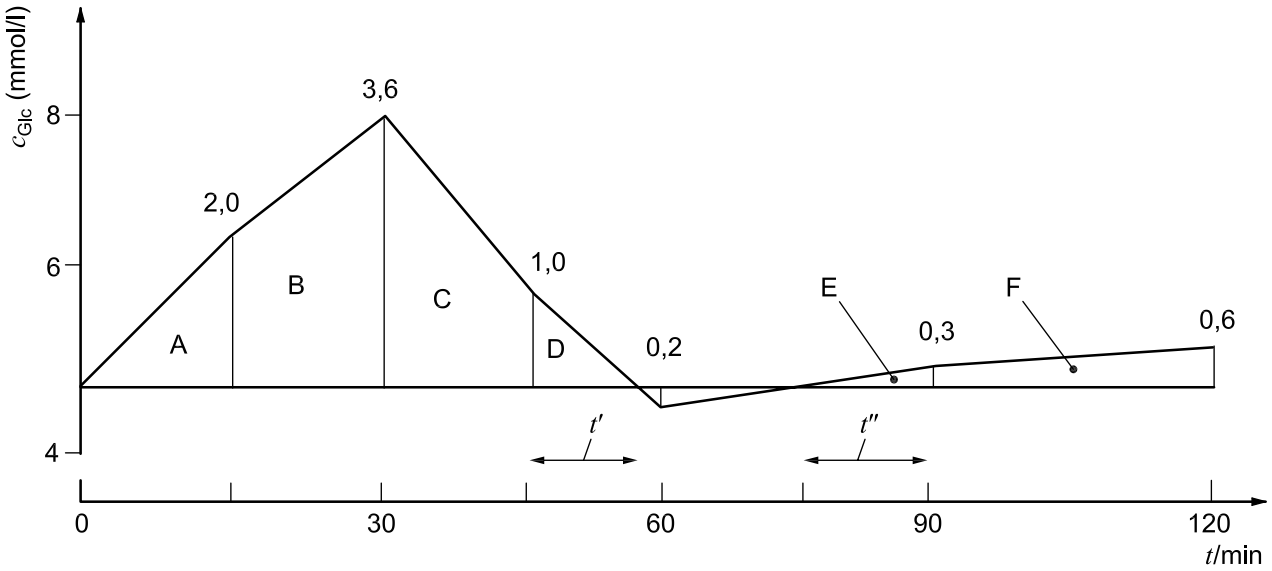
Sample data are shown in Table 1 for a single subject.

Table 1 — Sample blood glucose responses to the ingestion of a 50 g carbohydrate portion

Food sample	Time of sampling, min							IAUC
	0	15	30	45	60	90	120	
Reference food replicate No. 1	4,3	6,3	7,9	5,3	4,1	4,6	4,9	114
Reference food replicate No. 2	4,0	6,0	6,7	5,5	5,3	5,0	4,2	155
Reference food replicate No. 3	4,1	5,8	8,0	6,5	5,9	4,8	3,9	179
Test food	4,0	5,0	5,8	5,4	4,8	4,2	4,4	93

7.2.4.2 Actual calculation (sample A)

Data for reference food replicate No.1 are used in Figure 1 to illustrate the details of the actual calculation.



Key

c_{Glc} blood glucose

t' horizontal side of triangle D

t'' horizontal side of triangle E

Figure 1 — Sample calculations of incremental area under the curve (IAUC)

The IAUC for reference food replicate No.1 (data in Table 1) equals the sums of the areas of the triangles and trapezoids A to F (see Figure 1), A_A to A_F.

