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Review

Happi gummies Digestive Enzymes: helps to relief from occasional bloating & intestinal discomfort

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Abstract

Gummy bears (German: *Gummibär*) are small, fruit gum candies, similar to a jelly baby. The candy is roughly 2 cm (0.8 in) long and shaped in the form of a bear. A modern healthy and fitness companion contain powerhouse ingredients to support a healthy lifestyle. Additionally, to Apple Cider Vinegar (including The Mother), it contains needed Vitamins & Minerals. The Contemporary lifestyle behaviours of consuming processed foods and beverages will cause toxins within the body, and lowers immunity. Digestive Enzymes Indigestion, Bloating or gas, prevents you from enjoying a good meal then help is on the way. Now you have a safe natural and simple solution. Lactonova Happi gummy Digestive Enzymes helps your digestive system to break down the foods you consumed - so you receive all the nutrients available from your meals and halt the painful (and sometimes embarrassing) cycle of discomfort in intestine. Each Gummy goes to supplementing your own natural digestive enzymes - Contains a full spectrum of enzymes to help you digest carbohydrates, fats, and proteins Helps soothing your digestive system Lactonova Happi gummy Digestive Enzymes helps you relief from occasional bloating, intestinal discomfort and gas Help you obtain more nutritional value from the foods you consume. Contains natural enzymes at a high activity level than similar products on the market today. Simple and easy to take - one gummy immediately after meal.

Keywords: Lactonova, Gummies, Digestive Enzymes, Indigestion, Bloating.

INTRODUCTION

Digestive enzymes play a key role in breaking down the food you eat. These proteins speed up chemical reactions that turn nutrients into substances that your digestive tract can absorb. Our saliva has digestive enzymes in it. Some of your organs, including your pancreas, gallbladder, and liver, also release them. Cells on the surface of your intestines store them, too.

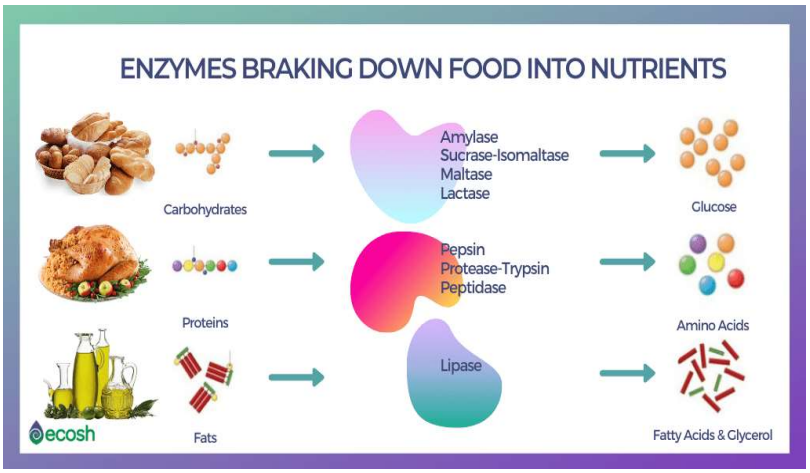

Fig 1: Enzymes braking down food into nutrients

Different types of enzymes target different nutrients

- Amylase breaks down carbs and starches
- Protease works on proteins
- Lipase handles fats

Natural Sources of Digestive Enzymes

Fruits, vegetables, and other foods have natural digestive enzymes. Eating them can improve your digestion.

- Honey, especially the raw kind, has amylase and protease.
- Mangoes and bananas have amylase, which also helps the fruit to ripen.
- Papaya has a type of protease called papain.
- Avocados have the digestive enzyme lipase.
- Sauerkraut, or fermented cabbage, picks up digestive enzymes during the fermentation process.

If your body doesn't make enough digestive enzymes, it can't digest food well. That can mean stomachaches, diarrhea, gas, or other painful symptoms.

