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Standard for determination of food glycemic index

食物血糖生成指数测定方法

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Standard for determination of food glycemic index

1 Scope

This Standard specifies the method for the determination of food glycemic index.

This Standard applies to the determination and evaluation of food glycemic index.

2 Terms and definitions

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

2.1

available carbohydrate; AC

glycemic carbohydrate

Carbohydrates that can be digested and absorbed in the small intestine, mainly including sugar, starch (except resistant starch) and some sugar alcohols that have a blood sugar-producing effect.

Appendix Table A.1 shows the available carbohydrate conversion amounts of common sugar alcohols, and Appendix Table A.2 lists the unavailable carbohydrate components.

2.2

glucose response; GR

The change in postprandial blood glucose concentration caused by the human body eating a certain amount of test food.

2.3

glucose response curve

A curve plotted with time as the horizontal axis and postprandial blood glucose concentration as the vertical axis.

2.4

glycemic index; GI

The increase in the area under the glucose response curve over a period of time (≥2 hours) after eating a meal containing a target amount (usually 50 g) of available

carbohydrates compared to fasting divided by the corresponding increase after eating a reference meal (glucose) containing the same amount of available carbohydrates, expressed as a percentage.

2.5

glycemic load; GL

The product of the mass of available carbohydrates (g) in 100 g or 1 serving of food and the GI value/100.

2.6

reference food

The reference substance used to determine the GI value of food, which is usually glucose.

The GI value of reference food is set at 100.

2.7

test food

Food used for GI value determination, which must have clear formula composition and production process.

3 Basic requirements for determination

3.1 GI determination shall comply with relevant ethical requirements.

3.2 For the facilities and conditions of the determination organization, refer to the requirements in Appendix B.

4 Subject selection

4.1 Requirements for the number of subjects

The number of subjects can be determined based on the measurement design requirements, which shall not be less than 12 people.

4.2 Inclusion criteria

4.2.1 Healthy adults (aged 18 ~ 60 years), half male and half female, not pregnant or nursing mothers;

4.2.2 Body mass index (BMI) within the normal range (18.5 kg/m^2 ~ 24.0 kg/m^2);

4.2.3 No history of diabetes (or impaired glucose tolerance), without other metabolic diseases, digestive system diseases, endocrine system diseases, or mental illness;

4.2.4 No history of allergy or intolerance to test food;

4.2.5 Not taking any nutrient supplements that may affect glucose tolerance, oral contraceptives, acetylsalicylic acid, steroids, protease inhibitors, antipsychotics, etc. in the past three months.

4.2.6 Be able to tolerate fasting for at least 10 hours.

4.3 Exclusion criteria

Other situations that are not suitable for inclusion.

5 Test food preparation

5.1 Test food dosage

5.1.1 Calculate the amount of test food based on the target amount of available carbohydrates provided and the available carbohydrate content in test food. The target amount is usually set at 50 g. Calculation is shown in Formula (1):

$$\text{Test food dosage (g)} = \frac{\text{target amount of available carbohydrates (g)}}{\text{available carbohydrate content in test food (g/100g)}} \cdots\cdots (1)$$

5.1.2 If the carbohydrate content of the test food is low, the target amount may be appropriately reduced (e.g., 25 g or 10 g), but must not be less than 10 g. Once the amount of the test food is adjusted, the amount of the reference food must also be adjusted accordingly.

5.2 Test food preparation

5.2.1 Reference food

5.2.1.1 Take an appropriate amount of food-grade or pharmaceutical-grade anhydrous glucose, glucose monohydrate or glucose solution (equivalent to the target amount of anhydrous glucose); dissolve it in purified water to 250 mL. Use on the same day or store at 4 ℃ ~ 8 ℃ after sealing and use within 48 hours.

5.2.2 Test food

Prepare the test food temporarily according to the method of consumption and dosage. If the test food is solid, provide 250 mL of pure water. If it is semi-solid or needs to be prepared with liquid, control the total amount of water to 250 mL.

6 GI value determination

6.1 Basic principles

6.1.1 GI determination should adopt a randomized design.

6.1.2 The test cycle shall include at least three independent test-meals, where the reference food shall be tested at least twice and the test food shall be tested at least once.

6.1.3 The interval between independent test-meals shall be ≥ 72 h. The test food shall be arranged between two reference food test-meals.

6.2 Test procedure for test-meal

6.2.1 Three days prior to the test, participants shall maintain a regular sleep and rest schedule, and eat a normal diet. They shall avoid high-fiber and high-sugar foods for dinner the day before the test and begin fasting before 10:00 PM. On the morning of the test, participants shall avoid strenuous exercise and shall sit quietly for 10 minutes before the start of the test-meal.

6.2.2 Collect two fasting blood samples at 5-min intervals.

6.2.3 Start eating. Strictly control the eating time and consume all the test substances and water within 5 ~ 10 minutes. Start timing from the time of the first bite of food.

6.2.4 Collect blood samples 15 min, 30 min, 45 min, 60 min, 90 min, and 120 min after a meal. If necessary, the blood collection time may be extended (e.g., 180 minutes). Ensure the consistency and accuracy of blood collection time points.

6.3 Basic requirements for blood sample collection

6.3.1 Keep the blood warm during blood collection.

6.3.2 Blood can be collected from fingertip capillary blood (whole blood) or from the back of the hand/elbow vein. The blood collection site shall be kept consistent during the measurement period.

6.3.3 The amount of blood collected should be sufficient for blood glucose measurement.

6.3.4 After blood sample collection, blood glucose shall be measured immediately for capillary blood. Venous blood shall be collected into separating gel vacuum blood collection tubes or vacuum blood collection tubes containing potassium oxalate-sodium fluoride anticoagulant; serum or plasma should be separated within 30 minutes, and testing should be completed within 8 hours. If conditions do not permit, the sample shall be stored in a refrigerator at 2 °C ~ 8 °C and blood glucose shall be measured within 48 hours.

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