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ENZYME ACTION: UNDERSTANDING DIASTASE AND PEPSIN

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Abstract

The given text provides information about diastase and pepsin enzymes found in animals, , and microbes. Diastase is a hydrolytic enzyme that breaks down polysaccharides like starch and glycogen into smaller molecules like oligosaccharides, disaccharides, and monosaccharides. The paper also discusses the activation process of pepsin molecules and the structure of human diastase. Overall, the text provides an overview of the different types of enzymes and their functions in biological systems.

Keywords: Digestive Enzymes, Diastase, Pepsin, Enzyme Mechanisms.

1 Introduction:

The gastrointestinal tract produces and secretes digestive enzymes to break down lipids, proteins, and carbohydrates in order to complete digestion and, subsequently, nutrient absorption. When necessary, their supplementation may be a valuable aid in the adjuvant treatment of several conditions marked by a dysfunction of the digestive system. The management of several digestive diseases, particularly those involving organs designated to the production of digestive enzymes, such as the exocrine pancreas (which produces pancreatic enzymes) and the small intestinal brush border (which produces lactase), is currently done in clinical practice using a variety of formulations of enzyme supplementation that are currently available on the market.

The preferred treatment for exocrine pancreatic insufficiency (EPI) in chronic pancreatitis, pancreatic cancer, cystic fibrosis (CF), or diabetes is pancreatic enzyme replacement (Olesen et al., 2013; Zubarik & Ganguly2011; Ianiro et al., 2016; Borowitz et al.,2011; Domínguez-Muñoz,hb hv. 2007and Imrie et al., 2010)

The treatment of lactose intolerance is a pertinent additional use of enzyme supplementation in clinical practice. Hypolactasia, or a reduction in lactase activity, is thought to affect 75% of people globally, especially as they get older (Kanabar et al., 2001).

Digestive enzymes may be helpful in celiac disease, according to recent research, although they are far from being used as part of the standard care for the condition. A lifelong gluten-free diet may be challenging for people with celiac disease since it can be difficult to totally avoid gluten due to its contamination in goods that are supposed to be gluten-free (Mitea et al., 2008). Intestinal barrier repair to prevent gluten entry, human

leukocyte antigen blockers, tissue transglutaminase inhibitors, and enzyme supplementation are some of the new therapeutic strategies (Selimoglu, & Karabiber 2010).

EPI is a potentially fatal disorder that is linked to several pancreatic and extra-pancreatic diseases (including cystic fibrosis, pancreatic cancer, acute and chronic pancreatitis, syndrome, and as a result of gastrointestinal and pancreatic surgery). Enzyme replacement treatment is traditionally thought to be necessary for patients with EPI who lose weight, those whose daily faecal fat excretion is higher than 15 g while on a diet containing 100 g of fat per day, and those who have relevant steatorrhea-related symptoms (Domínguez-Muñoz, 2007).

Additionally, as the addition of exogenous enzymes is thought to play a negative feedback control on endogenous enzyme secretion, with subsequent lowering of pancreatic duct pressure, pancreatic enzyme supplementation could be used to relieve abdominal pain in chronic pancreatitis. Despite this, there is ongoing debate regarding their utility in therapeutic settings (Olesen et al., 2013) and various research are seeking for indicators that this subset of patients will respond clinically (Zubarik & Ganguly, 2011).

According to their respective functions, pancreatic enzymes can be divided into three groups: lipolitic enzymes (primarily lipase), amylo-litic enzymes (pancreatic amylase), and proteolytic enzymes (primarily trypsinogen and chymotripsinogen and their active forms trypsin and chymotrypsin) (Roxas 2008). Microbe-derived enzymes have benefits over their animal-based counterparts in that they require a lower dosage to be effective and exhibit activity over a wider pH range (Griffin et al., 1989).

