



Pepsin

IDENTIFICATION

Name

Pepsin

Accession Number

DB13198

Type

Biotech

Groups

Approved, Experimental, Investigational

Biologic Classification

Protein Based Therapies
Other protein based therapies

Description

Pepsin is a potent enzyme in gastric juice that digests proteins such as those in meat, eggs, seeds, and dairy products ^[12].

Studies on gastric digestion from 1820-1840 led to the discovery of pepsin as the substance which, in the presence of stomach acid, causes nutrients including meat or coagulated egg whites to dissolve. Soon afterward, it was shown that these protein nutrients were cleaved by pepsin to products called *peptones* ^[2].

Pepsin is often used as a replacement enzyme for those with pancreatic insufficiency ^[11]. Stimulation of the pancreas and therefore enzymatic digestion of food is a tightly controlled and is a hormonally mediated process. Any changes or conditions affecting metabolic steps for successful digestion and absorption negatively affect pancreatic enzymatic secretion, entry into the intestine, functionality once inside the intestine, and appropriate mixing with foods/nutrients. Many causes of pancreatic insufficiency require that enzyme replacement therapy is started, including cystic fibrosis, pancreatic cancer, acute and chronic pancreatitis, as well as pancreatic surgery ^[11].



reflex (cough), which is a common illness of otolaryngology (ear, nose and throat specialist), visits [3].

Interestingly, recent research has suggested that pepsin participates in the digestion of nucleic acids [22].

Protein chemical formula

Not Available

Protein average weight

Not Available

Sequences

```
> Pepsin A Sus Scrofa (Pig)
MKWLLLLSLVVLSECLVKVPLVRKSLRQNLIKNGKLDKDFLTKHNPASKYFPEAAALI
GDEPLENYLDTEYFGTIGIGTPAQDFTVIFDTGSSNLWVPSVYCSSLACSDHNQFNPDDS
STFEATSQELSITYGTGSMTGILGYDTVQVGGISDTNQIFGLSETEPGSFLYYAPFDGIL
GLAYPSISASGATPVFDNLWDQGLVSQDLFSVYLSNDDSGSVVLLGGIDSSYYTGSLNW
VPVSVEGYWQITLDSITMDGETIACSGGCQAIVDTGTSLLTGPTSAIANIQSDIGASENS
DGEMVISCSSIDSLPDIVFTINGVQYPLSPSAYILQDDDSCTSGFEGMDVPTSSGELWIL
GDVFIHQYYTVFDRANNKVGLAPVA
```

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Synonyms

Lactated pepsin

Pepsin A

Pepsin porcine

Pepsin, bovine

Saccharated pepsin

Over the Counter Products

Search

NAME	DOSAGE	STRENGTH	ROUTE	LABELLER	MARKETING	MARKETING				
					START	END				
Digestex	Liquid	100 mg	Oral	Theralab Inc.	1981-04-25	2000-08-01				

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Mixture Products

Search



NAME	↑↓	INGREDIENTS	DOSAGE	↑↓	ROUTE	↑↓	LABELLER	↑↓	START	↑↓	END	↑↓	↑↓	↑↓
Bemosin Tab		Pepsin (130 mg) + Ammonium chloride (97.2 mg) + Betaine hydrochloride (130 mg)	Tablet		Oral		Therapeutic Foods Co.		1988-12-31		2003-07-16			
Betaine HCl and Pepsin		Pepsin (135 mg) + Betaine hydrochloride (324 mg)	Tablet		Oral		Rheingold Food International Ltd.		1985-12-31		2007-07-26			
Betasin Tab		Pepsin (130 mg) + Ammonium chloride (97.2 mg) + Betaine hydrochloride (130 mg)	Tablet		Oral		Bio Vita		1987-12-31		1996-09-09			
Debiline		Pepsin (50 mg) + Deoxycholic Acid (100 mg)	Tablet		Oral		Lab Nadeau LtÉE, Division Of Technilab Inc.		1951-12-31		1999-09-28			
Debiline H		Pepsin (50 mg) + Deoxycholic Acid (100 mg) + Homatropine Methylbromide (2.5 mg)	Tablet		Oral		Lab Nadeau LtÉE, Division Of Technilab Inc.		1951-12-31		1999-09-28			
Dygest		Pepsin (125 mg) + Betaine hydrochloride (90 mg) + Ox bile extract (75 mg) + Pancrelipase (200 mg) + Papain (100 mg) + Peppermint (50 mg)	Tablet		Oral		Creative Nutrition Canada Corp.		1987-12-31		2007-07-11			
Glutamic Acid HCl Betaine HCl W Pepsin		Pepsin (100 mg) + Glutamic acid hydrochloride (200 mg) + Betaine hydrochloride (100 mg)	Tablet		Oral		Nu Life Nutrition Ltd.		1963-12-31		2000-03-03			



