CLAIMS

1. An compound comprising:

a glycan-specific IgG antibody moiety,

a cellular receptor binding moiety which binds to hepatocytes or other degrading cells through asialoglycoprotein (ASGPR) receptors of hepatocytes or other cell receptors which are on the surface degrading cells in a patient or subject, and

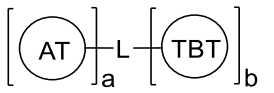
optionally a linker moiety connecting the glycan-specific IgG antibody moiety and the cellular receptor binding moiety.

2. The compound of Claim 1, wherein the glycan-specific IgG antibody moiety is configured to bind to a galactose-deficient IgA1 (Gd-IgA1).

3. The compound of Claims 1 or 2, wherein the glycan-specific IgG antibody moiety is a recombinant IgG antibody moiety (rIgG).

4. The compound of any one of Claims 1 or 2, wherein the glycan-specific IgG antibody moiety is isolated from sera of a IgA nephropathy patient.

5. The compound of any one of Claims 1-4, wherein the compound has the structure of formula [A-I]:



[A-I]

or a pharmaceutically acceptable salt thereof, wherein:

each of a and b is independently an integer of 1 or greater;

each AT is a glycan-specific IgG antibody moiety or a fragment thereof;

L is a linker moiety; and

each TBT is independently a cellular receptor binding moiety which binds to hepatocytes or other degrading cells through asialoglycoprotein (ASGPR) receptors of hepatocytes or other cell receptors which are on the surface degrading cells in a patient or subject.

6. The compound of Claim 5, wherein a is 1, b is 3, and each TBT comprises an N-acetyl-D-galactosamine (GalNAc) moiety.

7. The compound of Claim 5 or 6, wherein

the glycan-specific IgG antibody moiety comprises IgG1 or a fragment thereof connected to the linker L, at an amino acid residue selected from K246 and K248 of an IgG1 heavy chain and amino acid residues corresponding thereto; or

wherein the glycan-specific IgG antibody moiety comprises IgG2 or a fragment thereof connected to the linker L, at an amino acid residue selected from K251 and K253 of an IgG2 heavy chain and amino acid residues corresponding thereto; or

wherein the glycan-specific IgG antibody moiety comprises IgG4 or a fragment thereof is connected to the linker L, at an amino acid residue selected from K239 and K241 of an IgG4 heavy chain and amino acid residues corresponding thereto.

8. The compound of any one of Claim 5 to 7, wherein

L is a covalent bond, or a bivalent or polyvalent optionally substituted, linear or branched C_{1-100} group comprising one or more aliphatic, aryl, heteroaromatic having 1-20 heteroatoms, or any combinations thereof, wherein one or more methylene units of the group are optionally and independently replaced with C_{1-6} alkylene, C_{1-6} alkenylene, −C≡C−, −Cy−, $-C(R')_2-$, −O−, −S−S−, −N(R')−, −C(O)−, −C(S)−, −C(NR')−, −C(O)N(R')−,

−C(O)C(R')$_2$N(R')−, −N(R')C(O)N(R')−, −N(R')C(O)O−, −S(O)−, −S(O)$_2$−, −S(O)$_2$N(R')−, −C(O)S−, −C(O)O−, −P(O)(OR')−, −P(O)(SR')−, −P(O)(R')−, −P(O)(NR')−, −P(S)(OR')−, −P(S)(SR')−, −P(S)(R')−, −P(S)(NR')−, −P(R')−, −P(OR')−, −P(SR')−, −P(NR')−, an amino acid residue, or −[(−O−C(R')$_2$−C(R')$_2$−)$_n$]−, wherein n is 1-20; wherein

