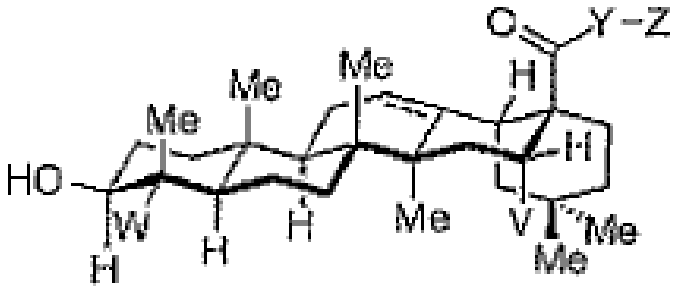
Claims

1. A compound of formula (I), or a pharmaceutically acceptable salt thereof,



(I)

wherein == is a single or double bond;

W is C(O)R, CH,OR or CH_2R, wherein R is H, or an optionally substituted group selected from acyl, arylalkyl, aryl, heteroaryl, aliphatic, heteroaliphatic, cycloaliphatic and heterocyclyl groups;

Vis H or OH;

Y is O;

Z is a linear tetrasaccharide or a linear trisaccharide with an acyl chain attached to a first sugar residue of the linear tetrasaccharide or a linear trisaccbride, wherein the first sugar residue is the sugar residue that is attached directly to Y, and wherein V is OH, or, when W is CH_2R, R is not H.

2. The compound of Claim 1, or a pharmaceutically acceptable salt thereof, wherein R is H.

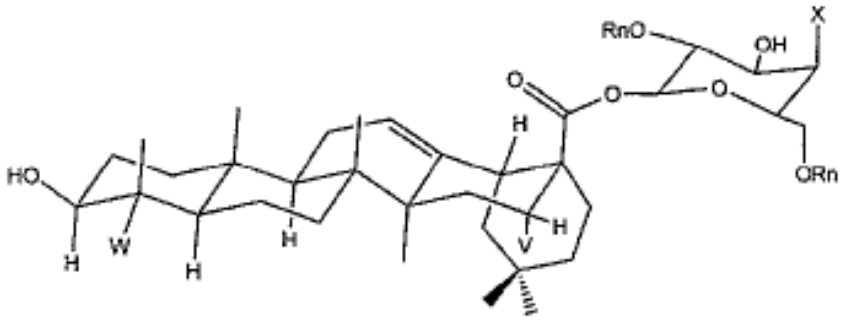
3. The compound of Claim 2, or a pharmaceutically acceptable salt thereof, wherein W is Me and V is OH.

4. The compound of Claim 2, or a pharmaceutically acceptable salt thereof, wherein W is CHO and V is OH.

5. The compound of Claim 2, or a pharmaceutically acceptable salt thereof, W is CH_2OH and V is OH.

6. The compound of any one of Claims 1 to 5, or a pharmaceutically acceptable salt thereof, wherein the acyl chain attached to the first sugar residue is 6-(4-iodobenzoylamino)hexanoyl.

7. A compound of formula (II), or a pharmaceutically acceptable salt thereof,



(II)

(II)

or a pharmaceutically acceptable salt thereof, wherein

W is C(O)R, CH_2OR or CH_2R; wherein R is H, or an optionally substituted group selected from acyl, arylalkyl, aryl, heteroaryl, aliphatic, heteroaliphatic, cycloaliphatic and heterocyclyl groups;

V is H or OH,

X is CH_2R^m, $C(O)R^m$, CH_2OR^m, CH_2R^m, OR^m, or NHR^m, wherein

R^m is H, or an optionally substituted group selected from acyl, arylalkyl, aryl, heteroaryl, aliphatic, heteroaliphatic, cycloaliphatic and heterocyclyl groups,

and

one occurrence of R^n is hydrogen, and the other is a monosaccharide, a disaccharide or a trisaccharide.

8. The compound of Claim 7, or a pharmaceutically acceptable salt thereof, wherein R is H.

9. The compound of Claim 8, or a pharmaceutically acceptable salt thereof, wherein W is Me and V is OH.

10. The compound of Claim 8, or a pharmaceutically acceptable salt thereof, wherein W is CHO and V is OH.

11. The compound of Claim 8, or a pharmaceutically acceptable salt thereof, W is CH_2OH and V is OH.

12. The compound of any one of Claims 7 to 11, or a pharmaceutically acceptable salt thereof, wherein X is NHR^m and wherein R^m is 6-(4-iodobenzoylamino)-hexanoyl.