INGREDIENTS							
Glutamic Acid Hydrochloride Nu Life	Pepsin (65 mg) + Glutamic acid hydrochloride (500 mg)	Tablet	Oral	Nu Life Nutrition Ltd.	1963-12-31	2005-03-15	
Glutamic Acid Pepsin and Betaine Tablets	Pepsin (100 mg) + Glutamic acid hydrochloride (100 mg) + Glycine betaine (10 mg)	Tablet	Oral	Jamieson Laboratories Ltd	1963-12-31	1996-09-10	
Neo Life Beta Gest Tab	Pepsin (130 mg) + Betaine hydrochloride (275 mg) + Papain (10 mg)	Tablet	Oral	Golden Neo Life International Ltd.	1979-12-31	1997-08-01	

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Categories

[Alimentary Tract and Metabolism](#)

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[Peptide Hydrolases](#)

UNII

[GID333S43J](#)

CAS number

9001-75-6



Indication

Used as a pancreatic enzyme replacement in pancreatic insufficiency [11]. It is intended to mimic naturally produced human pepsin [14].

Pepsin powder is prepared from the gastric mucosa of pigs, cattle or sheep [19]. In the laboratory, it is primarily used for the unspecific hydrolysis of proteins and peptides in acidic media. In addition, it provides limited hydrolysis of native immunoglobulins, yielding biologically active fragments [7].

In certain supplements, pepsin may be combined with betaine and HCl (hydrochloric acid) to aid in digestion in various gastrointestinal conditions [14], [6].

Pharmacodynamics

Pepsin digests protein [12]. It is classified by the FDA that is characterizing enzyme activity is that of a peptide *hydrolase* [17].

Mechanism of action

Glands present in the mucous membrane lining of the stomach produce and store an inactive protein named *pepsinogen*. Impulses from the vagus nerve and the hormonal secretions of the hormones *gastrin* and *secretin* promote the release of pepsinogen into the stomach, where it is mixed with hydrochloric acid and quickly converted to the active enzyme *pepsin*. The digestive potency of pepsin is highest at the acidic pH of normal gastric juice. In the intestine, the gastric acids are then neutralized, and pepsin is no longer effective [12].

Pepsin, the proteolytic enzyme of the stomach is normally responsible for less than 20% of the protein digestion occurring the gastrointestinal tract. It is an endopeptidase enzyme that metabolizes proteins to peptides. It preferentially hydrolyzes peptide linkages where one of the amino acids is aromatic. Pepsin, like other protease enzymes, is produced from an inactive precursor, *pepsinogen*, which is stored in granule form in the chief cells of the stomach and are released by a process called *exocytosis* [16].

In the digestive tract, pepsin activity only contributes to the partial breakdown of proteins into smaller units called peptides, which then either are absorbed from the intestine into the bloodstream or are broken down further by pancreatic enzymes [12].

Absorption

Not Available

Volume of distribution

Not Available

Protein binding

Not Available

Metabolism



bind in the deep active site groove of pepsin, and are then digested into smaller pieces. Following this, a variety of proteases and peptidases in the intestine complete the process. The small fragments, which are amino acids and dipeptides, are then absorbed by cells for use as metabolic energy or construction of new proteins [15].

Route of elimination

Not Available

Half life

Not Available

Clearance

Not Available

Toxicity

Oral LD50 Rat 90000 mg/kg [MSDS]

Chronic backflow of pepsin, acid, and other substances from the stomach into the esophagus, is the basis of reflux conditions, particularly gastroesophageal reflux disease (GERD) and laryngopharyngeal reflux. In the latter, pepsin and acid travel all the way up to the larynx, where they can lead to damage of the laryngeal mucosa and lead to symptoms ranging from hoarseness of the voice and chronic cough to laryngospasm (involuntary contraction of the vocal cords) as well as laryngeal cancer [12].

Though limited data is available on the toxicity of exogenous pepsin (not naturally produced in one's gastrointestinal tract), it can be extrapolated from the above-mentioned information that pepsin overdose may lead to mucosal tissue damage of the gastrointestinal tract.