Cy is independently an optionally substituted bivalent monocyclic, bicyclic or polycyclic group wherein each monocyclic ring is independently selected from a C_{3-20} cycloaliphatic ring, a C_{6-20} aryl ring, a 5-20 membered heteroaryl ring having 1-10 heteroatoms, and a 3-20 membered heterocyclyl ring having 1-10 heteroatoms;

each R' is independently −R, −C(O)R, −CO$_2$R, or −SO$_2$R; and

each R is independently −H, or an optionally substituted, or an optionally substituted group selected from C_{1-30} aliphatic, C_{1-30} heteroaliphatic having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, C_{6-30} aryl, C_{6-30} arylaliphatic, C_{6-30} arylheteroaliphatic having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, 5-30 membered heteroaryl having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, and 3-30 membered heterocyclyl having 1-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon, or

two R groups are optionally and independently taken together to form a covalent bond, or:

two or more R groups on the same atom are optionally and independently taken together with the atom to form an optionally substituted, 3-30 membered, monocyclic, bicyclic or polycyclic ring having, in addition to the atom, 0-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon; or

two or more R groups on two or more atoms are optionally and independently taken together with their intervening atoms to form an optionally substituted, 3-30 membered,

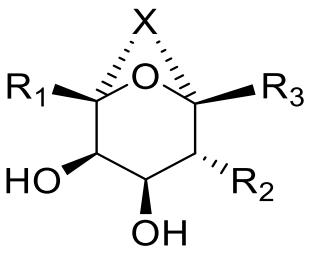
monocyclic, bicyclic or polycyclic ring having, in addition to the intervening atoms, 0-10 heteroatoms independently selected from oxygen, nitrogen, sulfur, phosphorus and silicon.

9. The compound of any one of Claims 1-8, wherein the linker comprises one or more $-[(CH_2)_n-O]_m-$, wherein each n is independently 1-20, and m is 1-100.

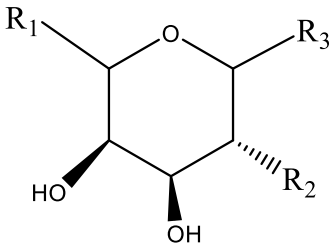
10. The compound of any one of Claims 1-9, wherein the cellular receptor binding moiety comprises an ASGPR binding group connected through an amine group.

11. The compound of Claim 10, wherein the amine group is a primary alkyl amine group or secondary alkyl amine group, each of which is optionally substituted on the amine group with a C_1-C_3 alkyl group.

12. The compound of any one of Claims 1-11, wherein the cellular receptor binding moiety comprises an ASGPR binding group according to the chemical structure:



or



wherein X is 1-4 atoms in length and comprises O, S, $N(R^{N1})$ or $C(R^{N1})(R^{N1})$ groups such that

when X is 1 atom in length, X is O, S, $N(R^{N1})$ or $C(R^{N1})(R^{N1})$,

when X is 2 atoms in length, no more than 1 atom of X is O, S or $N(R^{N1})$,

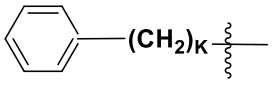
when X is 3 or 4 atoms in length, no more than 2 atoms of X are O, S or $N(R^{N1})$;

wherein R^{N1} is H or a C_1-C_3 alkyl group optionally substituted with from 1-3 halo groups;

R_1 and R_3 are each independently

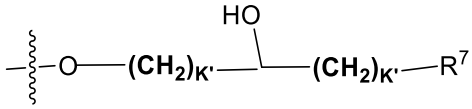
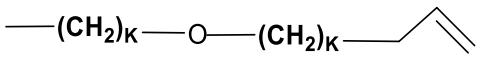
H, $-(CH_2)_KOH$, $-(CH_2)_KOC_1$-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, $-(CH_2)_K$-vinyl, $O-(CH_2)_K$-vinyl, $-(CH_2)_K$-alkynyl, $-(CH_2)_K$-COOH,

$-(CH_2)_KC(O)O-C_1$-C_4 alkyl which is optionally substituted with from 1-3 halo groups, $O-C(O)-C_1$-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, $-C(O)-C_1$-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, or

