

# Carbohydrates digestion and absorption



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The last of many carbohydrate digestion and absorption of about 20 years because they have been learning this new knowledge, in many ways, changed the thinking of our dietary carbohydrates completely. Now, is not completely digestible starch, and know that, indeed, is some very bad digestion. We learned the undigested carbohydrate bulking agent is not a neutral, an important physiological effects, as well as contribute to energy conservation on a diet. “ Sugar” not bad for health, starch, and equal to the effect of glucose and lipids, but not all. However, all these knowledge in the field is far from complete. In addition, the unresolved debate about how to measure how dietary fiber and starch in order to define how different methods are used in various parts of the world. The main challenge is to determine the value of energy and carbohydrate composition of foods which have the responsibility to formulate policy recommendations and dietary carbohydrates these people.

### **Energy values of carbohydrates:**

How many of the energy of the various ways food, energy metabolism is used to determine the availability of human metabolism (ME) is calling. Food (TE) can be determined by measuring the total amount of heat and energy, rather than food, which is all the energy is absorbed, some is absorbed, my TE is less than the urine lost. Most of the energy is contained in the manure, you will lose heat produced during colonic fermentation of unabsorbed gas and several finished.

The most common approach for determining the amount of food energy, the multiplication (68) is the energy consumption of various food components (ie, fat, protein, alcohol) the amount of carbohydrates contained in the is

calculated, the total number of results is the amount of energy is interpreted as the food. Conceptual challenges for determining the energy values of carbohydrates, carbohydrate one proposed change in the total amount of energy per gram, they are digested, the degree of absorption is, in fact, the extent to which the energy of undigested carbohydrates They provided the amount is dependent on fermentation in the colon. 0 to 100% which may vary. Regression model experiments demonstrate alternative energy is excreted in urine and total energy intake has been proposed based on the development from a variety of diet was measured in flight. Here, energy loss is equal to the total energy intake minus energy metabolism during the meal, the carbohydrate intake was estimated from nitrogen and the latter can not

### **Digestion and absorption of carbohydrates:**

Polysaccharide, which must be absorbed before hydrolysis of the component monosaccharides of oligosaccharides. The salivary amylase digestion of starch, and pancreatic amylase is much less than this activity is an important start in the small intestine. However, blood glucose levels of amylase is also generated some major end products, maltotriose, and – and that is Dekisutorinmarutosu, the hydrolysis of starch.  $\alpha$ -amylase digestion products are expressed on a cheeky border of an enzyme in cells of the small intestine of the component monosaccharides, sucrase of the most important among them, isomaltase is maltase, lactase (69) is hydrolyzed. Refined Western diet typically are rapidly digested carbohydrates, sugar absorption occurs primarily in the upper small intestine. The top of the villi lining the small intestine and this is reflected in the presence of a finger, the lower half of the

small intestine is as wide and short villi. However, along the entire length of the small intestine digestion and absorption of carbohydrates, when carbohydrates are present in the shift to less easily occur and the ileum, or intestinal glucosidase inhibitor, to treat diabetes When the digested food contains may be used. In this situation, the structure of the small intestine villi of the entire exhibition is at the top of the leaf, as the array, while the villi are longer and more like the fingers of the ileum.

### **AA:**

The only D – glucose and D – will be absorbed in the small intestine of human galactose actively. D – fructose, but is not actively absorbed, there is more than the speed of diffusion is expected by passive diffusion. Sodium-dependent glucose transporter, SGLT1, is responsible for the quality and volume of intestinal cells against the molar sodium concentration gradient for active transport of glucose and galactose. Facilitate the transport fructose, glucose transporter 5 (GLUT5) are accounted for. Glucose in the area of intestinal cells, glucose transporter 2 (GLUT2) (70) is pumped from. Not fully understand the mechanism of fructose absorption in the intestines of humans. Furukutosusutandaron solution is specified at 40-80 subjects and some subjects can absorb 15 percent less than Guramufurukutosu absorb. If, flatulence has been given 50 doses of oral fructose in grams or more, diarrhea is common. However, when given in combination with starch, glucose and fructose, fructose, malabsorb completely alone (71), fructose is absorbed in the subject. Since fructose is rare when there is no other carbohydrates, because the mouth with a load of fructose diet, fructose malabsorption is really the only problem.

