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Hypocholesterolemic activity of bovine casein hydrolysates fractions

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Increasing amounts of research show the bioactive role of peptides beyond their nutritional value. These food proteins derived bioactive peptides show huge potential to incorporate in functional foods, foods for specific health purposes and as nutraceuticals. These peptides have been found in various food sources in plant and animal protein origin. Peptides are released during fermentation or digestion of food proteins by proteolytic enzymes. Some of these released peptides exert biological activities such as antihypertensive, hypocholesterolemic, antioxidative, mineral-binding, opiate-like, antimicrobial, immuno- and cytomodulating activity. Now-a-days, the application of proteolytic enzymes in combination with new technologies such as membrane separation techniques allow the large scale production of bioactive peptides from various food proteins. This enables the enrichment of selected foods with bioactive peptides or the development of new functional foods. The present study focused on the bioactivities of casein hydrolysates for hypocholesterolemic (HC) properties.

Bovine casein was used as the source for the production of bioactive peptides by enzymatic hydrolysis using trypsin alone and with a combination of trypsin and pepsin at different time intervals. Crude casein hydrolysate was further fractionated by membrane separation technique using two different molecular weight cut-off membranes at 10 kDa and 1 kDa. The crude hydrolysate was then compared with the collected permeates. Hypocholesterolemic effect of the hydrolysates and the permeates, using trypsin showed a reduction of cholesterol level by 39.5, 50.7 and 69.6%, respectively. Furthermore, a pronounced hypocholesterolemic effect of 44.9, 52.2 and 87.0% was observed by the combined action of pepsin and trypsin. The combined effect of trypsin and pesin and fractionation by ultrafiltration proved to be effective in cholesterol reduction.

Biography

Imran Irshad completed his PhD in 2011 from University of Wales Institute, Cardiff, UK. He is currently working as assistant professor of food science at PMAS - AAUR, Pakistan. Formerly, served as a Technical Manager at Barons Patisserie, United Kingdom, for over 9 years, has an extensive knowledge in food safety and food quality well.

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Rational design and characterization of D-Phe-Pro-D-Arg-derived direct thrombin inhibitors

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Novel peptide-based thrombin inhibitors were discovered by use of computer-based docking procedures followed by experimental confirmation. These compounds contained both L- and D-amino acids, with the general sequence D-Phe(P3)-Pro(P2)-D-Arg(P1)-P1'-CONH2. One of the best compounds to come out of this study, D-Phe-Pro-D-Arg-D-Thr-CONH2, competitively inhibits α-thrombin with a Ki of 0.92 μM.

X-ray crystallography was used to determine the three-dimensional structure of three peptides of this family while complexed with human α-thrombin. All three inhibitors bind in a substrate-like orientation to the active site of the enzyme.

Two of the inhibitors were shown to disrupt the active site His57-Ser195 hydrogen bond. The combination of a P1 D-Arg and a bulky P1' residue induce an unfavorable geometry for the nucleophilic attack of the scissile bond by the catalytic serine.

The experimental models explain the observed relative potency of the inhibitors, as well as their stability to proteolysis. The newly identified direct thrombin inhibitors provide a new platform for developing antithrombotic agents.

Biography

Manfred Philipp received his Ph.D. at the age of 26 years from Northwestern University and did postdoctoral studies at the University of Freiburg and Johns Hopkins University. He is the President of the CUNY Academy for the Humanities and Sciences, Secretary for the Fulbright Association in the US, and Vice President of the German Academic Exchange Service Alumni Association in the US. He has published more than 30 papers in peer-reviewed journals.

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