In various embodiments, the immunogenic peptide conjugate is a compound of the formula (I) of the present disclosure or a pharmaceutically acceptable salt thereof.

The present disclosure also broadly consists in a peptide conjugate of the present disclosure produced by a method of the present disclosure.

The present disclosure also broadly consists in a composition comprising a peptide conjugate of formula (I) of the present disclosure or a salt or solvate thereof.

In various embodiments, the composition comprises isolated, pure, purified or substantially purified compound of formula (I) of the present disclosure or a salt or solvate thereof.

In various embodiments, the composition comprises at least about 60, 70, 75, 80, 85, 90, 95, 97, 98, or 99% by weight compound of formula (I) of the present disclosure or a salt or solvate thereof.

In various embodiments, the composition is free of substantially free of amino acid- or peptide containing compounds other than compounds of formula (I) of the present disclosure.

The present disclosure broadly consists in a pharmaceutical composition comprising an effective amount of a peptide conjugate compound of the formula (I) of the present disclosure or a pharmaceutically acceptable salt or solvate thereof, and a pharmaceutically acceptable carrier. In another aspect, the present disclosure relates to a pharmaceutical composition comprising an effective amount of a compound of the present disclosure or a pharmaceutically acceptable salt or solvate thereof, and a pharmaceutically acceptable carrier.

In various embodiments, the pharmaceutical composition comprises an effective amount of two or more peptide conjugate compounds of the formula (I) of the present disclosure.

In one embodiment, the pharmaceutical composition is an immunogenic composition.

In one embodiment, the pharmaceutical composition does not include an extrinsic adjuvant.

In some embodiments, the pharmaceutical composition is a vaccine.

peptides described herein, or any combination thereof. For example, the pharmaceutical composition comprises an effective amount of two or more peptide conjugates of the present disclosure and one or more peptides described herein, or an effective amount of one or more peptide conjugates of the present disclosure and two or more peptides described herein.

The present disclosure also broadly consists in a method of vaccinating or eliciting an immune response in a subject comprising administering to the subject an effective amount of one or more peptide conjugate compounds of the formula (I) of the disclosure or a pharmaceutically acceptable salt or solvate thereof, or an effective amount of a pharmaceutical composition of of the present disclosure.

The present disclosure broadly consists in use of one or more peptide conjugate compounds of formula (I) of the present disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the present disclosure in the manufacture of a medicament for vaccinating or eliciting an immune response or for activating TLR2 in a subject. In another aspect, the present disclosure relates to use of one or more compounds of the present disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the present disclosure in the manufacture of a medicament for treating or preventing infectious disease, treating or preventing cancer, or treating or preventing viral re-activation during or following immunosuppression.

The present disclosure broadly consists in one or more peptide conjugate compounds of the formula (I) of the present disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the present disclosure for vaccinating or eliciting an immune response or for activating TLR2 in a subject. In another aspect, the present disclosure relates to one or more compounds of the present disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the present disclosure for use in vaccinating a subject.

The present disclosure also broadly consists in use of one or more peptide conjugate compounds of the formula (I) of the disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the present disclosure for vaccinating or eliciting an immune response in a subject.

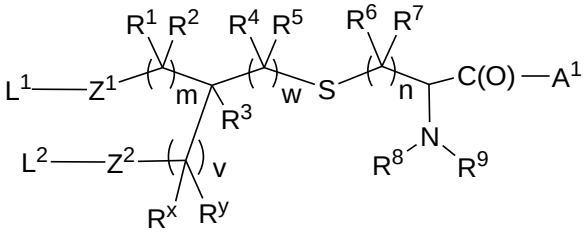
The present disclosure also broadly consists in a method of activating TLR2 in a subject, the method comprising administering to the subject an effective amount of one or more peptide conjugate of the disclosure or a pharmaceutically acceptable salt or solvate thereof, or an effective amount of a pharmaceutical composition of the disclosure.

Use of one or more peptide conjugate compounds of the disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the disclosure in the manufacture of a medicament for activating TLR2 in a subject.

One or more peptide conjugate compounds of the disclosure or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of the disclosure for activating TLR2 in a subject.

CLAIMS

1. A compound of the formula (I):



(I)

wherein

m and w are each independently an integer from 0 to 7 and v is an integer from 0 to 5,

provided that:

the sum of m, v, and w is at least 3; and

the sum of m and w is from 0 to 7;

n is 1 or 2;

Z1 and Z2 are each independently selected from the group consisting of –O–, –NR–, –S–, –S(O)–, –SO_2–, –C(O)O–, –OC(O)–, –C(O)NR–, –NRC(O)–, –C(O)S–, –SC(O)–, –OC(O)O–, –NRC(O)O–, –OC(O)NR–, and –NRC(O)NR–;

R1, R2, Rx, Ry, R4, R5, R6, and R7 at each instance of m, v, w, and n are each independently hydrogen or C1-6aliphatic;

R, R3, and R8 are each independently hydrogen or C1-6aliphatic;

R9 is hydrogen, C1-6aliphatic, an amino protecting group, L3–C(O)–, or A2;

