



## Impact of Dietary Carbohydrates on Health: A Comprehensive Overview

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### Description

Dietary carbohydrates are essential components of human nutrition, playing an important role in providing energy, supporting bodily functions, and influencing overall health. As one of the three primary macronutrients, alongside proteins and fats, carbohydrates have diverse forms and functions. The role of dietary carbohydrates in nutrition and health, emphasizing their types, physiological effects, and implications for disease prevention and management. Dietary carbohydrates are classified into three main types: Sugars, starches, and fiber. Each type has unique characteristics and impacts on health.

These are simple carbohydrates, including monosaccharides like glucose and fructose, and disaccharides like sucrose and lactose. Found naturally in fruits, vegetables, and dairy products, sugars are also added to processed foods and beverages. While natural sugars provide essential nutrients and energy, excessive intake of added sugars can lead to health problems such as obesity, type 2 diabetes, and dental caries. Starches are complex carbohydrates consisting of long chains of glucose molecules. They are found in foods like grains (rice, wheat, corn), legumes (beans, lentils), and tubers (potatoes, yams). Starches provide a sustained release of energy, making them a vital part of a balanced diet. Whole grains and legumes, in particular, offer additional nutrients like fiber, vitamins, and minerals.

Dietary fiber, also a complex carbohydrate, is the indigestible part of plant foods. It is categorized into soluble fiber, which dissolves in water and can help lower cholesterol and blood glucose levels, and insoluble fiber, which adds bulk to stool and aids in digestion. High-fiber foods include fruits, vegetables, whole grains, and legumes. Fiber promotes digestive health, prevents constipation, and may reduce the risk of chronic diseases like cardiovascular disease and certain cancers. Carbohydrates are the body's preferred energy source. When consumed, they are broken down into glucose, which is used by cells for energy. This is especially important for brain function, as the brain relies almost exclusively on glucose. Carbohydrates provide 4

kilocalories per gram, making them an efficient fuel for both aerobic and anaerobic activities.

Excess glucose is stored in the liver and muscles as glycogen. Glycogen serves as a readily available energy reserve, particularly during periods of fasting, intense physical activity, or between meals. This storage capacity allows the body to maintain stable blood glucose levels and provide energy during extended physical exertion. By providing sufficient energy, carbohydrates prevent the breakdown of proteins and fats for energy, thus preserving muscle mass and preventing ketosis. This "protein-sparing" effect is important for maintaining muscle function and overall metabolic health. Fiber, a type of carbohydrate, promotes a healthy gut microbiome by serving as a prebiotic, or food source, for beneficial gut bacteria. Fermentation of fiber in the colon produces Short-Chain Fatty Acids (SCFAs) that support gut health, enhance immune function, and may protect against metabolic diseases. The type and quantity of carbohydrates consumed can significantly affect health. Diets high in refined carbohydrates and added sugars are linked to adverse health outcomes, while diets rich in whole, unprocessed carbohydrates are associated with numerous health benefits.

Consuming high-glycemic-index foods (those that cause rapid spikes in blood glucose) can lead to insulin resistance, a precursor to type 2 diabetes, conversely low-glycemic-index foods, such as whole grains and legumes, result in slower glucose absorption and more stable blood glucose levels. High-fiber, complex carbohydrates are more satiating than simple sugars, which can aid in weight management by reducing overall calorie intake. Diets emphasizing whole grains, fruits, and vegetables are associated with lower body weight and reduced risk of obesity. Soluble fiber can help lower cholesterol levels by binding to bile acids and promoting their excretion. Diets high in whole grains and fiber are linked to lower risks of heart disease, hypertension, and stroke. Adequate fiber intake is essential for maintaining regular bowel movements and preventing digestive disorders such as diverticulosis and Irritable Bowel Syndrome (IBS). Fiber also supports a healthy gut microbiome, which is increasingly recognized for its role in overall health and disease prevention.

### Conclusion

Dietary carbohydrates are indispensable to human nutrition and health, providing essential energy, supporting bodily functions, and contributing to disease prevention. While the quality of carbohydrates consumed is essential, with a preference for whole, minimally processed sources over refined sugars, the overall role of carbohydrates in a balanced diet cannot be understated. Understanding the diverse functions and health impacts of carbohydrates enables individuals to make informed dietary choices, promoting optimal health and well-being. As research continues to elucidate the complex interactions between carbohydrates and health, dietary guidelines will evolve, reflecting the critical role of carbohydrates in nutrition.

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