Some digestive disorders prevent your body from making enough enzymes, such as:

Lactose intolerance. This is when your small intestine doesn't make enough of the enzyme lactase, which breaks down the natural sugar in milk called lactose. With a shortage of lactase, lactose in dairy products that you eat travels straight to your colon instead of getting absorbed into your body. It then combines with bacteria and causes uncomfortable stomach symptoms.

There are three kinds of lactose intolerance

Primary: You are born with a gene that makes you lactose intolerant. The gene is most common in people of African, Asian, or Hispanic background. Your lactase levels drop suddenly as a child. Then you're no longer able to digest dairy as easily. This is the most common type of lactose intolerance.

Secondary: Your small intestine makes less lactase after an illness, injury, or surgery. It can also be a symptom of both celiac disease and Crohn's disease.

Congenital or developmental: From the time you are born, your body doesn't make lactase. This is rare. You have to inherit the gene for this from both your mother and father.

People with lactose intolerance need to move their bowels a lot and have gas and bloating after eating or drinking dairy products like milk and ice cream. Some people can manage symptoms by eating smaller amounts of dairy. Others avoid dairy completely or choose lactose-free foods and drinks.

Exocrine pancreatic insufficiency (EPI). This can happen when another condition damages the pancreas. Common causes of EPI include:

- Pancreatitis, or inflammation of the pancreas
- Pancreatic cancer, which starts in the tissues of your pancreas
- Cystic fibrosis, a genetic condition that damages the lungs, digestive system, and other organs

Digestive enzymes

Digestive enzymes are a group of enzymes that break down polymeric macromolecules into their smaller building blocks, in order to facilitate their absorption into the cells of the body. Digestive enzymes are found in the digestive tracts of animals (including humans) and in the tracts of carnivorous plants, where they aid in the digestion of food, as well as inside cells, especially in their lysosomes, where they function to maintain cellular survival. Digestive enzymes of diverse specificities are found in the saliva secreted by the salivary glands, in the secretions of cells lining the stomach, in the pancreatic juice secreted by pancreatic exocrine cells, and in the secretions of cells lining the small and large intestines.

Digestive enzymes are classified based on their target substrates

- Lipases split fatty acids into fats and oils.
- Proteases and peptidases split proteins into small peptides and amino acids.
- Amylases split carbohydrates such as starch and sugars into simple sugars such as glucose.
- Nucleases split nucleic acids into nucleotides.
- In the human digestive system, the main sites of digestion are the mouth, stomach, and small intestine. Digestive enzymes are secreted by different exocrine glands including:
- Salivary glands
- Gastric glands in the stomach
- Secretory cells (islets) in the pancreas
- Secretory glands in the small intestine

Mouth

Complex food substances that are taken by animals and humans must be broken down into simple, soluble, and diffusible substances before they can be absorbed. In the oral cavity, salivary glands secrete an array of enzymes and substances that aid in digestion and also disinfection. They include the following:[1]

- Lingual lipase: Lipid digestion initiates in the mouth. Lingual lipase starts the digestion of the lipids/fats.
- Salivary amylase: Carbohydrate digestion also initiates in the mouth. Amylase, produced by the salivary glands, breaks complex carbohydrates, mainly cooked starch, to smaller chains, or even simple sugars. It is sometimes referred to as ptyalin.
- Lysozyme: Considering that food contains more than just essential nutrients, e.g. bacteria or viruses, the lysozyme offers a limited and non-specific, yet beneficial antiseptic function in digestion.

Of note is the diversity of the salivary glands. There are two types of salivary glands

- Serous glands: These glands produce a secretion rich in water, electrolytes, and enzymes. A great example of a serous oral gland is the parotid gland.
- Mixed glands: These glands have both serous cells and mucous cells, and include sublingual and submandibular glands. Their secretion is mucinous and high in viscosity.

