

Isolation and Characterization of Chaperonin Gene from *Panax ginseng* C.A. Meyer

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인삼에서 유래한 Chaperonin 유전자 분리 및 분석

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Objectives

Chaperonins are indispensable proteins which are present in chloroplast. These are function as an ATP-dependent manner to assist the folding of other proteins.

Calcium regulates cellular activities in plant through the action of calmodulin. Calmodulin is a ubiquitous transducer of the Ca^{2+} signal in all eukaryotes. The regulatory abilities of calmodulin are manifested by its ability to modulate the activities of a certain set of enzymes. This may be participate in regulating physiological responses, Which are require modulations of growth patterns such as gravitropism, phototropism, environmental stress and defense response. Calcium/calmodulin messenger system was involved in regulating Rubisco assembly in chloroplast, thereby influencing on photosynthesis. Here, we analyzed ESTs from a full length cDNA library constructed with isolated chaperonin gene (*CHN*) from ginseng.

Material and Methods

Total ESTs were obtained from the ginseng cDNA library. A full-length cDNA clone of *CHN* was isolated from expressed sequence tags of ginseng cDNA library. List of the nucleotide sequences are required for homology is available at NCBI. Nucleotide and amino acid sequence analyses were performed by using Bio-Edit program.

Result and Discussion

The EST clones homologous to chaperonin genes related in abiotic stress were isolated and the ESTs were named as *CHN*. One cDNA clone (*NHN*) of them was 767 nucleotides long and possess an open reading frame at 483 bp encoding a deduced 161 amino acid (Fig. 1). The deduced amino acids of *CHN* (Fig. 2) was 75 % identical to *Arabidopsis thaliana* (NP563961) and *Brassica napus* (Q96539). Further, we will study the relations and expression pattern of *CHN* by various abiotic stress.

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1  ATGGCGAAGCGTTTGGTCCCATTACTCAACAGGGTCTGGTGGAGAAAATTGTTCCCTCCGTGAAAACCCACCGCTGGAATTCTTCCCTGAGAAATC
   M A K R L V P L L N R V L V E K I V P P S K T T A G I L L P E K S
101 CCAAGTTGAACTCTCGAAAGTGGTAGCGGTGGACAGGGAGCCCTGATAAAGCCGAAATGCGATACCTGTAGTTCTCAAGGAAGGACACACCGTT
   S K L N S A K V V A V G P G S R D K A G N V I F V V V K E G D T V
201 CTGGCTGAATATGGTGGTACCCAAGTTAAGCTCGGTGATAAAGACTATCAITTTATTGAGGGATGATGATATTTTGGGTACCCYCCACAAGTGACAAT
   L P E Y G G T Q V K L G D R E Y H L F R D D D I L G T L H K * Q
301 TTGATGTAGTTTCTCAAGTTGCAATGAGTGATAATGATCAATGGAGTTTCTCAATTEAGGHTTCTTTAGAGTTCFTTTGGTTGACTTGTGAGATTA
   L I V V S Q V A L S D N D Q U R Y L N * X F Y R V L L V D L * D *
401 CTTTTTCAGTGAACAGATTCTCACCGTATTCTTGGCTATTATCTTGGTCAAAATGAGTAATGAAGAACATATCTTTACTTAA 163
   T F S V * Q I V T V L L P I K L V K L S N E E E I F T *

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Fig. 1. Nucleotide and deduced amino acid sequence of *CHN* from *P. ginseng*. The positions of nucleotides are shown on the left and the positions of amino acids are below.

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P. ginseng 1  MAKRLVPLLNRLVLEKIVPPSKTTAGILLPEKSSKLSAKVVAVGPGSRDKAGNVIIPVVKEGDTVLLPEYGGTQVKLGQKEYHLE
Arabidopsi 1  mmkrliptfnrilvgvviqaktesgillpekssklnsgkviavgggsrdkdgkclipvsvkegdtvllpeygggtqvklgcneyhlf
Brassica 1  mmkrliptfnrilvgvviqaktesgillpekssklnsgkviavgggsrdkdgkclipvsvkegdtvllpeygggtqvklgcneyhlf
Oryza 1  makrliplnrvlvekllvqkksaggillpekssklnsgkvavgggsrdkdgkclipvsvkegdtvllpeygggtqvklaaekeyll

P. ginseng 101 VVSQVALSDNDQWRELNHFVRLVLDLDFSVQIVTVLLPDLVKLSNEEHIF 154
Arabidopsi
Brassica
Oryza

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Fig. 2. Multiple alignment of the deduced amino acid sequence of *CHN* gene from other plants; *P. ginseng*, *Arabidopsis thaliana* (NP563961), *Brassica napus* (Q96539), (넘버) and *Oryza sativa* (AAB63591).