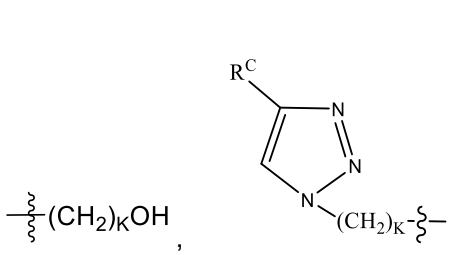
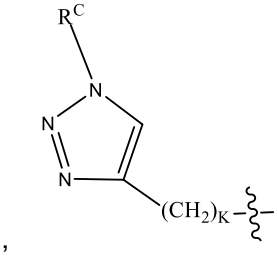
R_1 and R_3 are each independently a  group, which is optionally substituted with up to three halo groups, C_1-C_4 alkyl groups, each of which alkyl group is optionally substituted with from one to three halo groups or one or two hydroxyl groups, or $O-C_1$-C_4 alkyl groups, each of which alkyl groups is optionally substituted with from one to three halo groups or one or two hydroxyl groups; and

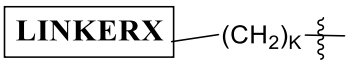
K is independently an integer of 0 to 4, or

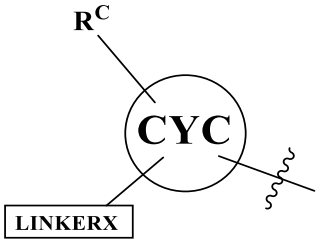
R_1 and R_3 are each independently a group according to the chemical structure:

 , wherein R^7 is $O-C_1$-C_4 alkyl, which is optionally substituted with from 1 to 3 halo groups 1 or 2 hydroxy groups, or R^7 is a $-NR^{N3}R^{N4}$ group or a  ; or

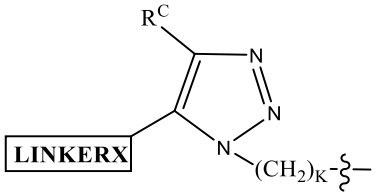
R_1 and R_3 are each independently a group according to the structure:

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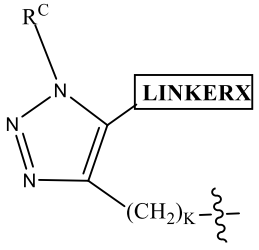
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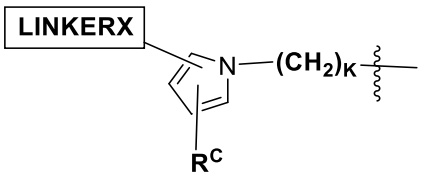
group according to the chemical structure:



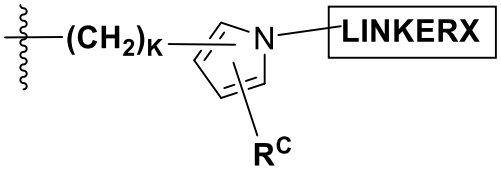
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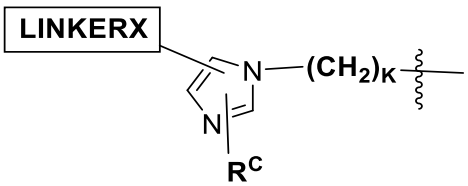
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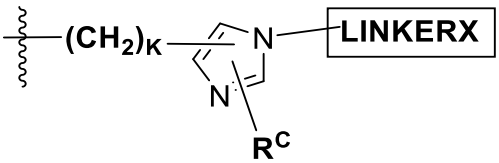
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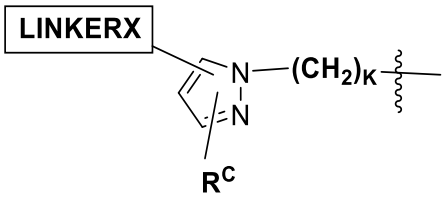
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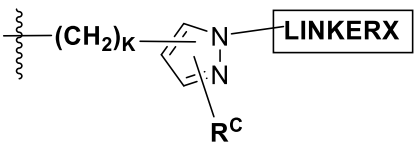
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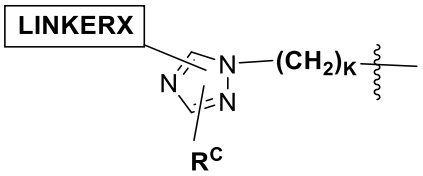
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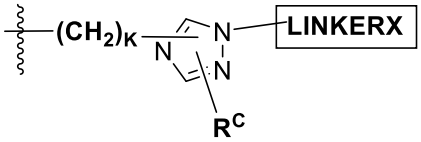