1.2 Diastase

1.2.1 General Description:

Payen and Persoz (1833) showed that a thermostable component capable of turning starch into sugar was present in an alcohol precipitate of malt extract. Diastase was the name of this chemical. Diastase are hydrolytic enzymes that break down a variety of polysaccharides, including starch and glycogen, into oligosaccharides, disaccharides, like maltose, and occasionally monosaccharides, like glucose.

Enzymes $(C_6H_{12}O_6)n + nH_2O$ Diastase $n(C_{12}H_{22}O_{11})$

Starch maltose

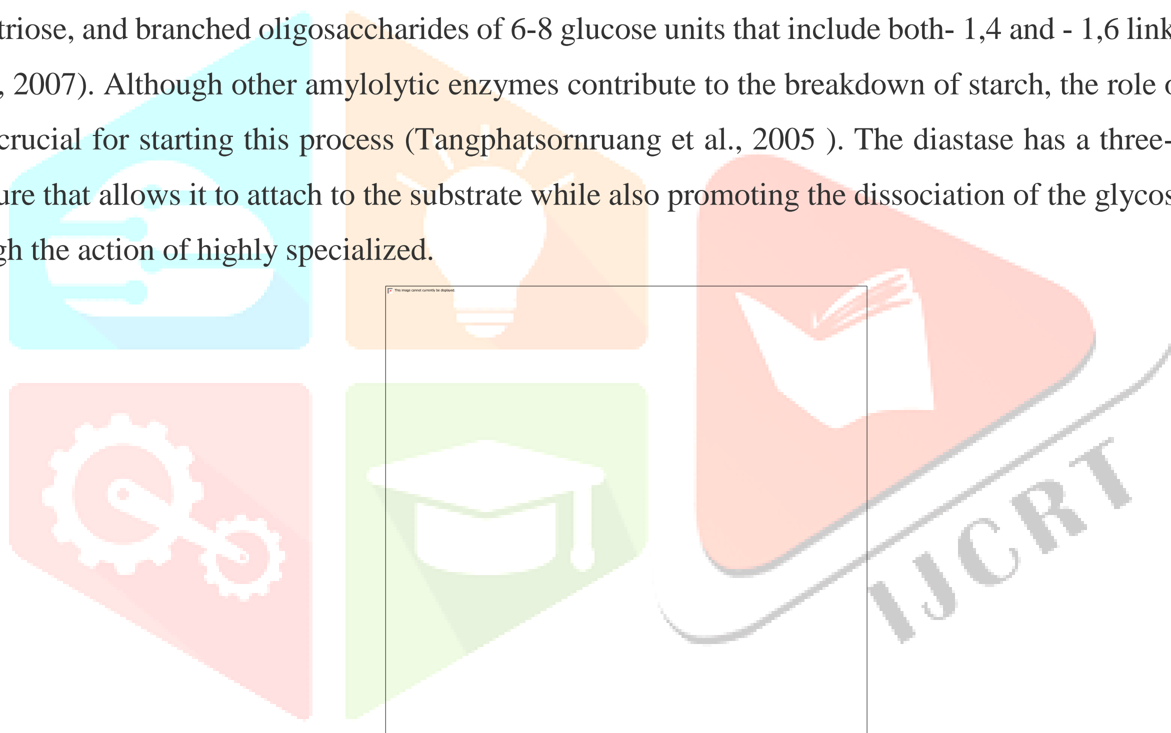
The diastase enzymes hydrolyze internal 1,4-glycosidic bonds in starch to produce low- molecular-weight products including glucose, maltose, and maltotriose units (Goyalet al., 2004; Kandra., 2003; and Rajagopalan & Krishnan, 2008). diastase are a family of industrial enzymes that make up around 25% of the global enzyme industry. They are among the most significant enzymes and have significant biotech implications (Rajagopalan& Krishnan.,2008, Reddyetal., 2003). They come from a variety of sources, including plants, animals, and microbes. Many microbial diastase are now commercially accessible, and they have nearly entirely supplanted chemica diastase l starch hydrolysis in the starch processing business. Since they are 1more stable than s made from plants and animals,microbes have a wide range of industrial uses (Tanyildiziet al., 2005). The ability to produce in large quantities at a low cost and the ease with which microbes may be manipulated to produce enzymes with desired properties are the two main benefits of employing microbes for this purpose. diastase may be used in a variety of industrial processes, including those in the food, fermentation, textile, paper, detergent, and pharmaceutical sectors. diastase produced

