

Modification of the amaranth 11S globulin storage protein to produce an inhibitory peptide of the angiotensin I converting enzyme, and its expression in *Escherichia coli*.

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Source

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Abstract

Amarantin is the predominant seed storage protein from amaranth. It shows a high content of essential amino acids, making this protein important from a nutritional viewpoint. The protein has two disulfide linked subunits: acidic and basic. Acidic subunit has the potential as a functional and nutraceutical protein, and it is structurally a good candidate for modification. In order to improve its functionality, the primary structure was modified in the third variable region of globulins 11S, by inserting four Val-Tyr antihypertensive peptides in tandem. The designed plasmid was expressed in *Escherichia coli* Origami (DE3) and then the expressed protein was purified. Mass spectrometry analysis was used to corroborate the identity of the protein by peptide mass fingerprinting; also, the modified peptide was fragmented and sequenced by mass spectrometry, corroborating thus the inserted residues. The hydrolyzed protein showed a high inhibitory activity of the angiotensin converting enzyme (IC₅₀ 0.064 mg ml⁻¹); it was nearly eightfold more active than the nonmodified protein. In spite that the nonmodified subunit is less active, its activity is comparable with other hydrolyzed proteins reported as high active inhibitors. The expressed and purified subunit after its engineered modification, may be useful for preventing hypertension and for other medical purposes.