**Sugar:**

Tend glucosidase induced intestinal brush border. For example, there is evidence, high sugar intake, and postprandial insulin, the increase reflects the oral sucrose for induction of intestinal sucrase activity probably absorbed (72), gastric inhibitory poly large load increase peptide response. Unable to absorb certain carbohydrates to the lack of brush border, the glucosidase results. This is much, except for the population occurs lactase deficiency is common in whites than this. The latter is the ability to digest and reduce the result may be partial or complete, and absorb lactose.

**Glycemic index:**

Glycemic response of carbohydrate foods, the glycemic index (GI) can be classified separately. Is considered to be a valid index of the biological value of dietary carbohydrates stomach. This is a standard food 50g glycemic response foods are defined as carbohydrate-induced portion (73) was withdrawn by the portion of 50g of carbohydrate is expressed as a percentage. Glycemic response is under the blood glucose response curve as the incremental area is defined by ignoring the area beneath the fasting concentration (lower curve) (74-76), ie area. Glucose and white bread has been standard cuisine. If blood glucose levels, the standard (ie GI glucose = 100 points) for food at lower values of GI, the glycemic response to glucose, white bread is the standard coefficient of 1. 38 is 1. 38 times the white bread .

**Mixed with glycemic index diet:**

GI is the main reason for the validity of many disputes that should not be applied to a mixed diet, that is. Are expected to estimate the glycemic

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response to mixed meals in an inappropriate way for the application of much debate. When properly applied, the stomach, then a reasonable prediction accuracy, different carbohydrate meal consisting of relative blood glucose response of mixed meals of identical composition.

**Implications for glycemic index:**

Percentage of GI absorption of carbohydrates and eating is the number of long-term effects of the change. Diet there is enough evidence gastrointestinal diseases (80) to improve overall blood sugar control subjects and to reduce serum triglycerides and lower in subjects with hypertriglyceridemia.

In addition, some evidence is that related to sports nutrition and appetite regulation of glycemic index. Low GI at the end of exercise to increase endurance time to prolonged strenuous exercise before the food, eating a high concentration of fuel provided to the plasma. However, after the exercise replenishment of muscle glycogen faster high-digested food.

**Phase of gastric secretion:**

Before entering the stomach for food, preparing the body included for food and digestion of the head - Phase - This phase occurs. Vision and is thought to stimulate the cerebral cortex. Taste and smell stimulus is sent to the hypothalamus and medulla oblongata. This is after being routed through the vagus nerve and acetylcholine release. At this stage of the maximum rate of secretion of the stomach to rise to 40 percent. The food in the stomach acidity, because at this point has not been buffered, the parietal lobe (to

suppress acid secretion) and cell function G (gastrin secretion) 3D somatostatin secretion through the activity of cells.

- Gastric phase – This phase is 3-4 hours. This is the stomach, the stomach pH and is stimulated by the expansion of the decline in the presence of food. Myentric distension activate the long-reflex. Acetylcholine is the release of gastric irritation of Ririsuakutibu more. As protein, and enters the stomach, a pH of 1-3 to avoid it, the stomach pH and hydrogen ions are bound to decrease. Will break the secretion of gastrin and hydrochloric acid suppression. This Gasutorinririsu stimulate the cells to secrete hydrochloric wall in order to trigger the cell Åœ. The hydrochloride is released, acetylcholine is triggered by histamine.
- Intestinal phase – This phase has two parts excitement and inhibition. Fills the duodenum and partially digested food. This triggers intestinal gastrin to be released. Vagal nucleus and inhibits the stomach, to prevent more food from entering the activation of the sympathetic fibers causing the pyloric sphincter to strengthen the control of local reflections.

## Oral:

### Main article: Mouth (human)

In humans, the food is chewed the digestive system begins in the mouth. A large amount of saliva (1 to 1.5 liters / day) of exocrine salivary glands of three pairs (submandibular, parotid, sublingual) is in the oral cavity are secreted, the food is chewed and mixed with tongue Masu. There are two

types of saliva. One is thin and watery discharge, and wet food that purpose. Other thickness, and mucosal secretions, acts as a lubricant and causes food particles stick together to form a clot. Saliva in the mouth is clean, moisten the food contains digestive enzymes such as salivary amylase, such as subsidies to the sugar maltose and starch polysaccharide degradation and chemical features. The mucous membrane contains glycoproteins that help to soften the food in the masses.

Dysphagia, the esophagus is chewed the food transport through the oropharynx and hypopharynx. Swallowing mechanism will be adjusted at the bridge and the medullary swallowing center. Receptors in the throat by a chunk of food-contact reflection starts being pressed on the back of the mouth.