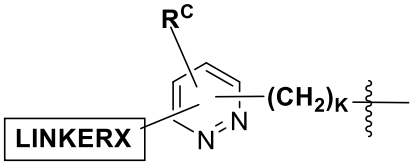
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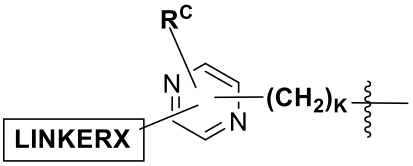


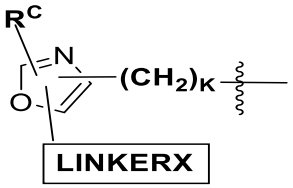
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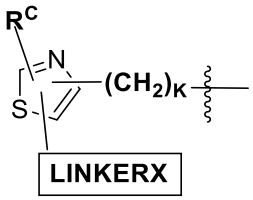

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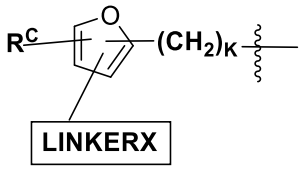

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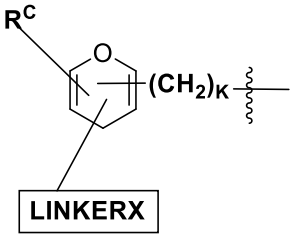

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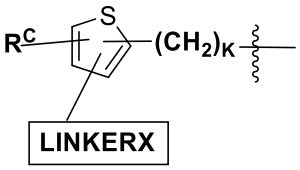

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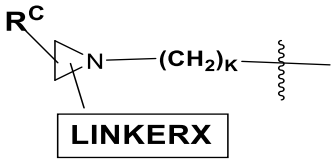

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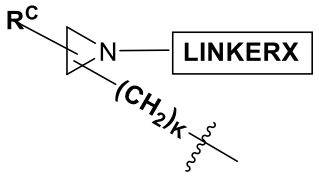
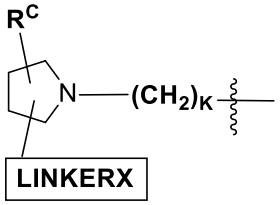
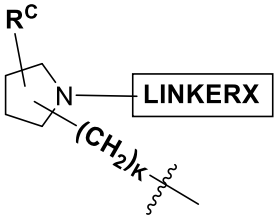
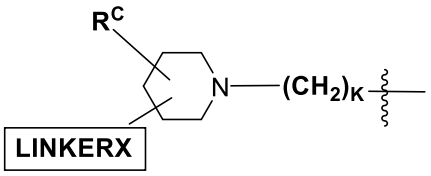
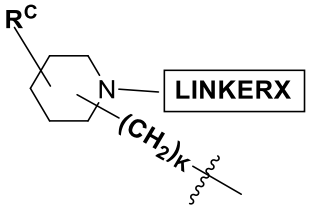
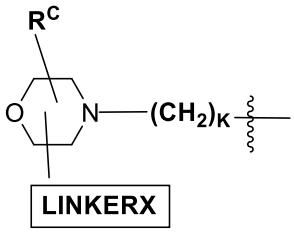
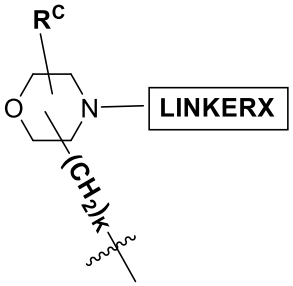
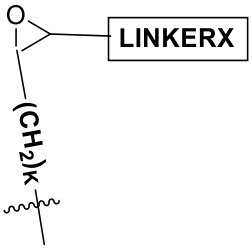
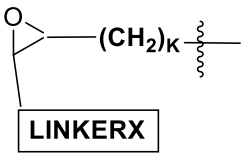
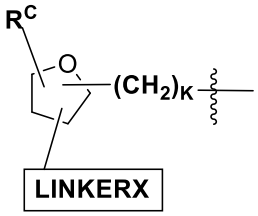
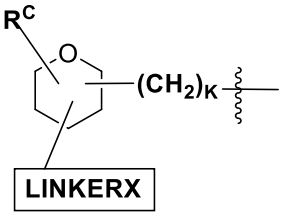
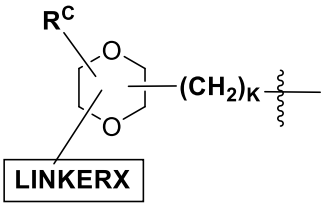