by fungi and bacteria may have used in the pharmaceutical and fine-chemical industries. However, because of advancements in biotechnology, the use of diastase has been broadened in a variety of sectors, including clinical, pharmaceutical, and analytical chemistry, as well as the textile, food, brewing, and distilling industries (Gupta., 2005, Kandra., 2003 and Pandey et al., 2000).

1.2.2 Structural and functional characteristics of diastase

Microorganisms, plants, and higher organisms all have the diastase (alfa - 1,4-glucan-4-glucanohydrolase) (Kandra., 2003).

The first hydrolysis of starch into shorter oligosaccharides is catalyzed by the diastase, an endo-amylase, via the cleavage of -D-(1-4) glycosidic linkages (Brayer et al., 1995, Iulek et al., 2000, Kandra., 2003 and Tangphatsornruang et al., 2005). By - diastase, neither terminal glucose residues nor - 1,6-linkages may be broken (Whitcomb & Lowe., 2007). The final results of the activity of - diastase are oligosaccharides of varied length with a - configuration and -limit dextrins (vander Maarelet al., 2002), which area combination of maltose, maltotriose, and branched oligosaccharides of 6-8 glucose units that include both- 1,4 and - 1,6 links Whitcomb & 82., 2007). Although other amylolytic enzymes contribute to the breakdown of starch, the role of diastase is most crucial for starting this process (Tangphatsornruang et al., 2005). The diastase has a three-dimensional structure that allows it to attach to the substrate while also promoting the dissociation of the glycoside linkages through the action of highly specialized.



Finger 1: Diastase structure (Ramasubbu N, Paloth V, Luo Y, Brayer GD, Levine MJ (May 1996). "Structure of human salivary α-amylase at 1.6 Å resolution: implications for its role in the oral cavity". Acta Crystallographica D. 52 (Pt 3): 435–46.)

ActaCrystallographicaD catalytic groups (Iuleket al., 2000). An oligosaccharide chain of 512 amino acids and a molecular weight of 57.6 kDa makes up human - diastase, a traditional calcium-containing enzyme (Whitcomb & Lowe., 2007). A,B, and C domains are all present in the protein (Figure 1). The biggest domain,A, displays the characteristic barrel-shaped (Alpha-beta) superstructure. Between the A and C domains, the B domain is inserted and connected to the A domain via a disulfide link. The C domain appears to be a separate domain with an unidentified function. It has a -sheet structure and is connected to the A domain by a short polypeptide chain. Between the carboxyl ends of the A and B domains is where the diastase active site (substrate-binding) is found. Between the A and B domains, calcium (Ca 2+) may operate as an allosteric activator as well as

stabilize the three-dimensional structure. According to the binding of analogs of the substrate, Asp206, Glu230, and Asp297 are involved in catalysis (Muralikrishna & Nirmala, 2005). The catalytic site is located at subsite 3 of the substrate-binding site's 5 subsites. The cleavage between the first and second or second and third glucose residues may take place when a substrate binds to the first glucose residue in subsites 1 or 2 (Whitcomb & Lowe., 2007).

1.2.3 Sources of Enzymes:

Animals, plants, and microbes all have amylases in varying concentrations. P-Amylases are mostly found in higher plants and microorganisms, whereas a-Amylases are found in microbial, plant, and animal tissues (Karlson, 1974). The majority of animal tissues and microorganisms include amyloglucosidase Cheetham & Wiseman,1985).

