Carbohydrates

What are carbohydrates?

Carbohydrates are an important nutrient found in foods and drinks. Carbohydrates are converted to glucose by the body and are essential in giving you **energy.** Being the main source of energy in the human diet, there is no need to avoid them and they should be included as part of **a healthy eating plan** for individuals with diabetes. A balanced meal gives your body the nutrients it needs.

How are carbohydrates converted to glucose?
- Your digestive system breaks down the carbohydrates in your food to glucose.
- This enters the bloodstream, causing a **rise in blood sugar levels.**

It's important to note that **different carbohydrates affect blood sugar differently.** Knowing how fast a carbohydrate food converts to sugar can help you to **optimise sugar control.**

Types of carbohydrates

There are 3 types of carbohydrates:

Sugars are simple carbohydrates that are easy to digest. They raise blood sugar levels **quickly**.

Starches are complex carbohydrates that are made up of sugars linked together. The speed at which starches are digested by the body into sugar depend on how processed they are and how much fibre the food item contains.

Fibre is the part of complex carbohydrates that cannot be digested by the body. It makes you feel full and helps with sugar control by slowing down the passage of food through the digestive system.

Sugar

There are two main types of sugar:

1. Naturally occurring sugar – this is sugar that is found naturally in foods such as fruits, vegetables and dairy products. Excessive intake of such sugar can lead to weight gain and suboptimal control of glucose. Examples: fructose (found in fruits), lactose (found in milk).

2. Added sugar - this includes any sugar (including natural sugar) or caloric sweetener added to food or beverages during processing or preparation (such as when sugar is added to coffee or tea). Example of added sugar: molasses, high fructose corn syrup.

Sugar

Sugars can be both a natural sugar AND an added sugar. Examples include sucrose (also known as table sugar or granulated sugar) and honey, which are natural sugars commonly added to food and drinks.

Avoid food and drinks with "added sugar" (e.g., cakes, sugar-sweetened soft drinks, cookies, kueh) and beware of items with "no sugar added" as they may already contain naturally occurring sugar (e.g., fruit juice). Excessive intake of such foods contributes to caloric intake and can lead to weight gain and sub-optimal blood sugar control.

Starch

Starches should make up ¼ of your plate. Choose <u>wholegrain/wholemeal</u> varieties, such as brown rice, as they result in a more gradual rise in blood sugar levels than their refined versions such as white rice.

Examples include brown rice, rolled oats, potato with skin on, sweet potato, corn, yam, and legumes such as peas.

Minimise foods made from refined grains and processed starchy foods. They tend to be stripped of nutrients and fibre, and can cause a quicker rise in blood sugar levels.

Examples include: white bread, instant oats, white rice, skinless or mashed potato.

Fibre

Dietary fibre can slow carbohydrate digestion and glucose absorption, for better blood sugar control.

High fibre food include vegetables, fruits and whole-grain products.

Increase your fibre intake by **switching** to these options:

- Brown rice
- Wholewheat noodles and pasta
- Wholegrain bread
- Steel-cut or rolled oats

These **contain more dietary fibre** than their refined versions and can help manage blood sugar levels.

What is the Glycaemic Index (GI)?

GI measures **how fast your food or drink can cause blood sugar levels to rise.** It ranks carbohydrates from 0 to 100, according to this impact. The higher the GI, the faster blood sugar levels are expected to rise.

Eating foods lower in GI brings about a slower increase in blood sugar over time, and reduces the spike in the body's insulin hormone response. This also helps the individual feel full longer.

Many factors can affect the GI of food including:

Processing - Less processed foods have a lower GI. For example, whole fruits have lower GI compared to fruit juice as the skin and pulp have not been removed.

Cooking time - Food that is less broken down by cooking has a lower GI. For example, for the same amount of grain, boiled rice has a lower GI compared to porridge which takes longer to cook.

Meal composition - In a meal where carbohydrates are mixed with protein and other food types, the GI will be lower. For example, the same amount of rice eaten with meat and vegetable side dishes will have a lower GI than if it were eaten on its own.

There are limitations in relying on GI alone to make healthy food choices.

Fat in a food item lowers its GI, so not all low GI food are healthy choices. A diet high in fat and calories may have a low GI, but it increases the risk of weight gain, insulin resistance and heart disease.

GI of foods and blood sugar levels

Blood sugar level

Porridge

White rice

Brown rice

Diagram compares 1 serving of each category
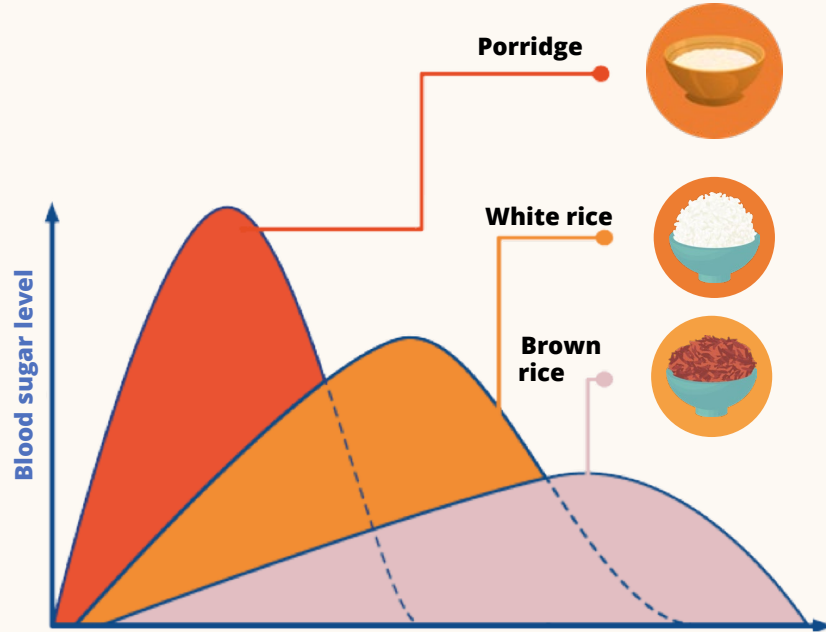
Do note that a high fat content may lower the GI of a meal. Meal 2 may have a lower GI due to its high fat content, but it is a high calorie dish and can cause weight gain in the long run.

Meal 1
Yong Tau Foo with vegetables and tofu

Meal 2
Economy fried rice