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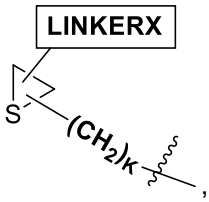

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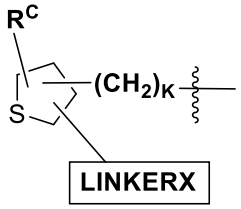

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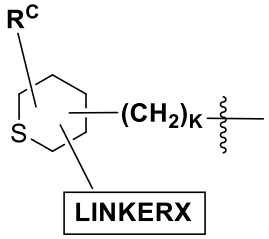

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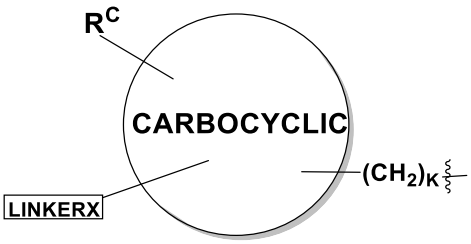
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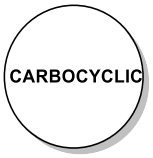
or



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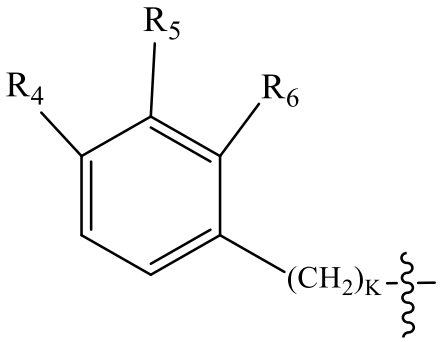
R_1 and R_3 are each independently a 

group,

where 

is a C_3-C_8 saturated carbocyclic group;

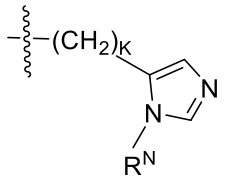
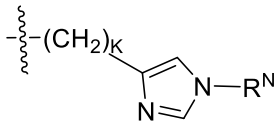
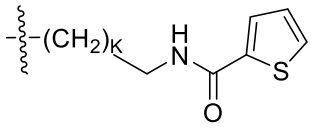
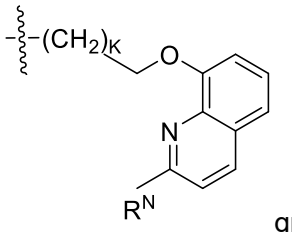
R^C is absent, H, C_1-C_4 alkyl which is optionally substituted with from 1-3 halo groups or 1-2 hydroxyl groups, or a group according to the structure:



wherein R_4, R_5 and R_6 are each independently, H, halo (F, Cl, Br, I), CN, $NR^{N1}R^{N2}$, -$(CH_2)_K$OH,