Affected organisms

Humans and other mammals

Pathways

Not Available

Pharmacogenomic Effects/ADRs ⓘ

Not Available

INTERACTIONS

Drug Interactions ⓘ

Not Available



REFERENCES

General References

1. Iannella G, Di Nardo G, Plateroti R, Rossi P, Plateroti AM, Mariani P, Magliulo G: Investigation of pepsin in tears of children with laryngopharyngeal reflux disease. *Int J Pediatr Otorhinolaryngol*. 2015 Dec;79(12):2312-5. doi: 10.1016/j.ijporl.2015.10.034. Epub 2015 Oct 30. [[PubMed:26586244](#)]
2. Fruton JS: A history of pepsin and related enzymes. *Q Rev Biol*. 2002 Jun;77(2):127-47. [[PubMed:12089768](#)]
3. Calvo-Henriquez C, Ruano-Ravina A, Vaamonde P, Martinez-Capoccioni G, Martin-Martin C: Is Pepsin a Reliable Marker of Laryngopharyngeal Reflux? A Systematic Review. *Otolaryngol Head Neck Surg*. 2017 Sep;157(3):385-391. doi: 10.1177/0194599817709430. Epub 2017 Jun 6. [[PubMed:28585488](#)]
4. Petersen KU: Pepsin and Its Importance for Functional Dyspepsia: Relic, Regulator or Remedy? *Dig Dis*. 2018;36(2):98-105. doi: 10.1159/000481399. Epub 2017 Oct 5. [[PubMed:28982106](#)]
5. Hedemann MS, Jensen BB: Variations in enzyme activity in stomach and pancreatic tissue and digesta in piglets around weaning. *Arch Anim Nutr*. 2004 Feb;58(1):47-59. [[PubMed:15085964](#)]
6. Nutritional Interventions for Gastroesophageal Reflux, Irritable Bowel Syndrome, and Hypochlorhydria: A Case Report [[Link](#)]
7. Pepsin, Sigma Aldrich [[Link](#)]
8. Effect of Pepsin on the Absorption of Food Vitamin B12 and Iron [[Link](#)]
9. Pepsin [[Link](#)]
10. Pepsin: science.gov topics [[Link](#)]
11. Pancreatic Enzyme Replacement Therapy During Pancreatic Insufficiency [[Link](#)]
12. Pepsin [[Link](#)]
13. Gastritis [[Link](#)]
14. Zypan [[Link](#)]
15. PDB-pepsin [[Link](#)]
16. NIH Dictionary- Pepsin [[Link](#)]
17. Code of Federal Regulations, Pepsin [[Link](#)]
18. Pepsin Drug Monograph [[Link](#)]
19. Pepsin, Drugs.com [[Link](#)]
20. Determining the Safety of Enzymes Used in Food Processing [[Link](#)]
21. PEPSIN, SIGMA AALDRICH [[Link](#)]
22. Digestion of Nucleic Acids Starts in the Stomach [[Link](#)]

External Links

PubChem Substance

[347911445](#)

Wikipedia

[Pepsin](#)

ATC Codes

[A09AA03 — Pepsin](#)

- [A09AA — Enzyme preparations](#)
- [A09A — DIGESTIVES, INCL. ENZYMES](#)
- [A09 — DIGESTIVES, INCL. ENZYMES](#)

- [A — ALIMENTARY TRACT AND METABOLISM](#)



- [A09A – DIGESTIVES, INCL. ENZYMES](#)
- [A09 – DIGESTIVES, INCL. ENZYMES](#)
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CLINICAL TRIALS

Clinical Trials ⓘ

Search

PHASE	STATUS	PURPOSE	CONDITIONS	COUNT
Not Available	Completed	Not Available	Abdominal Pain (AP) / Flatulence / Functional Gastrointestinal Disorders / Indigestion / Nausea / Vomiting	1

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PHARMACOECONOMICS

Manufacturers

Not Available

Packagers

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Dosage forms

Search

FORM	ROUTE	STRENGTH
Liquid	Oral	100 mg
Tablet	Oral	

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Prices

Not Available

Patents



PROPERTIES

State

Solid

Experimental Properties

PROPERTY	VALUE	SOURCE
water solubility	very soluble	MSDS

TAXONOMY

Description

Not Available

Kingdom

Organic Compounds

Super Class

Organic Acids

Class

Carboxylic Acids and Derivatives

Sub Class

Amino Acids, Peptides, and Analogues

Direct Parent

Peptides

Alternative Parents

Not Available

Substituents

Not Available

Molecular Framework

Not Available

External Descriptors

Not Available



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