Stomach

The enzymes that are secreted in the stomach are gastric enzymes. The stomach plays a major role in digestion, both in a mechanical sense by mixing and crushing the food, and also in an enzymatic sense, by digesting it. The following are enzymes produced by the stomach and their respective function:

- Pepsin is the main gastric enzyme. It is produced by the stomach cells called "chief cells" in its inactive form pepsinogen, which is a zymogen. Pepsinogen is then activated by the stomach acid into its active form, pepsin. Pepsin breaks down the protein in the food into smaller particles, such as peptide fragments and amino acids. Protein digestion, therefore, primarily starts in the stomach, unlike carbohydrate and lipids, which start their digestion in the mouth (however, trace amounts of the enzyme kallikrein, which catabolises certain protein, is found in saliva in the mouth).
- Gastric lipase: Gastric lipase is an acidic lipase secreted by the gastric chief cells in the fundic mucosa of the stomach. It has a pH level of 3–6. Gastric lipase, together with lingual lipase, comprise the two acidic lipases. These lipases, unlike alkaline lipases (such as pancreatic lipase), do not require bile acid or colipase for optimal enzymatic activity. Acidic lipases make up 30% of lipid hydrolysis occurring during digestion in the human adult, with gastric lipase contributing the most of the two acidic lipases. In neonates, acidic lipases are much more important, providing up to 50% of total lipolytic activity.

Hormones or compounds produced by the stomach and their respective function

- Hydrochloric acid (HCl): This is in essence positively charged hydrogen atoms (H^+), or in lay-terms stomach acid, and is produced by the cells of the stomach called parietal cells. HCl mainly functions to denature the proteins ingested, to destroy any bacteria or virus that remains in the food, and also to activate pepsinogen into pepsin.

- Intrinsic factor (IF): Intrinsic factor is produced by the parietal cells of the stomach. Vitamin B12 (Vit. B12) is an important vitamin that requires assistance for absorption in terminal ileum. Initially in the saliva, haptocorrin secreted by salivary glands binds Vit. B, creating a Vit. B12-Haptocorrin complex. The purpose of this complex is to protect Vitamin B12 from hydrochloric acid produced in the stomach. Once the stomach content exits the stomach into the duodenum, haptocorrin is cleaved with pancreatic enzymes, releasing the intact vitamin B12. Intrinsic factor (IF) produced by the parietal cells then binds Vitamin B12, creating a Vit. B12-IF complex. This complex is then absorbed at the terminal portion of the ileum.
- Mucin: The stomach has a priority to destroy the bacteria and viruses using its highly acidic environment but also has a duty to protect its own lining from its acid. The way that the stomach achieves this is by secreting mucin and bicarbonate via its mucous cells, and also by having a rapid cell turn-over.
- Gastrin: This is an important hormone produced by the "G cells" of the stomach. G cells produce gastrin in response to stomach stretching occurring after food enters it, and also after stomach exposure to protein. Gastrin is an endocrine hormone and therefore enters the bloodstream and eventually returns to the stomach where it stimulates parietal cells to produce hydrochloric acid (HCl) and Intrinsic factor (IF).

Of note is the division of function between the cells covering the stomach. There are four types of cells in the stomach:

- Parietal cells: Produce hydrochloric acid and intrinsic factor.
- Gastric chief cells: Produce pepsinogen. Chief cells are mainly found in the body of stomach, which is the middle or superior anatomic portion of the stomach.
- Mucous neck and pit cells: Produce mucin and bicarbonate to create a "neutral zone" to protect the stomach lining from the acid or irritants in the stomach chyme.
- G cells: Produce the hormone gastrin in response to distention of the stomach mucosa or protein, and stimulate parietal cells production of their secretion. G cells are located in the antrum of the stomach, which is the most inferior region of the stomach.

Secretion by the previous cells is controlled by the enteric nervous system. Distention in the stomach or innervation by the vagus nerve (via the parasympathetic division of the autonomic nervous system) activates the ENS, in turn leading to the release of acetylcholine. Once present, acetylcholine activates G cells and parietal cells.

