**Commentary**
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# The Power of Pancreatic Amylase: Understanding its Function in Carbohydrate Digestion

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## Description

Carbohydrates are organic compounds made up of carbon, hydrogen, and oxygen atoms, and they exist in various forms, ranging from simple sugars to complex polysaccharides. Common sources of carbohydrates in the diet include fruits, vegetables, grains, legumes, and dairy products. Complex carbohydrates, such as starches and glycogen, consist of long chains of glucose molecules linked together. These chains can be branched or unbranched, and their structural complexity determines the rate at which they can be digested and absorbed by the body. In contrast, simple carbohydrates, such as Monosaccharaides (e.g., glucose, fructose, and galactose), and Disaccharides (e.g., sucrose, lactose, and maltose), consist of one or two sugar molecules and are more readily absorbed.

Pancreatic amylase is a key enzyme involved in the digestion of complex carbohydrates. It is produced by the acinar cells of the pancreas and secreted into the small intestine, specifically the duodenum, where carbohydrate digestion primarily takes place [1]. The secretion of pancreatic amylase is regulated by hormonal signals triggered by the presence of carbohydrates in the digestive system. When carbohydrates reach the small intestine, the cells lining the intestinal walls release a hormone called Cholecystokinin (CCK). CCK stimulates the pancreas to release pancreatic amylase into the small intestine, where it can act on the complex carbohydrates in the food.

Pancreatic amylase works by hydrolysing the bonds between the glucose molecules in complex carbohydrates, ultimately breaking them down into smaller units. It specifically targets the alpha-1, 4 glycosidic linkages present in starches and glycogen. The hydrolysis process begins when pancreatic amylase binds to the polysaccharide substrate. It then cleaves the alpha-1, 4 glycosidic bonds, releasing shorter carbohydrate chains called dextrin. These dextrins undergo further hydrolysis by pancreatic amylase, resulting in the formation of maltose, a disaccharide consisting of two glucose molecules. Maltose, along with other disaccharides present in the small intestine, is further broken down into monosaccharaides by brush border enzymes, such as maltase, sucrase, and lactase, located on the surface of the intestinal cells [2]. These monosaccharides, primarily glucose, fructose, and galactose, are then absorbed into the bloodstream and transported to various tissues for energy production or storage.

Pancreatic amylase is highly effective at breaking down complex carbohydrates. Its ability to hydrolyse the alpha-1,4 glycosidic bonds in starches and glycogen enables the efficient release of glucose units, providing a readily available energy source. Pancreatic amylase complements the action of other carbohydrate-digesting enzymes, such as salivary amylase. Salivary amylase initiates carbohydrate digestion in the mouth, breaking down complex carbohydrates into smaller fragments. However, salivary amylase activity is limited due to the brief exposure to saliva during chewing. Pancreatic amylase takes over in the small intestine, where it further digests complex carbohydrates and ensures complete breakdown. The breakdown of complex carbohydrates into simpler forms by pancreatic amylase and other digestive enzymes facilitates optimal nutrient absorption. Smaller carbohydrate units, such as monosaccharides, are more efficiently absorbed through the intestinal wall into the bloodstream, ensuring that the body can readily utilize the energy they provide.

Hormonal release of pancreatic amylase is stimulated by the hormone Cholecystokinin (CCK). CCK is released by specialized cells in the lining of the small intestine in response to the presence of proteins and fats. As these food components enter the small intestine, CCK signals the pancreas to release pancreatic amylase, along with other digestive enzymes, to facilitate digestion [3]. Neural signals, particularly from the parasympathetic nervous system, also play a role in the regulation of pancreatic enzyme secretion. Parasympathetic stimulation, often occurring during the rest and digest state, enhances the secretion of pancreatic enzymes, including amylase.

Pancreatic amylase is a powerful enzyme that plays a vital role in the digestion of complex carbohydrates. It breaks down starches and glycogen into smaller units, facilitating the release of glucose molecules that can be readily absorbed by the body. Understanding the function and importance of pancreatic amylase in carbohydrate digestion provides insights into the intricate process of nutrient breakdown and absorption [4]. Disruptions in pancreatic amylase secretion or activity can lead to carbohydrate malabsorption and related health issues. Further research and advancements in our understanding of pancreatic amylase and carbohydrate digestion will continue to shed light on the optimal management and treatment of digestive disorders, as well as inform dietary recommendations for individuals with specific carbohydrate-related conditions [5].

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## Conflict of Interest

There are no conflicts of interest by author.

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