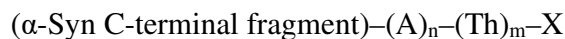


CLAIMS

1. An alpha-synuclein (α -Syn) peptide immunogen construct comprising:
a B cell epitope comprising 10 to 25 amino acid residues from a C-terminal fragment of α -Syn corresponding to amino acid G111 to amino acid D135 of SEQ ID NO: 1;
a T helper epitope comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 70-98; 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: 148),
wherein the B cell epitope is covalently linked to the T helper epitope directly or through the optional heterologous spacer.
2. The α -Syn peptide immunogen construct of **claim 1**, wherein the B cell epitope is selected from the group consisting of SEQ ID NOs: 12 – 15, 17, and 49 – 63.
3. The α -Syn peptide immunogen construct of **claim 1**, wherein the T helper epitope is selected from the group consisting of SEQ ID NOs: 81, 83, and 84.
4. The α -Syn peptide immunogen construct of **claim 1**, wherein the optional heterologous spacer is (α , ϵ -N)Lys or ϵ -N-Lys-Lys-Lys-Lys (SEQ ID NO: 148).
5. The α -Syn peptide immunogen construct of **claim 1**, wherein the T helper epitope is covalently linked to the amino terminus of the B cell epitope.
6. The α -Syn peptide immunogen construct of **claim 1**, wherein the T helper epitope is covalently linked to the amino terminus of the B cell epitope through the optional heterologous spacer.
7. The α -Syn peptide immunogen construct of **claim 1** comprising the following formula:

(Th)_m–(A)_n–(α -Syn C-terminal fragment)–X

or



wherein

Th is the T helper epitope;

A is the heterologous spacer;

(α -Syn C-terminal fragment) is the B cell epitope;

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

m is from 1 to about 4; and

n is from 1 to about 10.

8. The α -Syn peptide immunogen construct of **claim 1**, comprising the amino acid sequence selected from the group consisting of SEQ ID NOs: 107, 108, 111 – 113, and 115 – 147.

9. The α -Syn peptide immunogen construct of **claim 1**, comprising the amino acid sequence selected from the group consisting of SEQ ID NOs: 107, 108, and 111 – 113.

10. A composition comprising the α -Syn peptide immunogen construct of **claim 1**.

11. A composition comprising more than one α -Syn peptide immunogen construct of **claim 1**.

12. The composition of **claim 11**, wherein the α -Syn peptide immunogen constructs have amino acid sequences of SEQ ID NOs: 112 and 113.

13. A pharmaceutical composition comprising the α -Syn peptide immunogen construct of **claim 1** and a pharmaceutically acceptable delivery vehicle and/or adjuvant.

14. The pharmaceutical composition of **claim 13**, wherein

a. the α -Syn peptide immunogen construct is selected from the group consisting of SEQ ID NOs: 107, 108, 111 – 113, and 115 – 147; and

b. the adjuvant is a mineral salt of aluminum selected from the group consisting of Al(OH)₃ or AlPO₄.

15. The pharmaceutical composition of **claim 13**, wherein
 - a. the α -Syn peptide immunogen construct is selected from the group consisting of SEQ ID NOs: 107, 108, 111 – 113, and 115 – 147; and
 - b. the α -Syn peptide immunogen construct is mixed with an CpG oligodeoxynucleotide (ODN) to form a stabilized immunostimulatory complex.
16. An isolated antibody or epitope-binding fragment thereof that specifically binds to the B cell epitope of the α -Syn peptide immunogen construct of **claim 1**.
17. The isolated antibody or epitope-binding fragment thereof according to **claim 16** bound to the α -Syn peptide immunogen construct.
18. An isolated antibody or epitope-binding fragment thereof that specifically binds to the B cell epitope of the α -Syn peptide immunogen construct of **claim 9**.
19. A composition comprising the isolated antibody or epitope-binding fragment thereof according to **claim 16**.
20. A composition comprising the isolated antibody or epitope-binding fragment thereof according to **claim 18**.
21. The composition of **claim 20**, comprising a mixture of
 - a. an isolated antibody or epitope-binding fragment thereof that specifically binds to the B cell epitope of SEQ ID NO: 112; and
 - b. an isolated antibody or epitope-binding fragment thereof that specifically binds to the B cell epitope of SEQ ID NO: 113.
22. Use of the α -Syn peptide immunogen of **claim 1** and a delivery vehicle and/or adjuvant in the manufacture of a medicament for producing antibodies that recognize α -Syn in a host.
23. Use of the α -Syn peptide immunogen of **claim 1** in the manufacture of a medicament for inhibiting α -Syn aggregation in an animal.
24. Use of the α -Syn peptide immunogen of **claim 1** in the manufacture of a medicament for

reducing the amount of α -Syn aggregates in an animal.

25. A method of identifying α -Syn aggregates of different sizes in a biological sample comprising:

- a. exposing the biological sample to the antibody or epitope-binding fragment thereof according to **claim 16** under conditions that allow the antibody or epitope-binding fragment thereof to bind to the α -Syn aggregates; and
- b. detecting the amount of the antibody or epitope-binding fragment thereof bound to the α -Syn aggregates in the biological sample.