-$(CH_2)_K$OC_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, C_1-C_3 alkyl, which is optionally substituted with from 1-3 halo groups, -O-C_1-C_3-alkyl, which is

optionally substituted with from 1-3 halo groups, -$(CH_2)_K$COOH, -$(CH_2)_K$C(O)O-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo groups, O-C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, -C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, or

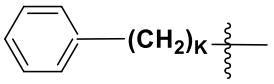
R^C is a  group, a  group a  group or a  group,

wherein R^N , R^{N1} and R^{N2} are each independently H or a C_1-C_3 alkyl group which is optionally substituted with from one to three halo groups or one or two hydroxyl groups;

K is independently an integer of 0 to 4;

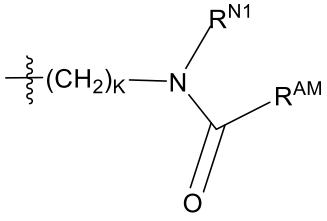
K' is an integer of 1 to 4;

R^{N3} is H, or a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups or 1 or 2 hydroxy groups; and

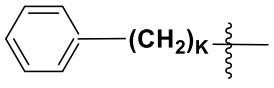
R^{N4} is H, a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups or 1 or 2 hydroxy groups, or R^{N4} is a  group, where K is preferably 1;

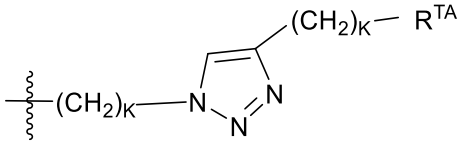
LINKERX is a linker group which comprises at least one glycan-specific IgG antibody moiety and links the at least one glycan-specific IgG antibody moiety to the cellular receptor binding moiety through the optional linker moiety, or

LINKERX is a linker group which contains at least one or more functional groups which can be used to covalently bond the linker group to at least one glycan-specific IgG antibody moiety or optional linker moiety;

R_2 is a  group wherein R^{N1} and K are the same as above;

R^{AM} is H, a C_1-C_4 alkyl group optionally substituted with up to 3 halo groups and one or two hydroxyl groups, a -$(CH_2)_K$COOH group, a -$(CH_2)_K$C(O)O-C_1-C_4 alkyl group which is optionally substituted with from 1-3 halo groups, a O-C(O)-C_1-C_4 alkyl group, which is optionally substituted with from 1-3 halo F groups, a -C(O)-C_1-C_4 alkyl group, which is optionally substituted with from 1-3 halo groups, a -$(CH_2)_K$-$NR^{N3}R^{N4}$ group where R^{N3} is H, or a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups or 1 or 2 hydroxy groups; and

R^{N4} is H, a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups or 1 or 2 hydroxy groups, or a  group, or

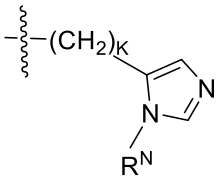
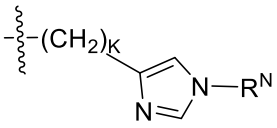
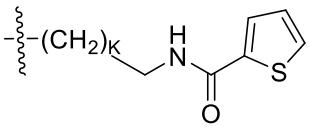
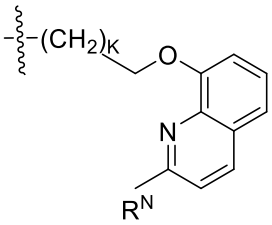
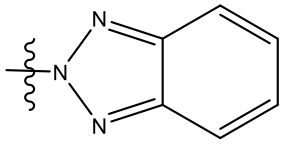
R_2 is a  group,

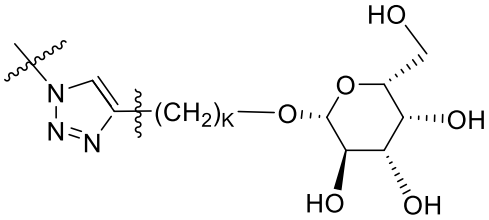
wherein R^{TA} is H, CN, $NR^{N1}R^{N2}$, -$(CH_2)_K$OH, -$(CH_2)_K$OC_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups,

