Review Article

The importance of proteolytic enzymes: Revisiting to era

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ABSTRACT

Proteolytic enzymes (also termed peptidases, proteases, and proteinases) are capable of hydrolyzing peptide bonds in proteins. They can be found in all living organisms, from viruses to animals and humans. Proteolytic enzymes have great medical and pharmaceutical importance due to their key role in biological processes and in the lifecycle of many pathogens. These enzymes have amino acid sequences similar to mammalian enzymes, even both insect amylases and serine proteinases differ from mammalian enzymes in substrate specificity and conduct within the sight of protein inhibitors. There is a renewed interest in proteases as targets for developing therapeutic agents against relentlessly spreading fatal diseases such as cancer, malaria, and AIDS. Advances in genetic manipulation of microorganisms by site-directed mutagenesis of the cloned gene open new possibilities for the introduction of predesigned changes, resulting in the production of tailor-made proteases with novel and desirable properties. Proteases are extensively applied enzymes in several sectors of industry and biotechnology, furthermore, numerous research applications require their use, including production of Klenow fragments, peptide synthesis, digestion of unwanted proteins during nucleic acid purification, cell culturing and tissue dissociation, preparation of recombinant antibody fragments for research, diagnostics and therapy, exploration of the structure-function relationships by structural studies, removal of affinity tags from fusion proteins in recombinant protein techniques, peptide sequencing, and proteolytic digestion of proteins in proteomics. The aim of this paper is to review the importance of proteolytic enzyme and molecular biological aspects of proteolytic enzymes and their applications in the life sciences.

Keywords: Biological aspects, life sciences, proteolytic enzymes, therapeutic agents

Introduction

A protease is an enzyme that performs proteolysis; protein catabolism by hydrolysis of peptide bonds. Proteases have evolved multiple times, and different classes of protease can perform the same reaction by completely different catalytic mechanisms. Proteases can be found in animalia, plantae, fungi, bacteria, archaea, and viruses. Proteolytic enzymes catalyze the cleavage of peptide bonds in different proteins. Proteases are degradative enzymes, which catalyze the hydrolysis of proteins. Proteolytic enzymes, also known as proteases, are the enzymes that catalyze the hydrolytic cleavage of particular peptide bonds in their target proteins (TPs). These enzymes have amino acid sequences similar to mammalian enzymes, even both insect amylases and serine proteinases differ from mammalian enzymes in substrate specificity and conduct within the sight of protein inhibitors. Digestive enzymes in insects happen in midgut luminal substance or may be limited to midgut cells. In cells, they might be connected with the glycocalyx or bound to microvillar layers. The discovery in plants of protein inhibitors influencing insect digestive enzymes called attention to the possibility of utilizing these enzymes as targets as a part of the advancement of new insect control techniques.[1] Proteinase inhibitors (PIs) are universal small proteins that are very normal in nature. They are natural, barrier-related proteins frequently present in seeds and affected in certain plant tissues by herbivore or injuring.[2,3] PIs are available in numerous structures in various tissues of animals and plants and, in addition, in microorganisms. In plants, they can be considered as a part of the defensive mechanism showed against phytophagous insects and microorganisms. The defensive capacities of plant PIs depend on the hindrance of proteases present in insect guts or discharged by microorganisms, bringing about a reduction in the accessibility of amino acids vital for the development and improvement.[4]

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