1.2.3.1 Animals

Human pancrease, pig pancrease, and human saliva diastase have all been collected in crystalline form(Meyer et al. , 1951 and Buisson et al. , 1987). While salivary diastase begins the hydrolytic attack on dietary polysaccharides, producing maltooligosaccharides, pancreatic a- amylase completes the digestive process by secreting juice into the small intestine, producing maltose, which is then hydrolyzed by a-glucosidase to glucose (Laner and Nickle, 1955). Longer oligosaccharides are hydrolyzed by amyloglucosidase, which finishes the process in the digestive system by generating glucose. This enzyme can be found in muscle extract as well (Cori and Laner, 1951).

1.2.3.2 Plants

There aren't many studies on the production, characteristics, and purification of amylases from higher plants. According to Novellie (1982a), *Sorghum sp.* has the capacity to manufacture amylases upon germination (Novellie, 1962 ; Mundy, 1982;). Ungerminated sorghum grain lacks atnylase, although ungerminated barley grain does (Maisch, 1979). While sorghum amylases are created in the germ and spread outward through the endosperm, barely and wheat amylases are found in the aleurone layer of the grain (Daiber and Novellie, 1968). The sorghum malt diastase is acid-resistant and functional over abroad pH range of 4-7 (Novellie, 1962). When compared to malt from other sorghum varieties, Budair (1977) and Ahmed (1988)'s study of the amylases in Sudanese sorghum malt revealed that feterita sorghum malt had the highest amylolytic activity. Besides sweet potatoes, cereals, particularly wheat and lukewarm milk, are the richest sources of beta-amylase. According to Salama et al (1997), P-amylases and other endogenous malt enzymes catalyse the conversion of starch to maltose, which accounts for 45% of the total carbohydrate content. Several researchers have isolated, purified, and characterised sorghum beta-amylases (Mundy, 1982). Beta-amylases from sweet potatoes and soy have been isolated and produced in crystalline form by TODA et al., 1993.

1.2.3.3. Fungi

The many amylases identified in fungus were examined by MacAllister (1979), Reichelt (1983) and Gupta and Gautan (1995). *Aspergillus foestidus*, *Aspergillus oryzae*, and *Aspergillus niger* have all been found to produce diastase (Michelena and Castillo, 1984; Matsuura et al, 1984 and Boelet al., 1990 in order). Different Rhizopus isolates' amylolytic activity has been determined by a number of scientists Limetal., 1987; Hang, 1989 and Yu, & Hang, 1990). *Aspergillus oryzae* and *Aspergillus niger* both produced fungal beta-amylases

(Svensson et al. , 1988). *Aspergillus niger*'s amyloglucosidases have also been identified and purified (Lineback et al. , 1969 and Lineback and Aira, 1972), *Penicillium oxalicum*(Yamasaki et al. , 1977a), *Aspergillus oryzae* (Mitsueet al., 1979 and Kita et al., 1982) and, *Aspergillus awamori* (Bhumibhamon,1983). From *Aspergillus niger*, two isoenzymes or types of glucoamylase have been identified and purified (Flemingi and Stone, 1965; Pazur et al., 1971; Lineback and Aira, 1972) and three isoenzymes of glucoamylase have been identified and distinguished from *Rhizopus sp.* (Takahashi et al., 1978), *Aspergillus oryzae* (Mitsue et al., 1979), and *Aspergillus oryzae* (Amirul et al., 1996).