The area of triangle A, A_A, is given by

$$A_A = 2{,}0 \times \frac{15}{2} = 15{,}0 \quad (1)$$

The area of trapezoid B, A_B, is given by

$$A_B = (2{,}0 + 3{,}6) \times \frac{15}{2} = 42{,}0 \quad (2)$$

The area of trapezoid C, A_C, is given by

$$A_C = (3,6 + 1,0) \times \frac{15}{2} = 34,5 \quad (3)$$

The area of triangle D, A_D, can be expressed as

$$A_D = 1,0 \times \frac{t'}{2}$$

since

$$\frac{t'}{15} = \frac{1,0}{(1,0 + 0,2)}$$

therefore

$$t' = 15 \times \frac{1,0}{1,2} = 12,5$$

Therefore A_D is given by

$$A_D = 1,0 \times \frac{12,5}{2} = 6,25 \quad (4)$$

The area of triangle E, A_E, can be expressed as

$$A_E = 0,3 \times \frac{t''}{2}$$

since

$$\frac{t''}{30} = \frac{0,3}{(0,3 + 0,2)}$$

therefore

$$t'' = 30 \times \frac{0,3}{0,5} = 18$$

Therefore A_E is given by

$$A_E = 0,3 \times \frac{18}{2} = 2,7 \quad (5)$$

The area of trapezoid F, A_F, is given by

$$A_F = (0,3 + 0,6) \times \frac{30}{2} = 13,5 \quad (6)$$

Therefore, the IAUC of reference food No.1, expressed in millimole minutes per litre, is given by

$$A_A + A_B + A_C + A_D + A_E + A_F = 15,0 + 42,0 + 34,5 + 6,25 + 2,7 + 13,5 = 114$$

When calculated as above:

a) the IAUC of reference food No.2 is equivalent to 155 mmol min/l;

b) the IAUC of reference food No. 3 is equivalent to 179 mmol min/l.

The mean IAUC, $\bar{A}_{\text{ref}}$, in millimole minutes per litre, is

$$\bar{A}_{\text{ref}} = 149 \pm 33$$

where 33 is the standard deviation.

The CV is given by

$$\frac{33}{149} \times 100 = 22\ \%$$

The IAUC of the test food is 93 mmol min/l.

For this subject, the GI of the test food, $I_{\text{G,t}}$, expressed as a percentage, is given by

$$I_{\text{G,t}} = \frac{93}{149} \times 100 = 62$$

8 Test report

The test report shall contain at least the following information:

a) the mean GI value;

b) the standard error of the mean value;

c) the CV of duplicate measures of fasting glucose and the identity and value of all excluded values;

d) the manner of preparation or cooking, whether the test food was pre-cooked, and its conditions of storage;

e) the number of grams of carbohydrate in the test food and the reference food, and the mass of the food consumed;

f) how the glycaemic carbohydrate was determined;

g) the amount of glycaemic carbohydrate in the test;

h) a reference to this International Standard (ISO 26642:2010);

i) a description of the type and volume of the drinks consumed with the test meals;

j) raw data, IAUC data and the graph, if required by the client.

Annex A
(informative)

Amount of carbohydrate

The precise measurement of glycaemic carbohydrate in foods can be problematic. Where reliable information is not available, direct measurement by standard test methods is recommended. The amount of carbohydrate listed on food labels is usually determined “by difference”. The value obtained by difference is intrinsically less reliable than that obtained by direct analysis.

However, both direct and indirect determination of glycaemic carbohydrate does not necessarily reflect exactly how much carbohydrate is available for digestion in the small intestine. A proportion of the common sugars in foods (sucrose, lactose, and fructose) can be malabsorbed to varying extents in normal individuals. In addition, certain fractions of the starch in common foods (i.e. resistant starches) are not available for digestion and absorption in the small intestine.

When carbohydrates reach the large intestine, they can be fermented by bacteria to varying extents and the products of digestion may be absorbed and contribute to energy intake. However, in this form, fermented carbohydrates do not directly affect blood glucose concentration. Only the carbohydrate that is absorbed from the small intestine and metabolized is relevant in the context of GI testing.

At the time of publication, there is consensus that non-digestible carbohydrates should be excluded when determining the amount of glycaemic carbohydrate in the food. Some examples of food carbohydrates that are classed as non-digestible carbohydrates are:

a) non-digestible oligosaccharides:

   1) fructans (fructooligosaccharides, oligofructose, inulin),

   2) raffinose, stachyose,

   3) galactooligosaccharides, xylooligosaccharides;

b) non-digestible polysaccharides:

   1) cellulose and cellulose derivatives,

   2) hydroxypropylcellulose,

   3) methylcellose,

   4) arabinoxylans and galactans,

   5) pectins,

   6) β-glucans,

   7) resistant starches, including modified starches, e.g. acetylated starch,

   8) resistant maltodextrin,

   9) gums such as guar, gum arabic, gellan, carregeenan,

   10) polydextrose.

