

New functions of lactoferrin and β -casein in mammalian milk as cysteine protease inhibitors

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Abstract: We found new inhibitory function of lactoferrin and β -casein in milk against cysteine proteases using reverse zymography. The inhibition of cathepsin L by lactoferrin was strongest and the inhibition kinetics were of a non-competitive type. Heat denatured lactoferrin lost the inhibitory activity completely, therefore the tertiary structure is essential to show the inhibition. Native lactoferrin was not degraded by papain during the assay condition. The intramolecular peptide, Y₆₇₉-K₆₉₅, of lactoferrin is an active domain and the synthesized peptide inhibited cysteine proteases. The Y₆₇₉-K₆₉₅ peptide showed 90% homology with the sequences of a common active site of cystatin family. β -Casein and the active domain, synthesized L₁₃₃-Q₁₅₁, peptide inhibited cysteine proteases. Lactoferrin and β -casein in milk might play a role in antiseptic and antiinfectious functions due to cysteine protease inhibition of bacteria and viruses. © 2003 Elsevier Science (USA). All rights reserved.

Author Keywords: β -Casein; Cystatin; Cysteine protease inhibitor; Lactoferrin; Milk; Reverse zymography

Index Keywords: antiinfective agent; beta casein; cathepsin L; cystatin; cysteine proteinase inhibitor; lactoferrin; leucylthreonylaspartylvalylglutamylasparaginylleucylhistidylleucylprolylleucylprolylleucylleucylglutaminylseryltryptophylmethionylhistidine; papain; peptide; tyrosylglutamyllysyltyrosylleucylglycylprolylglutaminylytyrosylvalylalanylglucylisoleucylthreonylasparaginylleucyllysine; unclassified drug; amino acid sequence; article; heat; milk; peptide synthesis; priority journal; protein analysis; protein degradation; protein denaturation; protein domain; protein family; protein function; protein structure; sequence homology; zymography; Amino Acid Sequence; Animals; Caseins; Cattle; Cysteine Endopeptidases; Cysteine Proteinase Inhibitors; Electrophoresis, Polyacrylamide Gel; Female; Humans; Kinetics; Lactoferrin; Milk; Milk, Human; Molecular Sequence Data; Protein Structure, Tertiary; Rats; Recombinant Proteins; Sequence Homology, Amino Acid; Mammalia

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