1.2.3.4 Bacteria

Extracelluar diastase is a recognised product of several bacteria For many years, diastese from Bacillus species have been used extensively in the commercial sector (Ingle and Boyer, 1976). Robyt and French (1964) reported that *Bacillus polymyxa* produced diastase. As the leading manufacturer of thermostable diastase, *Bacillus lichen* (Vihinen & Mantsiila, 1989). *Bacillus acidocaldarius* has three theromstable and acidophilic diastases that have been identified, according to Buonocore et al. (1976), Ingle and Boyer (1976), and Uchino (1982). Kanno (1986) reported the discovery of a further thermostable diastase from *Bacillus acidocaldarius* strain A-2. Yamane and Maruo (1974) discovered another heat-stablediastase from *Bacillus subtilis*. *Bacillus stearothermophilus* (Stark and Tetraut, 1951; Hartman et al., 1955; Campbell and Manning, 1961), *Bacillus coagulans* (Campbell, 1954), *Bacillus subtilis* (Toda and Narita, 1968), *Bacillus lichewformis* (Madsen et al., 1973; Chiang et al., 1979), *Bacillus circulans* (Takasaki, 1982;), *Bacillus amyloliquefaciens*, *Bacillus megaterium*, *Bacillus cereus*, and *Bacillus polymyxa* (Hayashi et al., 1988), as well as *Bacillus sp.E2* (Goya et al., 1995), have all been described by Norman (1979), Fogarty (2012), and Fogarty and Kelly (1980, 1980, and 1990). In addition to the genus *Bacillus*, numerous other bacteria have also been identified as producing a-amylase, including *Pseudomonas stutzeri* (Robyt and Ackerman, 1971), *Thermonospora sp.* (Glymph and stutzenberger, 1977; Upton and Fogarty, 1977), and *Thermoactinomyces sp.* (Kuo and Hartman, 1966; Mai et al., 1992). An amylase that extracts maltohexose from starch in *Aerobacior aerogens* was identified by Kainuma et al. in 1975. Imam et al. (1991) reported that *Lactobacillus amylovorus* secreted high molecular weight diastase.

1.2.4 Application

1.2.4.1 Detergent industry

The detergent industry is the largest consumer of enzymes, both in terms of volume and value. Enzymes are used in detergent formulations to make them more effective at removing tough stains and safe for the environment. diastase are the second kind of enzymes that are used to make enzymatic detergent. These enzymes are in 90% of all liquid detergents (Gupta et al., 2003, Hmidet et al., 2009, Mitidieri et al., 2006). These compounds are utilized in cleansers for clothing and programmed dishwashing to corrupt the buildups of bland food sources like potatoes, flavors, custard, chocolate, and so on. to smaller oligosaccharides like dextrin (Mukherjee, et al., 2009, Olsen &; Falhot, 1998). The oxidative stability of diastase is one of the most important criteria for their use in detergents where the washing environment is very oxidizing. diastase have activity at lower temperatures and an alkaline pH, maintaining the necessary stability under detergent conditions (Chi et al., 2010, Kriketal.,2002). Starch removal from surfaces is another 857 Souza, P.M. et al. Because starch can

act as an attractant for a variety of different kinds of particulate soils, the use of microbial diastase in the industry is crucial for enhancing whiteness. *Bacillus* or *Aspergillus* are two examples of diastase found in detergents (Mitidieri et al., 2006).

1.2.4.2 Production of fuel alcohol

Production of fuel alcohol Ethanol is the liquid biofuel that is used the most. Starch is the most widely used substrate for the production of ethanol due to its low cost and ease of availability as a raw material in most parts of the world (Chi et al.,2010). For fermentable sugars to be produced in this process, starch must first be solubilized and then subjected to two enzymatic processes. Liquefaction and saccharification, in which an amylolytic microorganism or enzyme like diastase converts starch into sugar, and fermentation, in which an ethanol-fermenting yeast like Saccharomyces cerevisiae converts sugar into ethanol, are the two steps in the bioconversion of starch into ethanol (Moraes et al.,1999, Oner et al.,2006). Brazil's economy relies heavily on the fermentation of yeast to produce ethanol (de Moras et al.,1995). Protoplast fusion was carried out between the amylolytic yeast Saccharomyces filigree and S. cerevisiae to produce a new strain of yeast that can directly produce ethanol from starch without the need for a separate saccharifying process (Chi et al.,2010). During the first step of hydrolysis of starch suspensions, diastase from thermoresistant bacteria like *Bacillus licheniformis* or engineered strains of *Escherichia coli* or *Bacillus subtilis* is used.

