Claims

1. A nucleic acid comprising:
a nucleotide sequence encoding a chimeric protein,
wherein the nucleotide sequence is a nucleotide sequence comprising the following nucleotide sequences in this order:
a nucleotide sequence encoding a signal peptide;
a nucleotide sequence encoding an intra-organelle stabilizing domain of LAMP;
a nucleotide sequence encoding an allergen domain comprising Lit v 1, Lit v 4, and Lit v 3;
a nucleotide sequence encoding a transmembrane domain; and
a nucleotide sequence encoding an endosomal/lysosomal targeting domain of LAMP.

2. A nucleic acid comprising:
a nucleotide sequence encoding a chimeric protein,
wherein the nucleotide sequence is a nucleotide sequence comprising the following nucleotide sequences in this order:
a nucleotide sequence encoding a signal peptide;
a nucleotide sequence encoding an intra-organelle stabilizing domain of LAMP;
a nucleotide sequence encoding an allergen domain comprising Lit v 1, Lit v 4, and Lit v 3 in this order;
a nucleotide sequence encoding a transmembrane domain; and
a nucleotide sequence encoding an endosomal/lysosomal targeting domain of LAMP.

3. The nucleic acid according to claim 1 or 2, wherein the signal peptide is a signal peptide of LAMP.

4. The nucleic acid according to any one of claims 1 to 3, wherein the transmembrane domain is a transmembrane domain of LAMP.

5. The nucleic acid according to any one of claims 1 to 4, wherein the signal peptide consists of an amino acid sequence of amino acid numbers 1 to 27 of SEQ ID NO: 2, the intra-organelle stabilizing domain consists of an amino acid sequence of amino acid numbers 28 to 380 of SEQ ID NO: 2, the allergen domain is an allergen domain comprising Lit v 1 consisting of an amino acid sequence of amino acid numbers 383 to 666 of SEQ ID NO: 2, Lit v 4 consisting of an amino acid sequence of amino acid numbers 671

to 863 of SEQ ID NO: 2, and Lit v 3 consisting of an amino acid sequence of amino acid numbers 868 to 1044 of SEQ ID NO: 2, the transmembrane domain consists of an amino acid sequence of amino acid numbers 1048 to 1070 of SEQ ID NO: 2, and the endosomal/lysosomal targeting domain consists of an amino acid sequence of amino acid numbers 1079 to 1082 of SEQ ID NO: 2.

6. A nucleic acid comprising:

a nucleotide sequence encoding a chimeric protein consisting of an amino acid sequence having at least 90% identity to an amino acid sequence shown by SEQ ID NO: 2, wherein the nucleic acid has an action of inducing Th1-type immunity to an allergen selected from the group consisting of Lit v 1, Lit v 4, and Lit v 3.

7. A nucleic acid comprising:

a) a nucleotide sequence encoding a chimeric protein consisting of an amino acid sequence shown by SEQ ID NO: 2; or

b) a nucleotide sequence encoding a chimeric protein consisting of an amino acid sequence in which 1 to 10 amino acids are deleted, substituted, inserted, and/or added in the amino acid sequence shown by SEQ ID NO: 2, wherein the nucleic acid has an action of inducing Th1-type immunity to an allergen selected from the group consisting of Lit v 1, Lit v 4, and Lit v 3.

8. A nucleic acid comprising:

a nucleotide sequence encoding a chimeric protein consisting of an amino acid sequence shown by SEQ ID NO: 2.

9. An expression vector comprising:

the nucleic acid according to any one of claims 1 to 8.

10. An expression vector comprising:

the nucleic acid according to claim 8.

11. A host cell transformed with the nucleic acid according to any one of claims 1 to 8.

12. A method for producing a nucleic acid, comprising:

culturing a host cell transformed with the nucleic acid according to any one of claims 1 to 8.

13. A pharmaceutical composition comprising:

the expression vector according to claim 10 and a pharmaceutically acceptable excipient.

14. The pharmaceutical composition according to claim 13, which is a pharmaceutical composition for preventing or treating crustacean allergy.

15. The expression vector according to claim 10, for use in preventing or treating crustacean allergy.

16. Use of the expression vector according to claim 10 in the manufacture of a medicament for the prevention or treatment of a crustacean allergy.