



Name of Subject: Pharmacognosy & Phytochemistry-I

Subject Code: BP305TP

Name of Chapter: Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Name of Topic: Proteins & Enzymes

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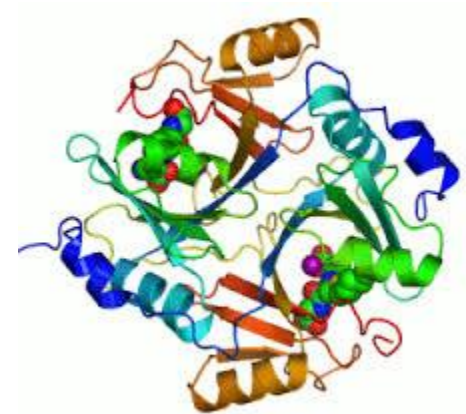
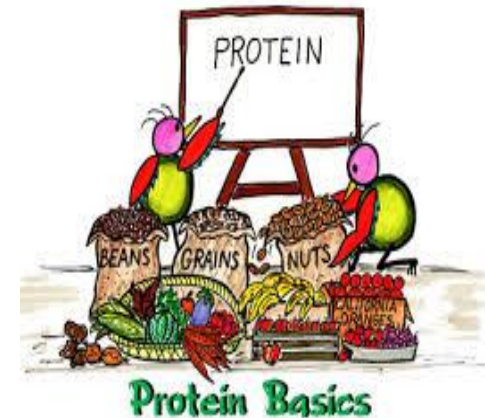
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ENZYMES

&

PROTEIN

DRUGS



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Introduction

- Enzyme: which are proteins which acts as biological catalysts.
- Play vital role in the function of cells and activities of an organism.
- Show maximum activity at 35-40 degree C
- Practically inactive at 0 degree C and beyond 65 degree C, gets denatured.

I. Papain

- Source: mixture of proteolytic enzymes obtained from the latex of unripe fruit of tropical melon tree ***Carica papaya***
- Family: Caricaceae
- Preparation:
 - Latex of the these fruits is collected in aluminum trays.
 - To the collected latex, Potassium metabisulphite is added.
 - The extraneous matter is cleared out by passing through sieves and latex is dried in vacuum shelf drier at 55-60 degree C
 - It is also processed by spray drying method.
 - This latex is called papain.

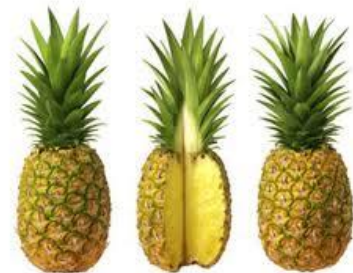


- Description:
- Available as light brown or white colored amorphous powder with typical odor and taste.
- It shows maximum proteolytic activity between pH 5-6.
- It is insoluble in water & glycerin.
- Chemical nature:
- Mixture of papain, chymopapain which acts upon polypeptide and amides.
- Identification:
- It decolorizes aq. Potassium permanganate solution
- It causes curdling of milk (prototypic activity)
- Uses:
- Clarification of beverages, meat tenderiser,
- Cheese manufacturing, substitute of renin,
- Degumming of silk fiber
- Anti-inflammatory & symptoms of episiotomy



2. Bromelain

- Source: mixture of proteolytic enzymes obtained from the stem and ripen fruits of pineapple plant ***Ananas comosus***
- Family: Bromeliaceae
- Description:
 - Odorless to slightly putrid buff color powder with irritating taste.
- Solubility:
- Soluble in water, insoluble in organic solvents like ether, chloroform and alcohol
- Use: treatment of soft tissue
- Inflammation, edema due to surgery and injury



3. Malt Extract

- Source: obtained by extracting malt or malted barley, which is partially and artificially germinated grain of one or more variety of barley grain, ***Hordeum vulgare***
- Family: Graminae
- Mixture of malted barley with NMT 33% malted wheat viz. ***Triticum aestivum***, family Graminae
- Description:
 - Occurs as yellowish-brown or amber colored viscous liquid with a characteristic odor and taste.
 - Contains nitrogen equivalent to NLT 4% protein.
 - Along with protein, also contains maltose,
 - dextrin, glucose and amylolytic enzymes.
- Use: nutritive, flavouring agent, masking bitter
- taste, vehicle for preparation containing codliver oil
- halibut liver oil.



4. Serratiopeptidase

- Source: proteolytic enzyme obtained from bacteria belonging to genus *Serratia*, present in the gut of the silk worm.
- Originally it was discovered in *Serratia* E15 species.
- Now-a-days it is produced by fermentation biotechnology.
- Considered as very effective bacterial enzyme and it is found to have better effects than trypsin and chymotrypsin with negligible toxicity and side effects,
- Given orally, it enters systemic circulation in unchanged form and can penetrate into all tissues, especially inflamed areas.
- It hydrolyses histamine, serotonin and bradykinin, Hence it reduces capillary permeability and also breakdown of proteins and exudates and hence, supports wound healing.
- Therapeutics application: resolution of inflammation, sputum liquefaction due to lysis of various protein in sputum and hence lowering viscosity, enhancement of antibiotic effect due to removal of inflammatory barrier and hence, increasing antibiotic transfer to infected areas.

Casein

- **Biological Source:** Casein is a proteolytic enzyme obtained from the stomachs of calves. It is extracted from the proteins of the milk; in the milk, casein is structured in voluminous globules. These globules are mainly responsible for the white colour of the milk.
- According to various species, the casein amount within the total proteins of the milk varies.
- The casein content of milk represents about 80% of milk proteins. The principal casein fractions are alpha (s1) and alpha (s2)-caseins, β -casein and κ -casein. The distinguishing property of all casein is their low solubility at pH 4.6. The common compositional factor is that caseins are conjugated proteins, most with phosphate group(s) esterified to serine residues. These phosphate groups are important to the structure of the casein micelle. Calcium binding by the individual caseins is proportional to the phosphate content.

Casein

- Within the group of caseins, there are several distinguishing features based on their charge distribution and sensitivity to calcium precipitation:
- Alpha (sI)-casein: (molecular weight 23,000; 199 residues, 17 proline residues).
- Two hydrophobia regions, containing all the proline residues, separated by a polar region, which contains all but one of eight phosphate groups. It can be precipitated at very low levels of calcium.