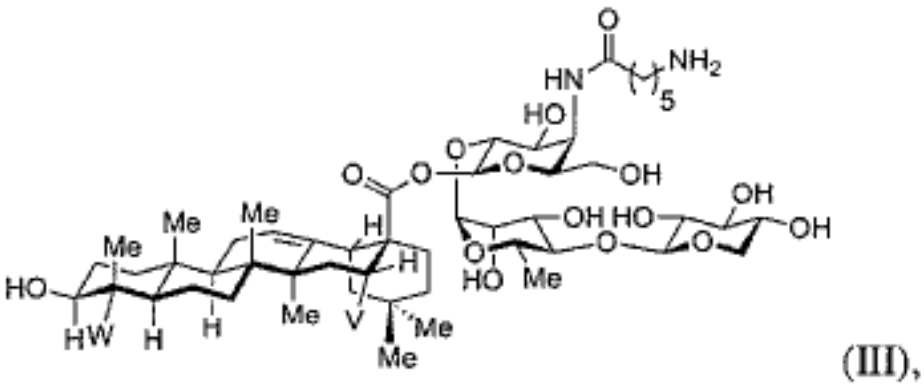
13. A pharmaceutical composition, comprising: the compound of any one of Claims 1-12, or a pharmaceutically acceptable salt thereof; and an immunologically effective amount of an antigen.

14. The use of the pharmaceutical composition of Claim 13 in the manufacture of a medicament for immunizing a subject.

15. A pharmaceutical composition, comprising: the compound of any one of Claims 1-12, or a pharmaceutically acceptable salt thereof; and an effective amount of a cytotoxic drug.

16. The use of the pharmaceutical composition of Claim 15 in the manufacture of a medicament for enhancing the effect of a cytotoxic drug in a subject.

17. A compound of formula (III),



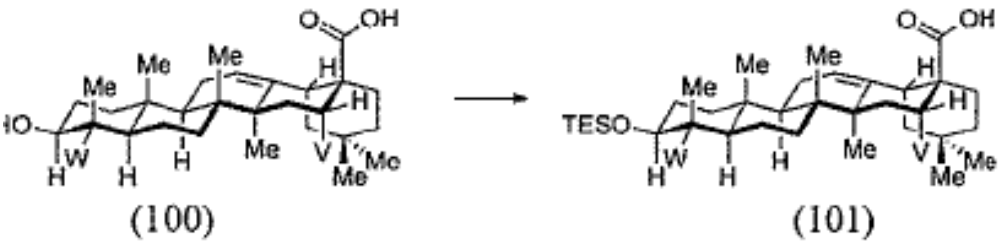
(III),

wherein W is Me, -CHO, or $-CH_2OH$, and V is H or OH.

18. The use of the compound of Claim 17 as an intermediate in the synthesis of a minimal saponin analogue.

19. A process for preparing the compound of Claim 17, comprising the steps of:

a) reacting a compound of formula (100) with a protecting group to form a compound of formula (101),

