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

Ohashi A., Murata E., Yamamoto K., Majima E., Sano E., Le Q.T., Katunuma N.

Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan; APRO Life Science Institute, 45-56, Kurosaki-Matsushima, Naruto-City, Tokushima 772-0001, Japan; Biotechnology Center, Vietnam National University, 144 Xuan thuy-Cau giay, Hanoi, Viet Nam

Abstract: We found new inhibitory function of lactoferrin and ?-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, Y_{679}-K_{695}, of lactoferrin is an active domain and the synthesized peptide inhibited cysteine proteases. The Y_{679}-K_{695} peptide showed 90% homology with the sequences of a common active site of cystatin family. ?-Casein and the active domain, synthesized L_{133}-Q_{151}, peptide inhibited cysteine proteases. Lactoferrin and ?-casein in milk might play a role in antiseptic and antiinfectious functions due to cysteine protease inhibition of bacteria and viruses. ??

Author Keywords: ?-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; tyrosylglutamyllysyltyrosylleucylglycylprolylglutaminyltyrosylvalylalanylglycylisoleucylthreonylasparaginylleucyllysine; 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

Year: 2003
Source title: Biochemical and Biophysical Research Communications
Volume: 306
Issue: 1
Page : 98-103
Cited by: 24
Link: Scorpus Link
Chemicals/CAS: cathepsin L, 60616-82-2; cystatin, 81989-95-9; lactoferrin, 55599-62-7; papain, 9001-73-4;

Caseins; Cysteine Endopeptidases, EC 3.4.22.-; Cysteine Proteinase Inhibitors; Lactoferrin; Recombinant Proteins
Correspondence Address: Katunuma, N.; Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan; email: katunuma@tokushima.bunri-u.ac.jp
ISSN: 0006291X
CODEN: BBRCA
DOI: 10.1016/S0006-291X(03)00917-3
PubMed ID: 12788072
Language of Original Document: English
Abbreviated Source Title: Biochemical and Biophysical Research Communications
Document Type: Article
Source: Scopus
Authors with affiliations:

1. Ohashi, A., Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan
2. Murata, E., Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan
3. Yamamoto, K., APRO Life Science Institute, 45-56, Kurosaki-Matsushima, Naruto-City, Tokushima 772-0001, Japan
4. Majima, E., APRO Life Science Institute, 45-56, Kurosaki-Matsushima, Naruto-City, Tokushima 772-0001, Japan
5. Sano, E., Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan
6. Le, Q.T., Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan, Biotechnology Center, Vietnam National University, 144 Xuan thuy-Cau giay, Hanoi, Viet Nam
7. Katunuma, N., Institute for Health Sciences, Tokushima Bunri University, Yamashiro-cho, Tokushima-City 770-8514, Japan

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