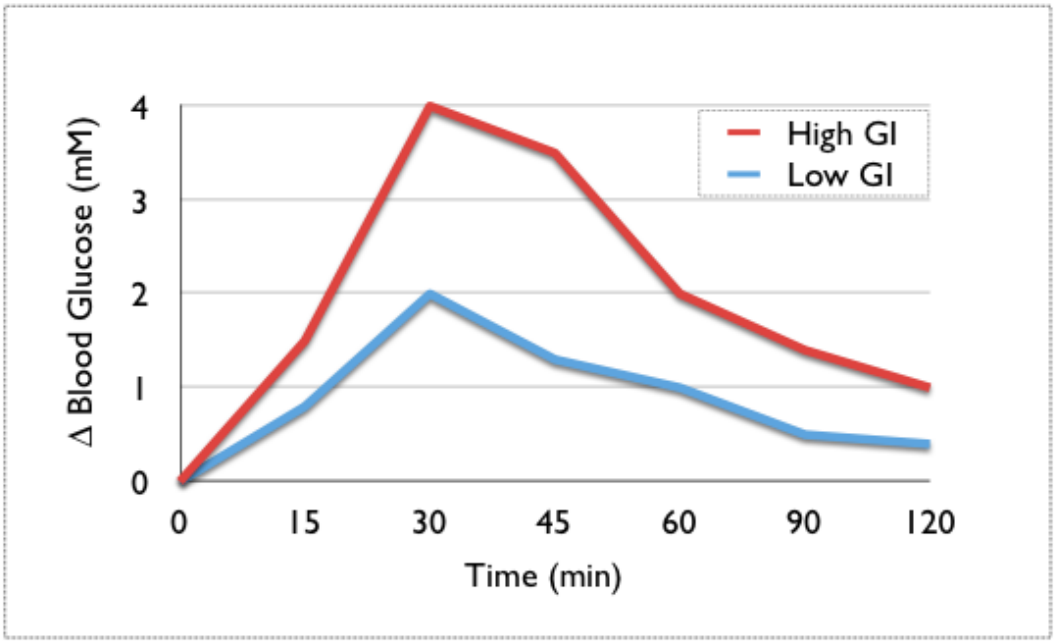
The **glycemic index**, **glycaemic index**, or **GI** is a measure of the effects of carbohydrates on blood sugar levels. Carbohydrates that break down quickly during digestion and release glucose rapidly into the bloodstream have a high GI; carbohydrates that break down more slowly, releasing glucose more gradually into the bloodstream, have a low GI. The concept was developed by Dr. David J. Jenkins and colleagues[1] in 1980–1981 at the University of Toronto in their research to find out which foods were best for people with diabetes. A lower glycemic index suggests slower rates of digestion and absorption of the foods' carbohydrates and may also indicate greater extraction from the liver and periphery of the products of carbohydrate digestion. A lower glycemic response usually equates to a lower insulin demand but not always, and may improve long-term blood glucose control[2] and blood lipids. The insulin index is also useful for providing a direct measure of the insulin response to a food.

The glycemic index of a food is defined as the area under the two-hour fasting blood glucose raised response curve (AUC) following the ingestion of a food with a certain quantity of carbohydrate (usually 50 g). The AUC of the test food is divided by the AUC of the standard (either glucose or white bread, giving two different definitions) and multiplied by 100. The average GI value is calculated from data collected in 10 human subjects. Both the standard and test food must contain an equal amount of available carbohydrate. The result gives a relative ranking for each tested food.[3]

The current validated methods use glucose as the reference food, giving it a glycemic index value of 100 by definition. This has the advantages of being universal and producing maximum GI values of approximately 100. White bread can also be used as a reference food, giving a different set of GI values (if white bread = 100, then glucose ≈ 140). For people whose staple carbohydrate source is white bread, this has the advantage of conveying directly whether replacement of the dietary staple with a different food would result in faster or slower blood glucose response. The disadvantages with this system are that the reference food is not well-defined and the GI scale is culture-dependent.[*citation needed*]



Glycemic index of foods

GI values can be interpreted intuitively as percentages on an absolute scale and are commonly interpreted as follows:

Classification	GI range	Examples
Low GI	55 or less	most fruits and vegetables, legumes/pulses, some whole, intact grains, nuts, fructose
Medium GI	56–69	whole wheat products, basmati rice, sweet potato, sucrose, baked potatoes
High GI	70 and above	white bread, most white rices, corn flakes, extruded breakfast cereals, glucose, maltose, maltodextrins]

A low-GI food will release glucose more slowly and steadily, which leads to more suitable postprandial (after meal) blood glucose readings. A high-GI food causes a more rapid rise in blood glucose levels and is suitable for energy recovery after exercise or for a person experiencing hypoglycemia.

The glycemic effect of foods depends on a number of factors such as the type of starch (amylose versus amylopectin), physical entrapment of the starch molecules within the food, fat and protein content of the food and organic acids or their salts in the meal — adding vinegar, for example, will lower the GI. The presence of fat or soluble dietary fiber can slow the gastric emptying rate, thus lowering the GI. In general, coarse, grainy breads with higher amounts of fiber have a lower GI value than white breads.[4] However, most breads made with 100% wholewheat or wholemeal flour have a GI similar to white bread.[5] Many brown breads are treated with enzymes to soften the crust, which makes the starch more accessible (high GI).

While adding fat or protein will lower the glycemic response to a meal, the relative differences remain. That is, with or without additions, there is still a higher blood glucose curve after a high GI bread than after a low-GI bread such as pumpernickel.

The glycemic index can be applied only to foods with a substantial carbohydrate content, as the test relies on subjects consuming an amount of the test food containing 50 g of available carbohydrate. Many fruits and vegetables (but not potatoes) contain very little carbohydrate per serving, and the average person is not likely to eat 50 g of carbohydrate from these foods. Fruits and vegetables tend to have a low glycemic index and a low glycemic load. This also applies to carrots, which were originally and incorrectly reported as having a high GI.[6] Alcoholic beverages have been reported to have low GI values, but it should be noted that beer has a moderate GI. Recent studies have shown that the consumption of an alcoholic drink prior to a meal reduces the GI of the meal by approximately 15%.[7] Moderate alcohol consumption more than 12 hours prior to a test does not affect the GI.[8]

Many modern diets rely on the glycemic index, including the South Beach Diet, Transitions by Market America and NutriSystem Nourish Diet.[9] However, others have pointed out that foods generally considered to be unhealthy can have a low glycemic index, for instance, chocolate cake (GI 38), ice cream (37), or pure fructose (19), whereas foods like potatoes and rice, eaten in countries with low rates of diabetes, have GIs around 100.[10][11]

The GI Symbol Program is an independent worldwide GI certification program that helps consumers identify low-GI foods and drinks. The symbol is only on foods or beverages that have had their GI values tested according to standard and meet the GI Foundation's certification criteria as a healthy choice within their food group, so they are also lower in kilojoules, fat and/or salt.