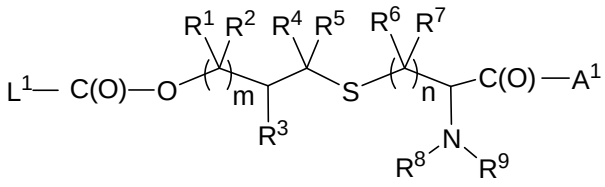
CLAIMS

1. A compound of the formula (V):



(V)

wherein

m is an integer from 0 to 4;

n is 1 or 2;

R1 and R2 at each instance of m are each independently hydrogen, C1-6alkyl, or C3-6cycloalkyl;

R3, R4, R5, R8, and R9 are each independently hydrogen, C1-6alkyl, or C3-6cycloalkyl; or R9 is an amino protecting group, L3–C(O), or A2;

R6 and R7 at each instance of n are each independently hydrogen, C1-6alkyl, or C3-6cycloalkyl,

L1 is C5-21alkyl or C4-20heteroalkyl;

L3 is C1-6alkyl or C3-6cycloalkyl;

A1and A2 are each independently an amino acid or a peptide; or A1 is OH or OP1, wherein P1 is a carboxyl protecting group, and wherein A1 or A2 comprise one or more EBV LMP2 epitopes, or wherein A1, A2 or both A1 and A2 comprise one or more peptides selected from the group consisting of SEQ ID NOs: 1 - 101;

wherein any alkyl, cycloalkyl or heteroalkyl present in any of R1, R2, R3, R4, R5, R6, R7, R8, R9, L1, and L3 is optionally substituted, and

or a pharmaceutically acceptable salt or solvate thereof.

2. The compound of claim 1, wherein R9 is independently hydrogen, C1-6alkyl, or C3-6cycloalkyl; or R9 is L3–C(O) or A2; and

A1 and A2 are each independently a peptide; or A1 is OH;

provided that:

at least one of A1 and A2 comprises an EBV LMP2 epitope; and

when R9 is not A2, A1 is a peptide.

3. The compound of claim 1 or 2, wherein L1 is C5-21alkyl or linear C15alkyl.

4. The compound of any one of claims 1 to 3, wherein m is an integer from 0 to 2 or m is 0 or 1.

5. The compound of any one of claims 1 to 4, wherein m is 0.

6. The compound of any one of claims 1 to 5, wherein R1 and R2 at each instance of m are each independently hydrogen.

7. The compound of any one of claims 1 to 6, wherein R3 is hydrogen.

8. The compound of any one of claims 1 to 7, wherein R4 and R5 are each hydrogen.

9. The compound of any one of claims 1 to 8, wherein R6 and R7 are each hydrogen.

10. The compound of any one of claims 1 to 9, wherein R8 is hydrogen and R9 is hydrogen, an amino protecting group, L3–C(O), or A2.

11. The compound of any one of claims 1 to 10, wherein A1 is a OP1 or OH and R9 is hydrogen, an amino protecting group or L3–C(O).

12. The compound of any one of claims 1 to 11, wherein L3 is Me.

13. The compound of any one of claims 1 to 12, wherein A1 and/or A2 is an amino acid or a peptide.

14. The compound of any one of claims 1 to 13, wherein the peptide comprises an epitope selected from the group consisting of the amino acid sequence of any one of SEQ ID NOs: 76 – 101.

15. The compound of any one of claims 1 to 14, wherein A1 is serine or a peptide comprising serine as the first N-terminal amino acid residue.

16. The compound of any one of claims 1 to 15, wherein A1 and/or A2 is a peptide comprising a solubilising group comprising an amino acid sequence comprising two or more hydrophilic amino acid residues in the peptide chain.

17. The compound of any one of claims 1 to 16 wherein the peptide comprises , consists essentially of, or consists of an amino acid sequence selected from the group consisting of
    a. 8 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 101;
    b. 10 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 101;
    c. 12 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 101;

d. 15 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 101;
e. 20 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 101;
f. the sequence of any one of SEQ ID NOs: 1 to 101,
g. 8 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 93;
h. 10 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 93;
i. 12 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 93;
j. 15 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 93;
k. 20 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 93;
l. the sequence of any one of SEQ ID NOs: 1 to 93,
m. 8 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 75;
n. 10 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 75;
o. 12 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 75;
p. 15 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 75;
q. 20 or more contiguous amino acid residues from the sequence of any one of SEQ ID NO:1 to 75;
r. the sequence of any one of SEQ ID NOs: 1 to 75,
s. or any combination of two or more of (a) to (r) above.

18. An isolated, purified, or recombinant peptide comprising, consisting of, or consisting essentially of an amino acid sequence selected from the group consisting of any one of SEQ ID NOs: 1 – 75.

19. A pharmaceutical composition comprising an effective amount of a peptide conjugate of any one of claims 1 to 17 or a peptide of claim 18 or a pharmaceutically acceptable salt or solvate thereof, or any combination thereof, and a pharmaceutically acceptable carrier.

20. An effective amount of a peptide conjugate of any one of claims 1 to 17 or a peptide of claim 18 or a pharmaceutically acceptable salt or solvate thereof, or an effective amount of the pharmaceutical composition of claim 19 for use in therapy.

21. Use of an effective amount of a peptide conjugate of any one of claims 1 to 17 or a peptide of claim 18 or a pharmaceutically acceptable salt or solvate thereof, or an effective amount of the pharmaceutical composition of claim 19 in the manufacture of a medicament for vaccinating or eliciting an immune response in a subject.

22. A method for making a peptide conjugate of claim 1, the method comprising

(A) reacting
a lipid-containing conjugation partner, and
an amino acid-comprising conjugation partner,
under conditions effective to conjugate the lipid-containing conjugation partner to the amino acid-comprising conjugation partner by the hydrothiolation of a carbon-carbon double bond with a thiol,
the method further comprising coupling the amino acid of the amino acid conjugate to an amino acid or a peptide to provide a peptide conjugate, and wherein the peptide conjugate comprises one or more EBV LMP2 epitopes; or

(B) reacting
a lipid-containing conjugation partner, and
a peptide-comprising conjugation partner, wherein the peptide-comprising partner comprises one or more EBV LMP2 epitopes,
under conditions effective to conjugate the lipid-containing conjugation partner to the peptide-comprising conjugation partner by the hydrothiolation of a carbon-carbon double bond with a thiol; or

(C) providing a lipididated amino acid or peptide, and
coupling the lipidated amino acid or peptide to one or more amino acids or peptides to provide a peptide conjugate, and wherein the peptide conjugate comprises one or more EBV LMP2 epitopes.