Some carbohydrates are partially absorbed in the small intestine and the estimated glycaemic carbohydrate content is listed in Table A.1.

Table A.1 — Estimated glycaemic carbohydrate content of various sugar alcohols

Sugar alcohol	Estimated glycaemic carbohydrate content g/100 g
Erythritol	0
Xylitol	50
Mannitol	0
Sorbitol	25
Lacitol	0
Isomalt	10
Maltitol	40
Maltitol syrup[a]	50
Maltitol syrup[b]	40
Polyglycitol	40

[a] Regular, intermediate and high maltitol syrups.

[b] High-polymer maltitol syrup.

NOTE Data from Reference [8].

Annex B
(informative)

Recommended categories of GI

Test foods may be classified as in Table B.1.

Table B.1 — Recommended categories of GI

Level	Glycaemic index
low	$I_{G,t} \leqslant 55$
medium	$55 < I_{G,t} \leqslant 70$
high	$70 < I_{G,t}$

The categories in Table B.1 apply to foods or food items. It is not appropriate to apply them to mixed meals. Classification of GI values is subject to revision as necessary.

Annex C
(informative)

Example of data and GI calculation

Table C.1 — Glucose 50 g, reference food No. 1

Time min	**Subject** 1	2	3	4	5	6	7	8	9	10	11	12	**Mean**	**Standard error of the mean**
	Plasma glucose results, mmol/l													
–5	5,3	5,1	5,4	5,4	4,7	5,4	5,8	5,0	5,3	5,5	5,3	5,4	5,3	0,1
0	5,3	4,9	5,5	5,5	5,0	5,4	5,9	5,0	5,4	5,5	5,6	5,3	5,4	0,1
0	5,3	5,0	5,5	5,4	4,9	5,4	5,8	5,0	5,4	5,5	5,4	5,3	**5,3**	**0,1**
15	7,6	6,0	7,5	7,4	6,9	7,3	8,9	8,7	6,8	8,7	7,9	6,6	**7,5**	**0,3**
30	9,4	8,4	9,2	8,0	6,6	8,2	8,8	9,7	9,2	10,0	9,5	7,9	**8,7**	**0,3**
45	8,7	7,4	7,4	6,8	6,8	7,2	8,1	9,0	9,6	7,5	9,2	7,0	**7,9**	**0,3**
60	7,3	6,4	7,8	6,3	7,3	6,3	7,7	7,7	7,6	5,2	7,5	6,0	**6,9**	**0,2**
90	6,8	4,4	8,8	5,5	6,6	6,5	5,8	5,9	5,0	4,2	5,1	5,7	**5,9**	**0,4**
120	6,2	4,6	5,7	6,0	4,9	6,3	4,5	4,0	4,5	4,9	5,0	5,5	**5,2**	**0,2**
IAUC	**251**	**127**	**268**	**122**	**189**	**164**	**169**	**267**	**185**	**144**	**199**	**115**	**183**	**16**

Table C.2 — Glucose 50 g, reference food No. 2

Time min	**Subject** 1	2	3	4	5	6	7	8	9	10	11	12	**Mean**	**Standard error of the mean**
	Plasma glucose results, mmol/l													
–5	5,4	5,3	5,2	5,0	5,2	5,4	5,3	4,7	6,3	5,8	5,2	5,5	5,3	0,1
0	5,2	5,1	5,4	4,9	5,1	5,4	5,4	4,8	6,4	5,9	5,4	5,7	5,4	0,1
0	5,3	5,2	5,3	4,9	5,2	5,4	5,3	4,7	6,3	5,9	5,3	5,6	**5,4**	**0,1**
15	7,7	5,7	6,6	8,1	6,4	8,4	8,6	7,3	9,8	8,9	8,0	9,6	**7,9**	**0,4**
30	8,8	8,4	8,8	8,3	8,3	8,1	11,2	8,3	11,6	9,0	10,1	9,2	**9,2**	**0,3**
45	6,5	6,5	7,3	6,4	6,5	6,7	10,8	8,2	9,7	7,1	7,9	7,8	**7,6**	**0,4**
60	5,4	5,5	7,0	5,5	9,9	5,8	9,2	7,3	7,4	6,3	6,4	8,8	**7,0**	**0,4**
90	7,2	5,6	5,8	5,1	6,0	6,3	5,5	6,5	4,9	5,1	4,4	5,3	**5,6**	**0,2**
120	5,3	4,8	5,2	5,7	5,0	5,9	3,8	4,6	5,7	5,5	4,3	4,2	**5,0**	**0,2**
IAUC	**166**	**91**	**154**	**153**	**211**	**149**	**312**	**257**	**199**	**115**	**169**	**215**	**182**	**18**

