Carbohydrates

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Carbs are a macronutrient and the primary energy source for your body (along with proteins and fats). They include starches, sugars, and fiber.

Carbs are molecules that contain single, double, or multiple sugar molecules called saccharides

Monosaccharides

Three types of monosaccharides

- Glucose: Fruits and vegetables are natural sources of glucose. It’s also commonly found in syrups, candy, honey, sports drinks, and desserts.
- Fructose: The primary natural dietary source of fructose is fruit, which is why fructose is commonly referred to as fruit sugar.
- Galactose: The main dietary source of galactose is lactose, the sugar in milk and milk products, such as cheese, butter, and yogurt.

Disaccharides

Types of disaccharides

Sucrose (glucose + fructose): Sucrose — table sugar — is a natural sweetener derived from sugarcane or beet; added to foods during processing and occurs naturally in fruits and vegetables.

Lactose (glucose + galactose): Also known as milk sugar, lactose is found in milk and milk products.

Maltose (glucose + glucose): Maltose is found in malt beverages, such as beer and malt liquors.

Few Clarifications about Carbohydrates

In the past, carbohydrates were commonly classified as being either “simple” or “complex,” and described as follows

Simple carbohydrates: easily, quickly utilized for energy by the body because of their simple chemical structure, leading to a faster rise in blood sugar and insulin secretion from the pancreas – which can have negative health effects.

Complex Carbs: complex chemical structures, with three or more sugars linked together (known as oligosaccharides and polysaccharides). Many contain fiber, vitamins and minerals, and they take longer to digest – which means they have less of an immediate impact on blood sugar, causing it to rise more slowly

However

Dividing carbohydrates into simple and complex, does not account for the effect of carbohydrates on blood sugar and chronic diseases.

Glycemic Index

To explain how different kinds of carbohydrate-rich foods directly affect blood sugar, the glycemic index was developed

- Low-glycemic foods have a rating of 55 or less
- Foods rated 70-100 are considered high-glycemic foods
- Medium-level foods have a glycemic index of 56-69.

Eating many high-glycemic-index foods – which cause powerful spikes in blood sugar – can lead to an increased risk for type 2 diabetes

Factors that Affect the Glycemic Index

- **Processing**: Grains that have been milled and refined—removing the bran and the germ
- **Physical form**: Ground grain is more rapidly digested than coarsely ground grain. This is why eating whole grains in their “whole form” like brown rice or oats is recommended than eating processed whole grain bread.
- **Fiber content**: High-fiber foods don’t contain as much digestible carbohydrate, so it slows the rate of digestion and causes a more gradual and lower rise in blood sugar
- **Ripeness**: Ripe fruits and vegetables tend to have a higher glycemic index than un-ripened fruit.
- **Fat content and acid content**: Meals with fat or acid are converted more slowly into sugar.

Do Carbs turn into Sugar?

Yes. When we eat carbs, the body breaks them down into glucose (sugar) and uses them for energy.

Carbs first get broken down by the saliva in your mouth and then by your gut until they're completely broken down into glucose. Once in the blood, it's known as your "blood sugar."

Carbs affect your blood sugar level more than protein or fats do.

When the body senses a large amount of glucose rushing into the blood, the pancreas releases insulin to tell the cells to take in the glucose, keeping blood sugar levels from getting too high.

Many cells prefer glucose as a source of energy versus other compounds like fatty acids.

Red blood cells, are only able to produce cellular energy from glucose.

The brain is highly sensitive to low blood-glucose levels because it uses only glucose to produce energy and function (unless under extreme starvation conditions).

About 70 percent of the glucose entering the body from digestion is redistributed (by the liver) back into the blood for use by other tissues.