1.2.4.3 Food industry

Amylases are used a lot in the processed food industry for things like baking, brewing, making digestive aids, making cakes, fruit juices, and starch syrups (Couto, Sanroman 2006). The baking industry has made extensive use of diastase. These enzymes can be added to bread dough to breakdown the flour's starch into smaller dextrin, which theyeast ferments. The dough's rate of fermentation is accelerated and its viscosity is decreased when diastase is added, both of which improve the product's volume and texture. Additionally, it adds sugar to the dough, which enhances the bread's flavor, color, and toasting characteristics. In addition to producing compounds that can be fermented, diastase s also prevent staling in bread baking, improve the softness retention of baked goods, and extend the shelf life of these products (Gupta et al.,2003, van der Maarel et al., 2002). In the bakery industry, a thermostable maltogenic diastase from Bacillus stearothermophilus is currently utilized commercially (van der Maarel et al., 2002).

diastase are also used to clarify beer or fruit juices, or they are used in the pretreatment of animal feed to make fiber easier to digest (Gavrilescu, Chisti 2005, Ghorai et al., 2009, van der Maarel et al., 2002).

1.2.4.4 Textile industry:

diastase are used in the designing process in the textile industry. Before making fabric, sizing agents like starch are applied to the yarn to make sure the weaving process goes quickly and safely. Starch is a very appealing size because it is inexpensive, readily available in most parts of the world, and simple to remove. In the textile finishing industry, a wet process removes starch from the woven fabric. Desiring is the process of removing starch from the fabric, which acts as a strengthening agent to keep the warp thread from breaking during the weaving process. The - diastase eliminate specifically the size furthermore, do not go after the filaments (Ahlawat et al 2009, Feitkenhauer2003, Gupta, et al., 2003). For a very longtime, the textile industry used diastase from *Bacillus* stain.

1.2.4.5 Paper industry

Paper industry diastase are utilized in the pulp and paper industry to modify coated paper starch and produce low-viscosity, high-molecular-weight starch (Gupta et al., 2003, van der Maarel et al., 2002). The coating treatment improves the paper's writing quality by making the surface sufficiently smooth and sturdy. Natural starch's viscosity is too high for paper sizing in this application, but it can be reduced by partially degrading the polymer with diastase in batch or continuous processes. Starch is a decent estimating specialist for the completing of papers, working on the quality and erasability, other than being a decent covering for the paper. Paper's stiffness and strength are enhanced by the size (Bruinenberg et al.,1986, Gupta et al., 2003). Instances of diastase acquired from microorganisms utilized in the paper industry Souza, P.M. et al. Amizyme® (PMP Fermentation Products, Peoria, USA), Term amyl®, Fung amyl, BAN® (Novozymes, Denmark), and diastase G9995® (Enzyme Biosystems, USA) are examples of industrial applications of microbial diastase.

1.3 Pepsin

1.3.1 History of Pepsin

The aspartic protease family's earliest enzyme, pepsin, is regarded as having a long evolutionary history. According to Gillespie (1898), it was the first enzyme to be given a name and the first to be recognised as having activity (in digestive processes). Porcine pepsin was one of the earliest proteins to be crystallised (Northrop 1930) and isolated (Gillespie 1898). It was also the first enzyme to exhibit crystal-based X-ray diffraction patterns (Bernal and Crowfoot 1934). For the extracted enzyme to resume its full function, it must be acidified. Different acids produced varying levels of activity, it was noted. Sorensen (Sorensen 1912) displayed the activities vs hydrogen ion concentrations. Sorensen created the pH scale by employing a logarithmic abscissa to fix the scaling issue in the plot.