Pancreas is both an endocrine and an exocrine gland, in that it functions to produce endocrinic hormones released into the circulatory system (such as insulin, and glucagon), to control glucose metabolism, and also to secrete digestive/exocrinic pancreatic juice, which is secreted eventually via the pancreatic duct into the duodenum. Digestive or exocrine function of pancreas is as significant to the maintenance of health as its endocrine function.

Two of the population of cells in the pancreatic parenchyma make up its digestive enzymes

- *Ductal cells:* Mainly responsible for production of bicarbonate (HCO3), which acts to neutralize the acidity of the stomach chyme entering duodenum through the pylorus. Ductal cells of the pancreas are stimulated by the hormone secretin to produce their bicarbonate-rich secretions, in what is in essence a bio-feedback mechanism; highly acidic stomach chyme entering the duodenum stimulates duodenal cells called "S cells" to produce the hormone secretin and release to the bloodstream. Secretin having entered the blood eventually comes into contact with the pancreatic ductal cells, stimulating them to produce their bicarbonate-rich juice. Secretin also inhibits production of gastrin by "G cells", and also stimulates acinar cells of the pancreas to produce their pancreatic enzyme.
- *Acinar cells:* Mainly responsible for production of the inactive pancreatic enzymes (zymogens) that, once present in the small bowel, become activated and perform their major digestive functions by breaking down proteins, fat, and DNA/RNA. Acinar cells are stimulated by cholecystokinin (CCK), which is a hormone/neurotransmitter produced by the intestinal cells (I cells) in the duodenum. CCK stimulates production of the pancreatic zymogens.

Pancreatic juice, composed of the secretions of both ductal and acinar cells, contains the following digestive enzymes:[2]

- Trypsinogen, which is an inactive(zymogenic) protease that, once activated in the duodenum into trypsin, breaks down proteins at the basic amino acids. Trypsinogen is activated via the duodenal enzyme enterokinase into its active form trypsin.
- Chymotrypsinogen, which is an inactive (zymogenic) protease that, once activated by duodenal enterokinase, turns into chymotrypsin and breaks down proteins at their aromatic amino acids. Chymotrypsinogen can also be activated by trypsin.
- Carboxypeptidase, which is a protease that takes off the terminal amino acid group from a protein

- Several elastases that degrade the protein elastin and some other proteins
- Pancreatic lipase that degrades triglycerides into two fatty acids and a monoglyceride[3]
- Sterol esterase
- Phospholipase
- Several nucleases that degrade nucleic acids, like DNAase and RNAase
- Pancreatic amylase that breaks down starch and glycogen which are alpha-linked glucose polymers. Humans lack the cellulases to digest the carbohydrate cellulose which is a beta-linked glucose polymer.

Some of the preceding endogenous enzymes have pharmaceutical counterparts (pancreatic enzymes) that are administered to people with exocrine pancreatic insufficiency. The pancreas's exocrine function owes part of its notable reliability to biofeedback mechanisms controlling secretion of the juice. The following significant pancreatic biofeedback mechanisms are essential to the maintenance of pancreatic juice balance/production:[4]

- Secretin, a hormone produced by the duodenal "S cells" in response to the stomach chyme containing high hydrogen atom concentration (high acidicity), is released into the blood stream; upon return to the digestive tract, secretion decreases gastric emptying, increases secretion of the pancreatic ductal cells, as well as stimulating pancreatic acinar cells to release their zymogenic juice.
- Cholecystokinin (CCK) is a unique peptide released by the duodenal "I cells" in response to chyme containing high fat or protein content. Unlike secretin, which is an endocrine hormone, CCK actually works via stimulation of a neuronal circuit, the end-result of which is stimulation of the acinar cells to release their content. CCK also increases gallbladder contraction, resulting in bile squeezed into the cystic duct, common bile duct and eventually the duodenum. Bile of course helps absorption of the fat by emulsifying it, increasing its absorptive surface. Bile is made by the liver, but is stored in the gallbladder.
- Gastric inhibitory peptide (GIP) is produced by the mucosal duodenal cells in response to chyme containing high amounts of carbohydrate, proteins, and fatty acids. Main function of GIP is to decrease gastric emptying.
- Somatostatin is a hormone produced by the mucosal cells of the duodenum and also the "delta cells" of the pancreas. Somatostatin has a major inhibitory effect, including on pancreatic production.