L1 and L2 are each independently selected from C5-21aliphatic or C4-20heteroaliphatic;

L3 is C1-21aliphatic or C2-20heteroaliphatic;

A1 is an amino acid, a peptide, OH, OP1, NH_2, or NHP2, wherein P1 is a carboxyl protecting group, and wherein P2 is a carboxamide protecting group;

A2 is an amino acid or a peptide;

wherein any aliphatic or heteroaliphatic present in any of R, R1, R2, R3, R4, R5, R6, R7, R8, R9, Rx, Ry, L1, L2, and L3 is optionally substituted;
or a pharmaceutically acceptable salt or solvate thereof;

with the proviso that:

(1) at least one of R9 and A1 is a peptide comprising, consisting essentially of, or consisting of an amino acid sequence selected from the group consisting of:

(a) 8 or more contiguous amino acid residues from the sequence $Xaa_1Xaa_2Xaa_3Xaa_4$LQQLSLLMWITQXaa_{22}FLPVFLAQPPSGQRR [SEQ ID NO:1], wherein Xaa_1 is absent or is S, Xaa_2 is absent or is a hydrophilic amino acid, Xaa_3 is absent or is a hydrophilic amino acid, and Xaa_4 is absent or is one or more hydrophilic amino acids,

(b) 8 or more contiguous amino acid residues from the sequence $Xaa_1Xaa_2Xaa_3$LQQLSLLMWITQXaa_{22}FLPVFLAQPPSGQRR [SEQ ID NO:2], wherein Xaa_1 is absent or is S, Xaa_2 is absent or is a hydrophilic amino acid, and Xaa_3 is absent or is from one to ten hydrophilic amino acids,

(c) 8 or more contiguous amino acid residues from the sequence Xaa_1Xaa_2LQQLSLLMWITQXaa_{22}FLPVFLAQPPSGQRR [SEQ ID NO:3], wherein Xaa_1 is absent or is S, and Xaa_2 is absent or is from one to four hydrophilic amino acids,

(d) 8 or more contiguous amino acid residues from the sequence SKKKKLQQLSLLMWITQXaa_{22}FLPVFLAQPPSGQRR [SEQ ID NO:4],

(e) the sequence of any one of SEQ ID NOs: 1 to 4,

(f) 8 or more contiguous amino acid residues from the sequence LQQLSLLMWITQXaa_{22}FLPVFLAQPPSGQRR [SEQ ID NO:5],

(g) the sequence of SEQ ID NO: 5,

(h) 8 or more contiguous amino acid residues from the sequence SLLMWITQXaa_{22}FLPVF [SEQ ID NO:6],

(i) the sequence of SEQ ID NO: 6,

(j) 8 or more contiguous amino acid residues from the sequence SKKKKSLLMWITQXaa_{22} [SEQ ID NO:7],

(k) the sequence of SEQ ID NO: 7,

(l) 8 or more contiguous amino acid residues from the sequence SLLMWITQXaa_{22} [SEQ ID NO:8],

(m) the sequence of SEQ ID NO: 8,

(n) or any combination of two or more of (a) to (m) above,

wherein Xaa_{22} in each sequence is independently any naturally occurring amino acid except C (for example, V, I, or L), and any sequence of 8 or more contiguous amino acid residues from any of the above sequences comprises Xaa_{22}; or

(2) m is an integer from 3 to 7, and at least one of R9 and A1 is an amino acid or a peptide.

2. The compound of claim 1, wherein at least one of R9 and A1 is a peptide comprising, consisting essentially of, or consisting of one or more amino acid sequences selected from the group as defined in proviso (1) of claim 1.

3. The compound of claim 2, wherein m is 2.

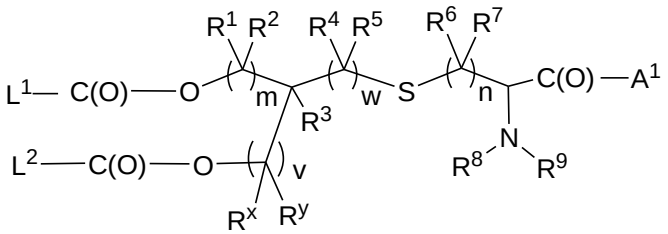
4. The compound of claim 1, wherein m is an integer from 3 to 7 and at least one of R9 and A1 is an amino acid or a peptide as defined in proviso (2) of claim 1.

5. The compound of claim 4, wherein at least one of R9 and A1 is a peptide, wherein the peptide comprises, consists essentially of, or consists of an amino acid sequence selected from the group consisting of 8 or more contiguous amino acids from the amino acid sequence of any one of SEQ ID NOs 8 – 129; or wherein the peptide comprises, consists essentially of, or consists of one or more amino acid sequences selected from the group defined in proviso (1) of claim 1.

6. The compound of any one of the preceding claims, wherein m is from 3 to 5.

7. The compound of any one of the preceding claims, wherein Z1 and Z2 are each independently selected from the group consisting of –C(O)O–, –C(O)NR–, and –C(O)S–.