1.3.2 Activation of Pepsin

Pepsin is often produced as an inactive zymogen, along with other aspartic proteases that are typically found in vertebrates and plants. This zymogen is known as pepsinogen for pepsin. The main structure of pepsinogen is identical to that of pepsin, with the addition of 44 residues at the protein's N-terminus. Pepsinogen is frequently referred to as a proenzyme, and this 44 residue piece is frequently referred to as a propeptide (Davies 1990). The pepsinogen propeptide is basic because it has nine lysine residues, two arginine residues, and two histidine residues. Six of the propeptide's basic side chains form ion pairs with the carboxylate side chains of pepsin, stabilising the propeptide's helical structure by electrostatic forces (Perlmann 1963). The propeptide prevents access to the catalytic aspartates in the active site, which reduces the enzyme's activity. Pepsinogen is activated to pepsin upon removal of the propeptide (James and Sielecki 1986). The propeptide typically loses its helical form once the zymogen is activated (Davies, 1990).

When the pH of a pepsinogen solution is reduced, pepsinogen is activated. According to theory, reducing the pH allows the complex to disintegrate and the active enzyme to form by protonating the carboxylate side chains of pepsin. If done quickly, raising the pH can completely undo zymogen activation. The activation, however, becomes irreversible if the pH is decreased over an extended length of time (James and Sielecki 1986). It is thought that there are two paths by which pepsinogen is activated, either in a single step or in a series of steps. Additionally, there are two distinct reactions that take place during activation.

Pepsinogen cleaves itself to create active pepsin in an intramolecular reaction, while in an intermolecular reaction, either another pepsinogen molecule, an intermediate form, or an active pepsin molecule cleaves pepsinogen. At pH values below 3.0, the intramolecular reaction is more prevalent, according to kinetic measurements (al-Janabi et al,. 1972). The intermolecular reaction appears to be the primary, but not the only, method that the one-step activation pathway moves forward (Kageyama and Takahashi 1983).

The activation of pepsinogen to pepsin is thought to take place concurrently via the one-step pathway and the stepwise approach (Christensen, Pedersen et al. 1977). The one-step approach involves both the intramolecular reaction and the intermolecular reaction. The intramolecular reaction seems to be a crucial step in the first activation that results in the production of active pepsin molecules. For the activation to be completed, the intermolecular reaction is crucial (Kageyama and Takahashi 1987).

1.3.3 Pepsin Crystal Structure

John Northrop crystallised porcine pepsin in 1930, and Sielecki et al. improved it in 1990 (Sielecki, Fedorov et al. 1990). Figure 1.4 depicts the crystal structure of human pepsin (Fujinaga, Chernaia et al. 1995). The catalytic Asp residues Asp32 and Asp215 are shown in blue, whereas pepstatin, the pepsin inhibitor, is indicated in red. James and Sielecki (1986) classified the protein into three sections. A six-stranded antiparallel -sheet makes up the initial area. This interdomain serves as the structure's backbone andisplaced behind the catalytic site area. The other two domains each have two lobes. One lobe is the N-terminal, which has 142 residues, and the other is the C-terminal, which has 123 residues. Despite having identical amino acid sequences, the N-terminal and C-terminal domains do not have similar secondary or tertiary structures (Sielecki, Fedorov et al.1990).