### **Throat:**

#### **Main article: Human throat**

It is located immediately to the rear portion of head works and throat (behind) the mouth and nose, and skull and Superior, to reflux into the esophagus. This is part of the respiratory system and digestive system. This is both food and air in the pharynx, through the flap of connective tissue and exits to prevent choking if swallowed or choked on food in the trachea of the epiglottis.

Oropharynx is lined by epithelium and squamous epithelium in the mouth behind, is part of the throat. Located behind the nasal cavity and pharynx are lined with ciliated columnar pseudostratified epithelium similar to the nasal cavity.



It (throat) hypopharynx acts as a food and air passages in the throat as described above, is lined with stratified squamous epithelium. It is located straight below the epiglottis, larynx where the divergence extends to respiratory or digestive route. In that respect, the esophagus is a straight throat. During swallowing, food and air passage temporarily stops and the “rights” there.

### **Esophagus:**

#### **Main article: Esophagus**

Esophagus is 25 centimeters long, the throat, and you start at the back of the mouth, and a narrow tube through the diaphragm and chest muscles, and ends at the cardia of the stomach. The wall of the esophagus, the smooth muscle from the esophagus to form a continuous layer 2 consists of an open contract with a single layer, slowly over a long period of time. Meanwhile, a series of descending rings of the inner circular muscle layer is placed vertically in the outer layer is placed. At the top of the esophagus, the flap of tissue called the epiglottis, the trachea (windpipe) during swallowing ends to prevent food from entering. The stomach below the esophagus chewed food is pushed through the peristaltic contraction of these muscles. This is about the food to pass through the esophagus without digestion takes place seven seconds.

#### **Small intestine is:**

In vertebrates, the digestive tract of the small intestine following the stomach (intestine) is part of, followed by large intestine, where digestion and, most of the absorption of food is done. In conditions such as worms “

gut” and “ colon”, the invertebrates are used often to describe the entire gut. However, direct information about the process, this article applies to most mammals, mainly about the details of the human intestine is. (The major exception is the cow for the digestion of cattle and other mammals is similar, please remind the.)

### **Digestion and absorption:**

Pyloric muscle called the food from the stomach into the duodenum, pyloric sphincter or are allowed, and then called peristalsis is pressed in the process of wavelike muscle contractions through the small intestine.

### **Digestive:**

Small intestine, most chemical digestion takes place. Most digestive enzymes will work to enter the small intestine through a duct into the small intestine and secreted by the pancreas. Enzymes, in order to respond to the hormone cholecystikinin, which is generated in response to the presence of nutrients in the small intestine, enter the small intestine. Potentially harmful acid is also coming from Hormonsekurechin neutralize stomach, bicarbonate is to be released from the pancreas to the small intestine.

Three undergo the digestion of nutrients in three main classes of proteins, lipids (fats) and carbohydrates are:

- Pepuchidoamino acids and proteins are broken down. Chemical breakdown begins in the stomach, which continues in the small intestine. Trypsin, chymotrypsin and other proteolytic enzymes are proteins that are secreted by the pancreas and cut into small peptides. Carboxypeptidase is a pancreatic brush border enzyme, splits one

amino acid at one time one. The final product of the free amino acid aminopeptidase and dipeptidase.

- lipid (fat) will be broken down into fatty acids and glycerol. Pancreatic lipase to break down triglycerides into free fatty acids and monoglycerides. Bile is secreted from the liver and gallbladder, pancreatic lipase works with the help of salt. The bile acid triglycerides, attach to the emulsion as an adjunct to pancreatic lipase access. This occurs when water is this lipase, triglycerides and hydrophobic water-soluble, and their distance from the intestinal environment, such as water and tend towards the other direction. Lipase to the bile acid salt is a triglyceride that holds water in such an environment can break them into smaller components that can enter the villi for absorption “middle person” is.
- Some carbohydrates are simple sugars, or monosaccharides (eg glucose) are broken down. Several oligosaccharide carbohydrates (particularly starch) to break down pancreatic amylase. Further processing passes undigested into the large intestine and other intestinal carbohydrate. Succeed because of the brush border enzymes. Dextrinase brush border is the most important enzyme, glucoamylase which further break down the oligosaccharides. Is Sukurazemarutaze other brush border enzymes, lactase. If you do not exist for most human adult lactase, lactose, and, most polysaccharides are not digested in the small intestine. Some carbohydrates such as cellulose, even when all is not digested and glucose is made of multiple units.

