Towards Novel Angiotensin I–Converting Enzyme–Inhibitory Peptides from Bovine Collagen: Insights into Inhibitory Mechanism and Transepithelial Transport

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Abstract

Angiotensin I–converting enzyme (ACE)–inhibitory peptides were produced via enzymatic hydrolysis of bovine collagen using alcalase and papain. The most potent ACE-inhibitory peptide fractions derived from each enzymatic digestion were subjected to purification by reversed-phase high-performance liquid chromatography (RP-HPLC). Two novel ACE-inhibitory peptides were identified as Val-Gly-Pro-Val and Gly-Pro-Arg-Gly-Phe. Their IC_{50} values for ACE-inhibitory activity were 405.12 μM and 200.91 μM, respectively. The inhibitory patterns of Val-Gly-Pro-Val and Gly-Pro-Arg-Gly-Phe were, by the Lineweaver–Burk plots, determined to be non-competitive binding modes and further confirmed by molecular docking. Val-Gly-Pro-Val and Gly-Pro-Arg-Gly-Phe were transepithelially transported across a Caco-2 monolayer and might exhibit antihypertensive effect *in vivo*. The main route involved in the transepithelial transport of collagen peptides was paracellular transport. The present results highlight that the described ACE-inhibitory peptides derived from bovine collagen are potentially bioavailable and may serve as bio-functional ingredient in food industry.

Key words: ACE-inhibitory peptides; inhibitory mechanism; transepithelial transport

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