Other features of the pepsin crystal structure include a short interdomain peptide located on the outside of the six-stranded -sheet (Sielecki, Fedorov et al. 1990). There are also two strands that create a -hairpin loop known as the flap. The flap protrudes from the molecule's active site cleft (Davies 1990). At its heart, pepsin has a huge hydrophobic core. This is due to there-assembly of the three previously stated areas. Side chains that protrude inward from the six-stranded -sheet contribute significantly to the hydrophobic core (Sielecki, Fedorov et al. 1990)

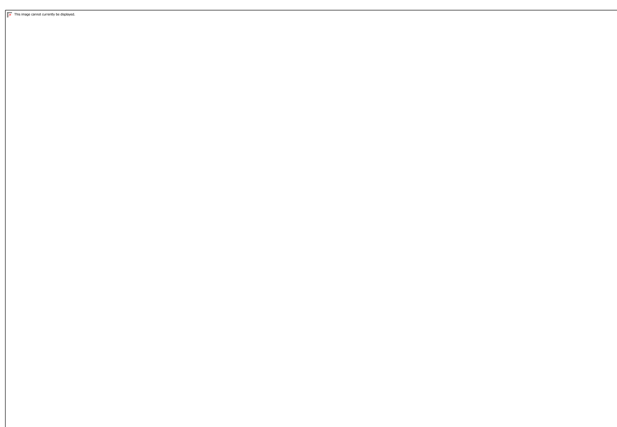


Figure 2: Pepsin structure (PDB: 1PSO; Fujinaga M, Chernaia MM, Tarasova NI, Mosimann SC, James MN (May 1995). "Crystal structure of human pepsin and its complex with pepstatin". Protein Science. 4 (5): 960–72.)

Two aspartic acid residues, Asp32 and Asp215, indicate the catalytic location of pepsin. Both theN-terminal and C-terminal domains include an Asp residue. The two Asp residues reside at the end of each domain and are linked by a network of hydrogen bonds. The active site is quite stiff. The flap that protrudes over the active site, on the other hand, is rather flexible. The flap can shut around inhibitors bound to the active site, reducing its mobility (James, Sielecki et al. 1982).

1.3.4 Activity of Pepsin

Pepsin is an enzyme whose activity is highly reliant on its pH. Pepsin's enzymatic activity is greatest at pH levels between 1.8 and 2.0. When the pH falls below 1.0, it stays stable and extremely active (Ryle 1970). Pepsin loses activity about pH 5 (Smith 1991), and it becomes permanently inactive around pH 7. A large quantity of pepsin, on the other hand, will not become inactive until the pH reaches about 8 (Jones and Landon 2002). The enzyme to protein ratio also influences pepsin activity. The greater this ratio, the more effective the enzyme (Wu, Kaveti et al. 2006).

1.3.5 Pepsin and Proteomics

Pepsin can be a very important tool in proteomics. Pepsin has a wide specificity and is considered to often cleave after bulky hydrophobic residues (Fruton 1970; Ryle 1970). Pepsin creates a large number of peptides during digestion due to its wide specificity. Because of the many cleavage sites, the peptides generated are typically short, ranging from 3 to 30 residues in length. The peptides are also frequently overlapping, which aids in protein mapping. Despite its wide specificity, pepsin is a fairly repeatable enzyme, which means it will produce the same peptides under identical circumstances when digesting a protein (Zhang and Smith 1993).

2 Conclusion:

In conclusion, diastase and pepsin are two crucial enzymes that play significant roles in the digestive processes of living organisms. Diastase, also known as amylase, is responsible for breaking down complex carbohydrates into simpler sugars, facilitating their absorption and utilization by the body. On the other hand, pepsin is a proteolytic enzyme found in the stomach, aiding in the digestion of proteins into smaller peptides.

Both enzymes are essential for proper digestion and nutrient absorption. Diastase begins the process of carbohydrate digestion in the mouth, while pepsin carries out protein digestion in the acidic environment of the stomach. Without these enzymes, the breakdown of nutrients would be inefficient, leading to potential nutrient deficiencies and digestive issues.

Understanding the functions and mechanisms of diastase and pepsin is vital for maintaining a healthy digestive system and overall well-being. Further research on these enzymes may lead to the development of targeted treatments for digestive disorders and offer insights into how dietary choices impact our digestive health. As science progresses, the knowledge of these enzymes will continue to enhance our understanding of human physiology and the role of enzymes in maintaining optimal health.

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