**Absorption:**

Food digestion is currently in the blood vessels of the intestinal wall, you can go through a process known as diffusion. Site of the small intestine, nutrients are absorbed from food intake for most. Wall and the inner lining is lined with simple columnar epithelium of the small intestine. In structure, is covered with a mucous membrane, circular folds or wrinkles are a permanent feature, the fold is called the wall of the organ considered. They are distinguished from expansion and contraction with the wrinkles on a permanent or temporary is considered hidden. Villous tissue fragments of microscopic finger projects from the circular folds (eg, “woolly hair”) to be called Latin. Individual epithelial cells also have finger like projections called microvilli. Circular folds, the function of villi and microvilli is to increase the amount of available surface area for absorption of nutrients.

And is close to the surface of the milk and fine network of lymphatic capillaries in each villus. These capillaries (amino acids and carbohydrates) villus epithelial cells transport nutrients from the intestinal lumen (fat) milk. Absorbing material is where the blood vessels to various organs of the body will be transferred over and will be used as our body needs protein to build a complex matter. This is called diffusion. The food is not absorbed through the large intestine undigested remains.

Majority of the intestinal absorption of nutrients is carried out following significant exceptions:

- Iron is absorbed in the duodenum.
- Vitamin B12 is absorbed in the terminal ileum and bile acid.

- The passive diffusion of lipids and water is absorbed throughout the small intestine.
- Active transport of sodium will be absorbed by the joint transport of glucose and amino acids.
- Fructose is absorbed by facilitated diffusion.

**Digestive:**

Small component of the mechanical and chemical digestion of food are broken down to be absorbed into the bloodstream, for example. Digested form catabolism: breakdown large food molecules are small.

In mammals, food, the teeth will bite the chemical processes in the chemical, first enter the mouth of saliva from the salivary glands. Then, move the esophagus to acid pollution kills most microorganisms that are both in the stomach, some food and mechanical (eg, denaturation of proteins) begin to break down, and some chemical changes. After a while (usually two hours or more dogs in one of two people 4-6 hours, cat house is slightly shorter period, results ...), through the small intestine, through the large intestine, which, during defecation excreted.

**Digestive:**

Digestive system takes many forms. During the digestion of a fundamental distinction between internal and external. External digestion evolve, the first and most bacteria are dependent on it yet. In this process, enzymes, microbial environment, which is secreted into the surrounding organic material to break where the back of some products, the spread organisms. Then, it rolled into a tube and more animals, more efficient digestion of the

internal breakdown products has evolved to get by, you can more efficiently control the chemical environment can be captured.

Outside environment, and almost all spiders, some organisms, biological toxins and chemical substances secreted into the digestive system simple (eg, [enzyme]) before, as a result of “ the ingestion of the soup”. In others, once a potential nutrient or food, such structures can be carried out seminal vesicles and in vivo digestion, tubes, or aimed at more efficient absorption of nutrients and some special organs are over.

#### **Absorption of sugars:**

Without intestinal flora, can not digest because it does not utilize a portion of the human body, enough enzyme to split the specific polysaccharides of several types of human cells in the intestinal flora carbohydrates consumed it. Rodents raised in sterile environment, devoid of intestinal flora in only 30% more calories, you need to maintain the same weight and the normal counterpart. Carbohydrates, starch without the help of certain bacteria in humans, dietary fiber, sugars and oligosaccharides, in the case of sugar alcohol and lactose intolerance to digest the body, such as lactose can not be absorbed in the intestine mucus generation, and can not digest protein. Flatulence more results, specifically the metabolism of oligosaccharides in beans (especially) *Methanobrevibacter smithii* is from the.

Enable the bacterial short-chain fatty acids, SCFAs or in the fermentation of carbohydrate. These materials, depending on the host cell can be used for the main source of human energy and valuable nutrients. They are harmful bacteria is to reduce the number of increased growth of human intestinal

cells, increased intestinal absorption of water is used for the growth of indigenous bacteria. SCFAs are produced in a form called the glycolytic fermentation fermentation, acetic acid, propionic acid, butyric acid and other organic acid. Gases also contains lactic acid and is produced by fermentation of sugar degradation. Muscles used in acetic acid, propionic acid, butyric acid liver helps to generate ATP, may prevent bowel cancer cells to provide energy.