The following enzymes/hormones are produced in the duodenum

- *Secretin:* This is an endocrine hormone produced by the duodenal "S cells" in response to the acidity of the gastric chyme.
- *Cholecystokinin (CCK):* is a unique peptide released by the duodenal "I cells" in response to chyme containing high fat or protein content. Unlike secretin, which is an endocrine hormone, CCK actually works via stimulation of a neuronal circuit, the end-result of which is stimulation of the acinar cells to release their content.[5] CCK also increases gallbladder contraction, causing release of pre-stored bile into the cystic duct, and eventually into the common bile duct and via the ampulla of Vater into the second anatomic position of the duodenum. CCK also decreases the tone of the sphincter of Oddi, which is the sphincter that regulates flow through the ampulla of Vater. CCK also decreases gastric activity and decreases gastric emptying, thereby giving more time to the pancreatic juices to neutralize the acidity of the gastric chyme.
- *Gastric inhibitory peptide (GIP):* This peptide decreases gastric motility and is produced by duodenal mucosal cells.
- *Motilin:* This substance increases gastro-intestinal motility via specialized receptors called "motilin receptors".
- *Somatostatin:* This hormone is produced by duodenal mucosa and also by the delta cells of the pancreas. Its main function is to inhibit a variety of secretory mechanisms.

Throughout the lining of the small intestine there are numerous brush border enzymes whose function is to further break down the chyme released from the stomach into absorbable particles. These enzymes are absorbed whilst peristalsis occurs. Some of these enzymes include:

- Various exopeptidases and endopeptidases including dipeptidase and amino-peptidases that convert peptones and polypeptides into amino acids.[6]
- Maltase: converts maltose into glucose.
- Lactase: This is a significant enzyme that converts lactose into glucose and galactose. A majority of Middle-Eastern and Asian populations lack this enzyme. This enzyme also decreases with age. As such lactose intolerance is often a common abdominal complaint in the Middle-Eastern, Asian, and older populations, manifesting with bloating, abdominal pain, and osmotic diarrhea.
- Sucrase: converts sucrose into glucose and fructose.
- Other disaccharidases.

Plants

In carnivorous plants digestive enzymes and acids break down insects and in some plants small animals. In some plants the leaf collapses on the prey to increase contact, others have a small vessel of digestive liquid. Then digestion fluids are used to digest the prey to get at the needed nitrates and phosphorus. The absorption of the needed nutrients are usually more efficient than in other plants. Digestive enzymes independently came about in carnivorous plants and animals.[7][8][9] Some carnivorous plants, like the Heliamphora do not use digestive enzymes, but use bacteria to break down the food. These plants do not have digestive juices, but use the rot of the prey.[10] Some carnivorous plants digestive enzymes:[11]

- Hydrolytic process
- Esterase a hydrolase enzyme
- Proteases enzyme
- Nucleases enzyme
- Phosphatases enzyme
- Glucanases enzyme
- Peroxidases enzyme
- Ureas an organic compounds
- Chitinase enzyme

DISCUSSION

Digestive enzyme supplements have gained popularity for their claims of treating common forms of gut irritation, heartburn and other ailments.

What are digestive enzymes, and what do they do?

Naturally occurring digestive enzymes are proteins that our body makes to break down food and aid digestion. Digestion is the process of using the nutrients found in food to give your body energy, help it grow and perform vital functions.

Our stomach, small intestine and pancreas all make digestive enzymes. The pancreas is really the enzyme "powerhouse" of digestion. It produces the most important digestive enzymes, which are those that break down carbohydrates, proteins and fats.

