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Inhibition of angiotensin I-converting enzyme by collagen peptides derived from bovine connective tissue

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This aim of this study is to explore *in vitro* angiotensin I-converting enzyme (ACE) inhibitory activity of collagen peptides derived from bovine connective tissue. It is generally accepted that ACE plays a crucial role in the renin-angiotensin system, which can convert inactive angiotensin I to angiotensin II, leading to increased blood pressure. Therefore, effective inhibition of this enzyme has been regarded as a therapeutic approach of hypertension. The meat processing industry produces considerable quantities of slaughter byproducts every year. Connective tissue is abundant of collagen and considered one of the byproducts from the meat processing industry. Utilization of bovine connective tissue as precursor for production of ACE inhibitory peptides could be promising.

Pepsin-solubilized collagen was isolated from bovine connective tissue and characterized by means of sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and amino acid analysis. Alcalase and papain were employed to hydrolyze collagen into collagen hydrolysates with different degree of hydrolysis (DH). *In vitro* ACE inhibitory activities of these collagen hydrolysates were evaluated. The two most potent collagen hydrolysates in each group were selected for further separation by a two-step purification process using ion-exchange chromatography and gel filtration chromatography.

Results indicated that the extracted collagen was bovine type I collagen. Both Alcalase-catalyzed and papain-catalyzed hydrolysates exhibited strong ACE inhibitory capacities with IC_{50} values of 0.17 and 0.35 mg/mL. With the aid of the two-step purification, the ACE inhibitory capacity of two purified fractions (F-II-C and F2-B) from each group displayed higher ACE inhibitory activities (increased by approximately 30-fold), the IC_{50} values of which were 3.95 and 7.29 µg/mL, respectively.

Consequently, collagen peptides derived from bovine connective tissue can be utilized as a bio-functional component for development of high value-added products, such as ACE inhibitory peptides.

Keywords: Collagen, Byproduct, ACE inhibitory peptides, Purification