### **Glucokinase:**

Enzymes, promoting the phosphorylation of glucose to glucose – 6 – phosphate is. Cell glucokinase in the liver, pancreas, occurs in the intestine, and most other vertebrates, the human brain. An important role in the regulation of carbohydrate metabolism and acts as a glucose sensor, each of these organs, or rise, in response to falling blood sugar levels that occur after meals or fasting such trigger changes in metabolism and cell function. Mutation of the gene for this enzyme has an unusual form of diabetes and hypoglycemia.

Glucokinase (GK) Hekisokinaseaisozaimu and related to the same evolutionary phase, at least one other three is to hexokinases. Hexokinases can all mediate the phosphorylation of glucose to glucose – 6 – (G6P), the phosphate system is the first step of both glycogen synthesis and glycolysis. However, glucokinase and other genes can provide a different set of functions coded in the properties of its characteristic movements. Glucokinase is cooked as more important for glucose glycolysis and glycogen synthesis in most tissues and organs, and other 3 hexokinases or leaves, their activities are localized in several cell types, etc. The low-affinity <https://assignbuster.com/carbohydrates-digestion-and-absorption/>

hexokinases have than glucose. Because of this decreased affinity, glucokinase activity under normal physiological conditions can vary substantially depending on the concentration of glucose.

**Mechanism:**

Sulfhydryl binding sites of several cysteine residues, enclose your blood sugar. All 230 non-essential cysteine catalytic process has multiple disulfide bond formation during the interaction with substrates and regulators. At least 1 in  $10^2$  cells, glucokinase active and inactive molecules, the ratio is determined by the balance of the oxidation or reduction of disulfide bonds at least partially Surufuhidorirugurupu.

These Surufuhidorirugurupu significant cellular oxidative state, most of the components of oxidative stress is one of the glucokinase the beta cells are particularly sensitive vulnerability.

**Function and regulation:**

Most glucokinase mammals are found in the liver, hexokinase activity of about 95% of glucokinase in hepatocytes provides. Phosphorylation of glucose to glucose – 6 – (G6P) both glycogen synthesis and glycolysis Gurukokinazerin acid is the first step in the liver.

Enough glucose when cells are replete with glycogen to the liver cells around the glycogen synthesis can proceed. Adipose tissue triglycerides are converted to more exports and storage of excess glucose. Glucokinase activity increased in the cytoplasm, and with the appropriate glucose.



G6P, glucokinase products is a major substrate for glycogen synthesis is closely related to the function and regulation of synthesis and Glucokinase. When is the best, GK and glycogen synthase is active seems to be located in the surrounding area as has occurred in the cytoplasm of liver glycogen synthesis.

Attenuation in response to changes in glucose supply or you can rapidly amplify glucokinase activity is usually caused by eating and hunger. The level and speed of some of the regulations is to occur, which is affected by two main factors that affect a lot of one common mechanism:

1. Glucokinase regulatory protein or a few minutes you can amplify the activity of glucokinase (GKRP) decreased by the action. The action of this protein is affected by small molecules such as glucose and fructose.

- Two. The amount of glucokinase, you can increase the synthesis of new proteins. Increased insulin, the major signal for transcription, sterol regulatory element binding protein transcription factors in the way of the Liver X receptor 1c (SREBP1c) is called the behavior. This rise in insulin levels after 1 hours, occurs after a meal of carbohydrates.

Neonatal fat digestion:

Relies on high-carbohydrate diet of the fetus in the womb. After birth, nutrition is a major source of fat milk or milk replacer. Compared to the adult rate of absorption of fat in your diet, as babies, compared to 65-80 percent “ 95%, respectively, can be lower due to low pancreatic lipase activity. In addition, milk fat, pancreas good substrate for the lipase is not available.

This fact, lack of bile salts through the gut of the newborn, the combination of low pH, the request is to catalyze the hydrolysis of fat in the diet of the main lingual lipase enzyme. activity of this enzyme as a 26-week gestational age, ability, are expected, according to early maturity of the gastrointestinal tract and the hydrolysis of dietary fat variables.

Digestive enzymes:

The gastrointestinal tract that is secreted by two important second, mouth and digestive enzymes are secreted in the stomach and intestines. On the other hand, is secreted by the stomach and intestinal epithelial cells in the digestive enzymes of these accessories will be secreted. During the digestive tract embedded in the walls of these enzymes remains to be secreted in an inactive form of the enzyme other professional. These proenzymes tube factors will activate it to reach the lumen of the specific enzyme specific professional. The best pepsin secreted by the cells in the stomach is a typical example. Secreted in an inactive form of pepsin (pepsinogen) is.