Types of Digestive Enzymes

There are many digestive enzymes. The main digestive enzymes made in the pancreas include:

- Amylase (made in the mouth and pancreas; breaks down complex carbohydrates)
- Lipase (made in the pancreas; breaks down fats)
- Protease (made in the pancreas; breaks down proteins)

Some other common enzymes are made in the small intestine, including:

- Lactase (breaks down lactose)
- Sucrase (breaks down sucrose)3

What is digestive enzyme insufficiency?

Some people don't have enough digestive enzymes, or their bodies don't release the enzymes as they should. This means they can't break down certain foods and absorb nutrients.

A few types of digestive enzyme insufficiency include:

- Congenital sucrase-isomaltase deficiency: You don't have enough sucrase to digest certain sugars.
- Exocrine pancreatic insufficiency: EPI occurs when your pancreas doesn't produce enough of the enzymes necessary to digest carbohydrates, proteins and fats.
- Lactose intolerance: Your body doesn't produce enough lactase, so you might have problems digesting the sugar naturally found in milk and dairy products.

Symptoms of Digestive Enzyme Insufficiency

Digestive enzyme insufficiency can lead to malnutrition or gastrointestinal irritation. Common symptoms include:

- Belly pain or cramps
- Bloating
- Diarrhea
- Gas
- Oily stools (bowel movements)
- Unexplained weight loss

Digestive Enzymes vs. Probiotics: What's the difference?

Sometimes people confuse enzymes and probiotics. Both affect our digestion, but in very different ways. Probiotics are live organisms that make up the good bacteria in your gut. They help keep your digestive tract healthy, so they support the work your enzymes do. Unlike enzymes, probiotics do not have the ability to break down or digest food components.

Without good gut bacteria, you might experience symptoms similar to those of an enzyme insufficiency, such as bloating or gas, due to abnormal bacterial overgrowth or imbalance in your intestines.

What conditions can cause digestive enzyme insufficiency?

Some enzyme insufficiencies are genetic, which means they're the result of an abnormal gene. Such a gene might be inherited from a parent, or a mutation can occur without a known cause. Enzyme insufficiencies can be congenital (present at birth) or develop over time.

Some disorders or medical treatments can lead to pancreatic enzyme insufficiency:

- Chronic pancreatitis
- Cystic fibrosis
- Gastrointestinal surgeries
- Pancreatic cancer
- Any condition that disrupts your pancreas

CONCLUSION

VEGETERIAN AND FRIENDLY TO ALL

- Each gummy of LACTONOVA is Free off Gluten, Soy, Sugar, Dairy, yeast, Peanuts, Tree Nut, and Gelatin. We meticulously develop our delightful gummies so they can be cherished by everyone.

SO WHY GUMMIES, WHY NOT CAPSULES?

- Gummies are jelly like substances which are easy to chew and swallow. And it doesn't feel like you are gulping a bitter capsules and do not require water to take. Each gummy is packed separately making it easy to carry them in your bag while travelling or while leaving for work and gummies can be easily eaten by anyone as they are fun shaped and has a great apple flavour which are tasty and delicious so anyone can enjoy eating these beneficial delicious gummies whereas capsules are bitter and mostly resisted.

FREE OF GLUTEN, SOY, SUGAR, DAIRY, TREE NUT, AND GELATIN

- Most gummies in the market are based on gelatin, which hinders the use of the supplement for long time. Each gummy of LACTONOVA is Free of Gluten, Soy, Dairy, Yeast, Sugar, Peanuts, Fish, Tree Nut, and Gelatin. We meticulously develop our delightful gummies so they can be cherished by everyone.

EASY TO CARRY

- Each gummy is packed in pillow pack making it easily to carry in bag while leaving for work or during a travel.

RECOMMENDED USAGE

- Adult-1 gummy per day or dosage prescribed by your health care practitioner

WHAT IF YOU HAVE MORE THAN TWO GUMMIES A DAY?

- As lactonova happi gummies are tasty and delicious we understand that you can't stop eating more than two .but still try to limit yourself with two if possible or you can have one to two gummies extra per week. Excess of gummies than recommended dosage may lead to bloating or stomach upset.

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