

CLAIMS

1. An IgE EMPD peptide immunogen construct represented by the formulae:

$$(\text{Th})_m-(\text{A})_n-(\text{IgE EMPD fragment})-\text{X}$$

or

$$(\text{IgE EMPD fragment})-(\text{A})_n-(\text{Th})_m-\text{X}$$

or

$$(\text{Th})_m-(\text{A})_n-(\text{IgE EMPD fragment})-(\text{A})_n-(\text{Th})_m-\text{X}$$

wherein

Th is a heterologous T helper epitope;

A is a heterologous spacer;

(IgE EMPD fragment) is a B cell epitope having about 20 to about 40 amino acid residues from the central intramolecular loop of IgE EMPD;

X is an α -COOH or α -CONH₂ of an amino acid;

m is from 1 to about 4; and

n is from 0 to about 10.

2. The IgE EMPD peptide immunogen construct according to claim 1, wherein the IgE EMPD fragment is selected from the group consisting of SEQ ID NOs: 5, 6, 8, and 9.

3. The IgE EMPD peptide immunogen construct according to any of claims 1 or 2, wherein the Th epitope is selected from the group consisting of SEQ ID NOs: 59-87.

4. The IgE EMPD peptide immunogen construct according to claim 1, wherein the peptide immunogen construct is selected from the group consisting of SEQ ID NOs: 88-95, 98-124, and 130.

5. An IgE EMPD peptide immunogen construct comprising:
 a B cell epitope comprising about 20 to about 40 amino acid residues from the IgE EMPD sequence of SEQ ID NO: 1 or SEQ ID NO: 2;
 a T helper epitope comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 59-87; and

an optional heterologous spacer selected from the group consisting of an amino acid, Lys-, Gly-, Lys-Lys-Lys-, (α , ϵ -N)Lys, and ϵ -N-Lys-Lys-Lys-Lys (SEQ ID NO: 129), wherein the B cell epitope is covalently linked to the T helper epitope directly or through the optional heterologous spacer.

6. The IgE EMPD peptide immunogen construct of claim 5, wherein the B cell epitope is selected from the group consisting of SEQ ID NOs: 5, 6, 8, and 9.
7. The IgE EMPD peptide immunogen construct of claim 5, wherein the T helper epitope is selected from the group consisting of SEQ ID NOs: 59-87.
8. The IgE EMPD peptide immunogen construct of claim 5, wherein the optional heterologous spacer is (α , ϵ -N)Lys or ϵ -N-Lys-Lys-Lys-Lys (SEQ ID NO: 129).
9. The IgE EMPD peptide immunogen construct of claim 5, wherein the T helper epitope is covalently linked to the amino terminus of the B cell epitope.
10. The IgE EMPD peptide immunogen construct of claim 5, wherein the T helper epitope is covalently linked to the amino terminus of the B cell epitope through the optional heterologous spacer.
11. A composition comprising a peptide immunogen construction according to any of claims 1 to 10.
12. A pharmaceutical composition comprising:
 - a. a peptide immunogen construct according to any of claims 1 to 10; and
 - b. and a pharmaceutically acceptable delivery vehicle and/or adjuvant.
13. The pharmaceutical composition of claim 12, wherein
 - a. the IgE EMPD peptide immunogen construct is selected from the group consisting of SEQ ID NOs: 88-95, 98-124, and 130; and
 - b. the IgE EMPD peptide immunogen construct is mixed with an CpG oligodeoxynucleotide (ODN) to form a stabilized immunostimulatory complex.

14. An isolated antibody or epitope-binding fragment thereof that specifically binds to the B cell epitope of the IgE EMPD peptide immunogen construct according to any of claims 1 to 10.
15. The isolated antibody or epitope-binding fragment thereof according to claim 14 bound to the IgE EMPD peptide immunogen construct.
16. An isolated antibody or epitope-binding fragment thereof that specifically binds to the B cell epitope of the IgE EMPD peptide immunogen construct according to any of claims 1 to 10.
17. A composition comprising the isolated antibody or epitope-binding fragment thereof according to any of claims 14 to 16.