Table C.3 — Glucose 50 g, reference food No. 3

Time min	**Subject** 1	2	3	4	5	6	7	8	9	10	11	12	**Mean**	**Standard error of the mean**
	Plasma glucose results, mmol/l													
–5	6,0	5,6	5,7	5,7	5,4	5,4	5,9	5,3	5,7	5,5	5,1	5,2	5,5	0,1
0	6,0	5,6	5,8	5,8	5,5	5,2	5,9	5,2	5,8	5,5	5,3	5,0	5,6	0,1
0	6,0	5,6	5,7	5,8	5,5	5,3	5,9	5,2	5,7	5,5	5,2	5,1	**5,5**	**0,1**
15	8,4	6,0	7,5	8,5	6,9	7,0	9,9	6,8	8,6	7,7	8,3	8,3	**7,8**	**0,3**
30	10,3	7,8	8,9	8,7	8,7	9,2	13,2	9,1	10,1	7,3	10,7	8,6	**9,4**	**0,4**
45	6,8	8,8	7,5	7,2	7,6	7,6	10,6	9,8	7,9	7,4	9,8	7,8	**8,2**	**0,3**
60	7,0	6,8	6,7	6,0	6,2	6,2	7,7	9,2	6,3	5,8	7,7	6,3	**6,8**	**0,3**
90	7,9	6,6	5,4	5,9	4,9	6,6	4,2	6,7	4,6	4,6	5,7	4,2	**5,6**	**0,3**
120	6,3	6,0	5,7	6,5	5,4	5,7	4,9	5,2	5,4	4,9	4,4	4,5	**5,4**	**0,2**
IAUC	**197**	**150**	**121**	**123**	**111**	**184**	**267**	**287**	**150**	**92**	**265**	**160**	**176**	**19**

Table C.4 — Product X

Time min	**Subject**												**Mean**	**Standard error of the mean**
	1	2	3	4	5	6	7	8	9	10	11	12		
	Plasma glucose results, mmol/l													
–5	5,3	4,9	6,2	5,0	6,2	5,5	5,2	4,9	5,4	5,3	5,4	5,1	5,4	0,1
0	5,3	4,9	6,2	5,1	6,3	5,4	5,1	5,2	5,4	5,4	5,3	5,1	5,4	0,1
0	5,3	4,9	6,2	5,1	6,2	5,4	5,2	5,1	5,4	5,4	5,3	5,1	**5,4**	**0,1**
15	6,6	5,3	7,3	5,7	7,7	6,6	6,4	6,3	5,6	6,1	6,6	6,4	**6,4**	**0,2**
30	7,7	6,9	7,8	5,9	8,8	6,2	8,8	6,7	6,8	7,0	7,9	6,8	**7,3**	**0,3**
45	6,4	5,2	7,5	9,7	5,7	5,4	6,9	5,3	6,8	6,5	7,0	6,3	**6,6**	**0,4**
60	6,0	4,4	6,2	5,6	5,6	5,9	5,8	5,3	6,9	5,7	6,0	5,3	**5,7**	**0,2**
90	5,9	5,7	7,1	5,5	7,1	6,1	5,1	5,4	5,3	5,6	5,7	4,9	**5,8**	**0,2**
120	5,5	5,2	6,4	5,2	6,5	5,7	5,2	5,2	5,5	5,4	5,5	4,9	**5,5**	**0,1**
IAUC	109	63	90	115	84	67	110	60	78	64	115	66	**85**	**6**
GI	**53**	**51**	**50**	**86**	**50**	**40**	**44**	**22**	**44**	**55**	**54**	**40**	**49**	**4**

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