8. The compound of any one of the preceding claims, wherein the compound is a compound of the formula (IA):



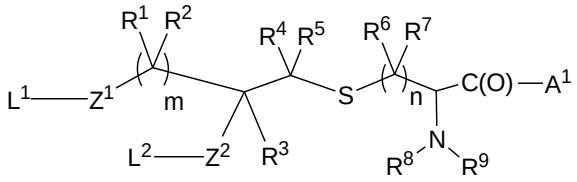
(IA).

9. The compound of any one of the preceding claims, wherein w is 1 or 2; and/or wherein n is 1; and/or wherein v is from 0 to 3.

10. The compound of any one of the preceding claims, wherein L1 and L2 are each independently C5-21alkyl, preferably linear C15alkyl; and/or wherein L3 is methyl or linear C15alkyl, preferably methyl.

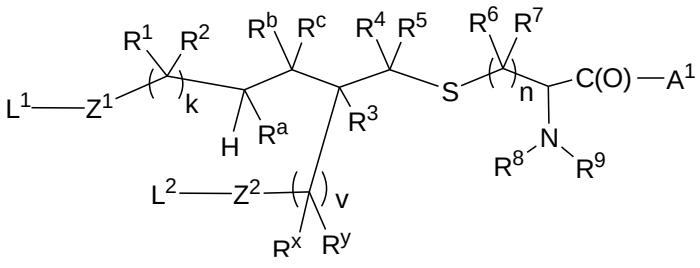
11. The compound of any one of the preceding claims, wherein R1 and R2 at each instance of m are each independently C1-6alkyl or hydrogen, preferably hydrogen; and/or wherein R3 is C1-6alkyl or hydrogen, preferably hydrogen; and/or wherein R4 and R5 at each instance of w are each independently C1-6alkyl or hydrogen, preferably hydrogen; and/or wherein Rx and Ry at each instance of v are each independently C1-6alkyl or hydrogen, preferably hydrogen; and/or wherein R6 and R7 at each instance of n are each independently C1-6alkyl or hydrogen, preferably hydrogen; and/or wherein R8 is independently C1-6alkyl or hydrogen, preferably hydrogen; and/or wherein R9 is C1-6alkyl, hydrogen, an amino protecting group, L3–C(O), or A2, preferably hydrogen, an amino protecting group, L3–C(O), or A2.

12. The compound of any one of the preceding claims, wherein the compound is a compound of the formula (IF):



(IF); or

a compound of the formula (IB):



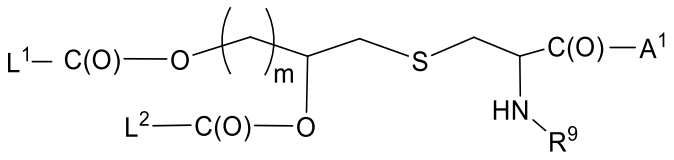
(IB)

wherein

k is an integer from 0 to 4, preferably 0 to 3; and

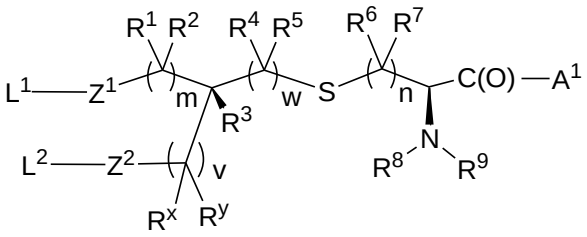
Ra, Rb, and Rc are each independently hydrogen or C1-6aliphatic, preferably hydrogen or C1-6alkyl, preferably hydrogen.

13. The compound of any one of the preceding claims, wherein the compound is a compound of the formula (ID-1):



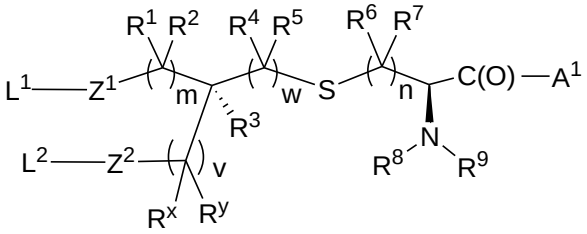
(ID-1).

14. The compound of any one of the preceding claims, wherein the compound has the formula (IE-1):



(IE-1); or

has the formula (IE-2):



(IE-2).

15. The compound of any one of the preceding claims, wherein the amino acid of the compound to which L1 and L2 are conjugated is an N-terminal amino acid residue; and/or wherein A1 is serine or a peptide comprising serine as the first N-terminal amino acid residue.

16. A pharmaceutical composition comprising an effective amount of a compound of any one of claims 1 to 15 or a pharmaceutically acceptable salt or solvate thereof, and a pharmaceutically acceptable carrier.

17. Use of one or more compounds of any one of claims 1 to 15 or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of claim 16 in the manufacture of a medicament for treating or preventing infectious disease, treating or preventing cancer, or treating or preventing viral re-activation during or following immunosuppression.

18. One or more compounds of any one of claims 1 to 15 or a pharmaceutically acceptable salt or solvate thereof or a pharmaceutical composition of claim 16 for use in vaccinating a subject.