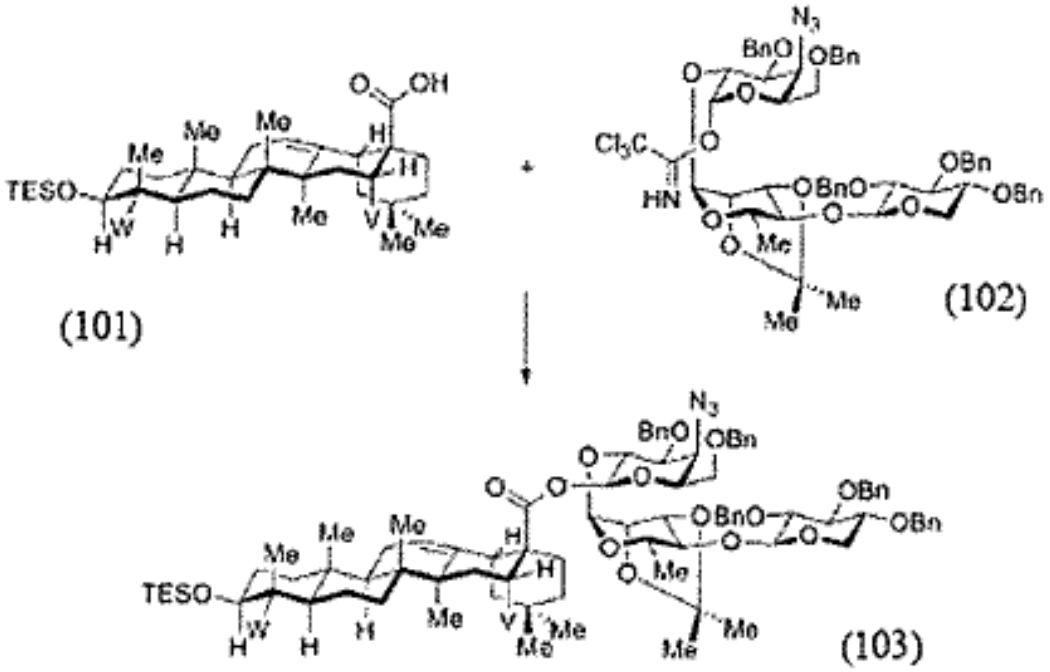


wherein W is Me, CHO, CH_2OH, or CH_2OR^p; wherein

Rp is H or a suitable protecting group as necessary to achieve regioselectivity; V is H or OR^p, and TES is a triethylsilyl protecting group;

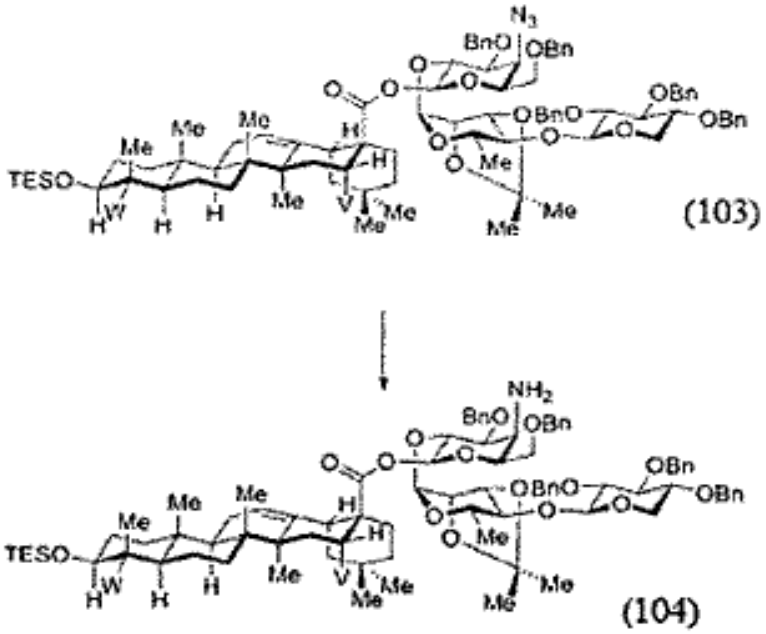
b) reacting the compound of formula (101) with the compound of formula (102)

to form the compound of formula (103), wherein Bn is a benzyl protecting group;

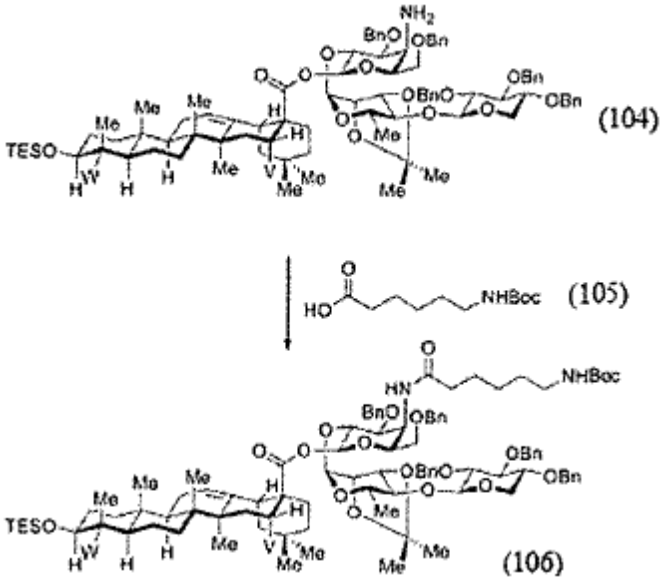


c) reacting the compound of formula (103) with a reducing agent to form the compound of formula (104);