Carbs turn into Sugar

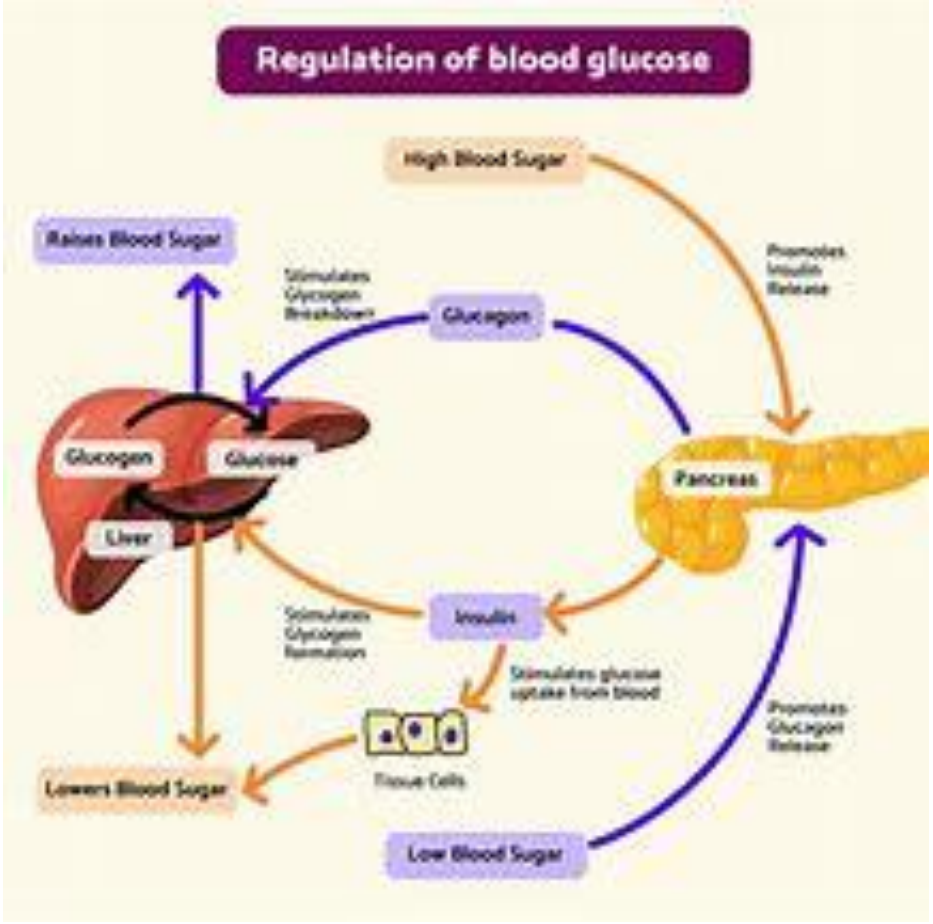
- As blood sugar levels rise, the pancreas produces insulin, which prompts cells to absorb blood sugar for energy or storage.
- As cells absorb blood sugar, levels in the bloodstream begin to fall.
- When this happens, the pancreas start making glucagon, a hormone that signals the liver to start releasing stored sugar
- This interplay of insulin and glucagon ensure that cells throughout the body, and especially in the brain, have a steady supply of blood sugar.

The small intestine tends to only absorb single sugar molecules; digestive enzymes break down carbohydrates into monosaccharides

Monosaccharides are transported to the liver

The liver then sends the produced glucose into the bloodstream, where it is transported to the cells that need energy.

When there are excessive glucose levels in the blood, the liver stores glucose into glycogen or fat..... Fatty Liver


Regulation of blood glucose
High Blood Sugar
Raises Blood Sugar
Glucagon
Glucogen
Glucose
Liver
Pancreas
Insulin
Lowers Blood Sugar
Low Blood Sugar

What’s so bad about sugar

Studies have shown that getting too many calories from added sugar can lead to elevated triglycerides — a known risk factor for heart disease

It’s been found that people who got 10–25% of their calories from added sugars were 30% more likely to die from heart disease compared to those who got less than 10% of their calories from added sugar

This risk nearly doubled for those who got more than 25% of their calories from added sugar.

Sugar and the Brain

Increased sugar consumption has been linked to an increased risk of cognitive decline

This is because high levels of sugar can cause inflammation in the brain, which can lead to damage to the brain cells responsible for memory and cognitive function.

How much Carbs do we need? Its personalized

Dietary Guidelines: 45-65% of your total calorie intake (225g -275g on a 2000 kcal intake)

1 sl bread, ½ c starchy veg, ½ c rice..... 15 g

1 serving veg..... 4 g

1 serving fruit..... 15 g

For weight loss, lower carbs to 35%, then 30% to 25%

Stabilize to 25% for weight maintenance

Watching Carbs

If you have diabetes, pre-diabetes, metabolic syndrome, or obesity, scientific evidence demonstrates significant benefit from limiting your carbs.

Bottom Line

Carbs are an important part of a healthy diet.

General rule: aim to get carbs from unrefined and unprocessed sources, like vegetables, whole grains, and legumes.

For people with diabetes, focusing on these types of carbs can help maintain blood sugar levels.

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