

Purification of Angiotensin I-Converting Enzyme (ACE) Inhibitory Peptides of Molecular Docking Analysis and Antihypertensive Effect of Algae Hydrolysates

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Outline

1. Introduction

(1) Hypertension and synthetic ACE inhibitors

(2) Utilization of algae

(3) The methods of *in vitro* and *in vivo* antihypertensive activity

(4) Enzyme inhibitory kinetics

(5) Molecular docking

2. Purification and the mechanism of ACE inhibitory peptides from *Sargassum maclurei* and *Isochrysis zhanjiangensis* protein hydrolysates

(1) Identification of active peptides and their molecular docking analysis

(2) Antihypertensive effect of spontaneous hypertensive rats (SHR)

(3) Effects of active peptides on inflammation in human umbilical vein endothelial cells (HUVEC).

3. Conclusion

Abstract

As about 9.4 million patients die from hypertension worldwide every year. When angiotensin I is exposed to angiotensin I converting enzyme (ACE), resulting in the formation of angiotensin II causes blood pressure to rise. Algae protein has high nutritional value and can be used as a good source of natural plant protein and bioactive peptides with ACE inhibitory activity. *Sargassum maclurei* protein hydrolysates (SMPHs) was purified by gel chromatography and LC-ESI-MS/MS. The major peptide sequence RWDISQPY exhibited the highest ACE inhibitory activity ($IC_{50} = 72.24 \mu M$), it serve as a competitive ACE inhibitor. Finally, *in vivo* data showed that RWDISQPY administration of significantly reduced SBP and DBP in SHRs. *Isochrysis zhanjiangensis* microalgae was successfully purified and identify a novel peptide, FEIHCC ($IC_{50} = 61.38 \mu M$) exhibited significant inhibition activity on ACE. it serve as a mixed competitive ACE inhibitor. The data show that incubation of Peptide *Isochrysis Zhanjiangensis* (PIZ) inhibited oxidative stress and blunted vascular injury in an Ang II stimulated model of hypertension. In conclusion, the purified peptides isolated from algae protein hydrolysates have potential antihypertensive properties which could potentially be used as functional food ingredients.

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2 angiotensin-I-converting enzyme inhibitory peptide from *Isochrysis zhanjiangensis*
3 microalgae for suppressing vascular injury in human umbilical vein endothelial cells.
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- 5 Zheng Yajun.; Zhang Yufeng.; San Sang. Efficacy of a novel ACE-Inhibitory Peptide from
6 *Sargassum maclurei* in hypertension and reduction of intracellular endothelin-1. *Nutrients*.
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