(103)



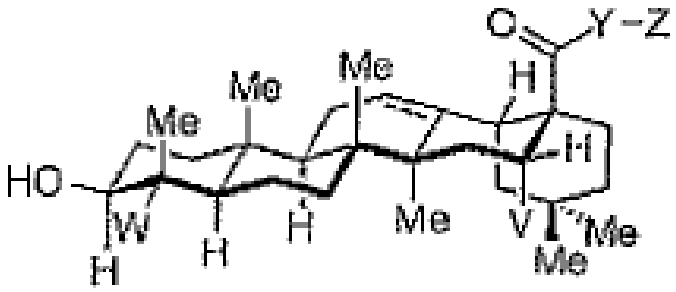
d) coupling the compound of formula (104) with compound of formula (105) in the presence of an activating agent to form the compound of formula (106), wherein Boc is a tertbutyloxycarbonyl protecting group;



e) deprotecting the compound of formula (106) to form the compound of formula (III).

20. A pharmaceutical composition, comprising:

a) a compound of Formula I,



(I)

or a pharmaceutically acceptable salt thereof;

== is a single or double bond;

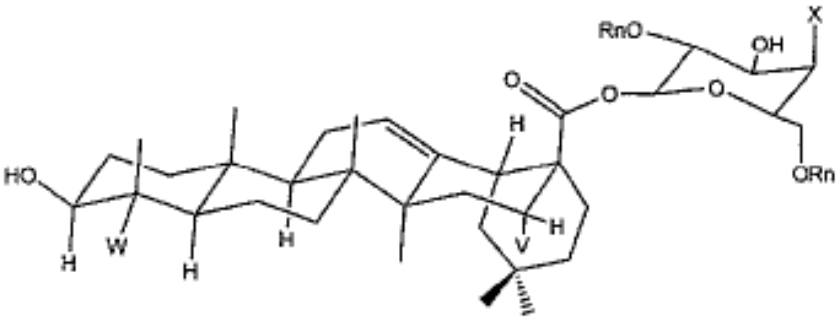
W is C(O)R, CH,OR or CH_2R, wherein R is H, or an optionally substituted group selected from acyl, arylalkyl, aryl, heteroaryl, aliphatic, heteroaliphatic, cycloaliphatic and heterocyclyl groups;

Vis H or OH;

Y is O; and

Z is a linear oligosaccharide; or

b) a compound of formula (II), or a pharmaceutically acceptable salt thereof,



(II)

or a pharmaceutically acceptable salt thereof, wherein

W is C(O)R, CH_2OR or CH2R; wherein R is H, or an optionally substituted group selected from acyl, arylalkyl, aryl, heteroaryl, aliphatic, heteroaliphatic, cycloaliphatic and heterocyclyl groups;

V is H or OH,
X is CH_2R^m, $C(O)R^m$, CH_2OR^m, CH_2R^m, OR^m, or NHR^m, wherein
R^m is H, or an optionally substituted group selected from acyl, arylalkyl, aryl, heteroaryl, aliphatic, heteroaliphatic, cycloaliphatic and heterocyclyl groups, and

each occurrence of R^n is independently a hydrogen, a monosaccharide, a disaccharide or a trisaccharide, and

c) and an immunologically effective amount of an antigen.

21. The composition of Claim 20, wherein Z is a linear tetrasaccharide or a linear trisaccharide with an acyl chain attached to a first sugar residue of the linear tetrasaccharide or a linear trisaccharide, wherein the first sugar residue is the sugar residue that is attached directly to Y.

22. The composition of Claim 21, wherein R is H.

23. The composition of Claim 22, wherein W is Me and V is OH.

24. The composition of Claim 22, wherein W is CHO and V is OH.

25. The composition of Claim 22, wherein W is CH_2OH and V is OH.

26. The composition of any one of Claims 21 to 25, wherein the acyl chain attached to the first sugar residue is 6-(4-iodobenzoylamino)hexanoyl.

27. The use of the pharmaceutical composition of any of Claims 20 to 26 in the manufacture of a medicament for immunizing a subject.