

Claims

1. A peptide combination comprising:
 - a peptide having the amino acid sequence of SEQ ID NO: 1;
 - a peptide having the amino acid sequence of SEQ ID NO: 2;
 - 5 a peptide having the amino acid sequence of SEQ ID NO: 3;
 - a peptide having the amino acid sequence of SEQ ID NO: 4;
 - a peptide having the amino acid sequence of SEQ ID NO: 5; and
 - a peptide having the amino acid sequence of SEQ ID NO: 6.
- 10 2. A peptide combination according to claim 1, consisting of:
 - a peptide having the amino acid sequence of SEQ ID NO: 1;
 - a peptide having the amino acid sequence of SEQ ID NO: 2;
 - a peptide having the amino acid sequence of SEQ ID NO: 3;**
 - a peptide having the amino acid sequence of SEQ ID NO: 4;**
 - 15 a peptide having the amino acid sequence of SEQ ID NO: 5; and
 - a peptide having the amino acid sequence of SEQ ID NO: 6.
3. A pharmaceutically acceptable composition comprising the peptide combination of claim 1 or claim 2 and one or more pharmaceutically acceptable excipients.
- 20 4. The pharmaceutically acceptable composition of claim 3, further comprising cysteine.
5. The pharmaceutically acceptable composition of claim 3 or 4 for use in therapy.
- 25 6. The pharmaceutically acceptable composition of claim 5 for use in the treatment or prevention of Type 1 Diabetes (T1D).
7. The pharmaceutically acceptable composition of claim 5 for use in the manufacture of a medicament for the treatment or prevention of Type 1 Diabetes (T1D).
- 30 8. The pharmaceutically acceptable composition of any of claims 3 to 7 wherein the composition is formulated to be delivered by parenteral, oral or topical routes,

including intravenous, intradermal, intramuscular, subcutaneous, intraperitoneal, nasal, oral or epicutaneous routes.

- 5 9. The pharmaceutically acceptable composition of claim 8 wherein the composition is formulated to be delivered by an intradermal route.
- 10 10. Use of the pharmaceutically acceptable composition of claim 3 or 4 in the manufacture of a medicament for the treatment or prevention of Type 1 Diabetes (T1D), wherein the pharmaceutically acceptable composition is to be administered to a patient with T1D or a non-diabetic individual identified as being at high-risk of T1D.
11. The use of claim 10 wherein the pharmaceutically acceptable composition is to be administered to a patient who has beta cell mass remaining.
- 15 12. The use of claim 10 or 11 wherein the pharmaceutically acceptable composition is to be administered by parenteral, oral or topical routes, including intravenous, intradermal, intramuscular, subcutaneous, intraperitoneal, nasal, oral or epicutaneous routes.
- 20 13. The use of claim 12 wherein the pharmaceutically acceptable composition is to be administered by an intradermal route.
14. A kit for treating or preventing Type 1 Diabetes (T1D) comprising the peptide combination of claim 1 or claim 2.
- 25 15. A method of diagnosis or determining treatment efficacy comprising:
 - (a) providing CD4 lymphocytes from an individual suspected of having or being susceptible to T1D;
 - (b) providing a population of Antigen Presenting Cells (APCs) which bear on

30 their surface a class II MHC molecule of an allele identical to one expressed by said individual, the population of APCs having been contacted with the peptide combination of claim 1 and the class II MHC molecule being bound to one or more of the peptides of the peptide combination of claim 1; or

(c) providing a soluble peptide-HLA multimer reagent comprising class II MHC molecules of an allele identical to one expressed by said individual, the MHC molecules having been bound to one or more peptides of the peptide combination of the present invention;

5 (d) contacting the population of APCs of (b) or the peptide-HLA multimer of (c) with the CD4 lymphocytes of (a); and

(e) determining whether the CD4 lymphocytes recognize the class II MHC-bound peptide, as an indication that the individual has, or is, susceptible to T1D.

10 16. Use of the peptide combination of claim 1 or claim 2 in the manufacture of a medicament for the treatment or prevention of Type 1 Diabetes (T1D), wherein the peptide combination is to be administered to an individual who is diagnosed according to the method of claim 15 as having, or is, susceptible to T1D.

15 17. **A peptide combination comprising:**

a peptide having the amino acid sequence of SEQ ID NO: 4;

a peptide having the amino acid sequence of SEQ ID NO: 5; and

a peptide having the amino acid sequence of SEQ ID NO: 6

for use in the treatment or prevention of Type 1 Diabetes (T1D) wherein the
20 combination is for administration at least once per month, preferably once every 1 to 4 weeks for four administrations.

18. A peptide combination according to claim 17 wherein the combination is for
administration at least once per month, preferably once every 2 to 4 weeks for four
25 administrations.

19. A peptide combination according to claim 17 wherein the combination is for
administration at least once per month, preferably once per week for four weeks.

30 20. A peptide combination according to any one of claims 17 to 19 wherein the combination is for administration at a dosage of 240 µg of total peptide.

21. A peptide combination according to any one of claims 17 to 19 wherein the combination is for administration at a dosage of 12 mg of total peptide.
22. A peptide combination according to any one of claims 17 to 21 wherein the peptide combination is formulated as a pharmaceutically acceptable composition which includes one or more pharmaceutically acceptable excipients.
23. A peptide combination according to claim 22 wherein the composition is formulated to be delivered by parenteral, oral or topical routes, including intravenous, intradermal, intramuscular, subcutaneous, intraperitoneal, nasal, oral or epicutaneous routes.
24. A peptide combination according to claim 23 wherein the composition is formulated to be delivered by an intradermal route.
25. **Use of a peptide combination in the manufacture of a medicament for the treatment or prevention of Type I Diabetes (T1D), wherein the peptide combination comprises:**
a peptide having the amino acid sequence of SEQ ID NO: 4;
a peptide having the amino acid sequence of SEQ ID NO: 5; and
a peptide having the amino acid sequence of SEQ ID NO: 6; and
wherein the peptide combination is to be administered to a patient with T1D or a non-diabetic individual identified of being at high-risk of T1D at least once per month, preferably once every 1 to 4 weeks for four administrations.
26. The use of claim 25 wherein the peptide combination is to be administered at least once per month, preferably once every 2 to 4 weeks for four administrations.
27. The use of claim 25 wherein the peptide combination is to be administered at least once per month, preferably once per week for four weeks.
28. The use of any of claims 25 to 27 wherein the peptide combination is to be administered at a dosage of 240 µg total peptide.

29. The use of any of claims 25 to 27 wherein the peptide combination is to be administered at a dosage of 12 mg total peptide.
30. The use of any of claims 25 to 29 wherein the peptide combination is formulated as a
5 pharmaceutically acceptable composition which includes one or more
pharmaceutically acceptable excipients.
31. The use of claim 30 wherein the composition is formulated to be delivered by
parenteral, oral or topical routes, including intravenous, intradermal, intramuscular,
10 subcutaneous, intraperitoneal, nasal, oral or epicutaneous routes.
32. The use of claim 31 wherein the composition is formulated to be delivered by an
intradermal route.