-$(CH_2)_K$COOH, -$(CH_2)_K$C(O)O-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo groups, O-C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, -C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups, or

R^{TA} is a C_3-C_{10} aryl or a three- to ten-membered heteroaryl group containing up to 5 heteroaryl atoms, each of said aryl or heteroaryl groups being optionally substituted with up to three (preferably 1) CN, $NR^{N1}R^{N2}$, -$(CH_2)_K$OH, -$(CH_2)_K$OC_1-C_4 alkyl, which is optionally

substituted with from 1-3 halo groups, C_1-C_3 alkyl, which is optionally substituted with from 1-3 halo groups or 1 or 2 hydroxy groups, -O-C_1-C_3-alkyl, which is optionally substituted with from 1-3 halo groups, -$(CH_2)_K$COOH, -$(CH_2)_K$C(O)O-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo groups, O-C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo groups or -$(CH_2)_K$C(O)-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo groups, or

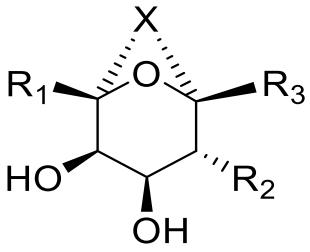
R^{TA} is a  group, a  group, a  group a  group, a  group which is optionally substituted with up to three C_1-C_3 alkyl groups which are optionally substituted with up to three halo groups, or

R^{TA} is a  group,

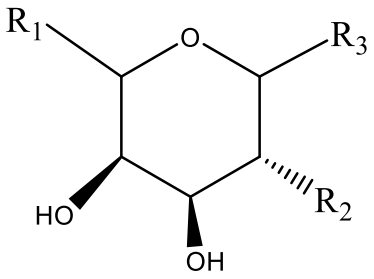
wherein R^N , R^{N1} and R^{N2} are each independently H or a C_1-C_3 alkyl group which is optionally substituted with from one to three halo groups or one or two hydroxyl groups and each -$(CH_2)_K$ group is optionally substituted with 1-4, preferably 1 or 2, C_1-C_3 alkyl groups which are optionally substituted with from 1-3 fluoro groups or 1-2 hydroxyl groups;

and K is independently 0-4.

13. The compound of any one of Claims 1-11, wherein the cellular receptor binding moiety comprises an ASGPR binding group according to the chemical structure:



or



wherein X is 1-4 atoms in length and comprises O, S, N(R^{N1}) or C(R^{N1})(R^{N1}) groups such that

when X is 1 atom in length, X is O, S, N(R^{N1}) or C(R^{N1})(R^{N1}),

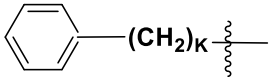
when X is 2 atoms in length, no more than 1 atom of X is O, S or N(R^{N1}),

when X is 3 or 4 atoms in length, no more than 2 atoms of X are O, S or N(R^{N1});

wherein each R^{N1} is independently H or a C_1-C_3 alkyl group optionally substituted with from 1-3 halo groups, preferably F (R^{N1} is preferably H or methyl, more often H);

R_1 and R_3 are each independently H, -$(CH_2)_K$OH, -$(CH_2)_K$OC_1-C_4 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, -$(CH_2)_K$vinyl, O-$(CH_2)_K$vinyl,

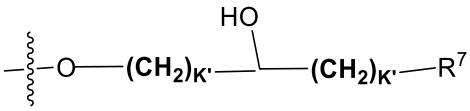
-$(CH_2)_K$alkynyl, -$(CH_2)_K$COOH, -$(CH_2)_K$C(O)O-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo, preferably F groups, O-C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, -C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, or

R_1 and R_3 are each independently a 

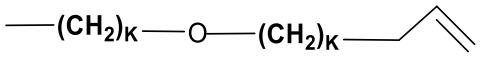
group, which is optionally substituted with up to three (preferably 1) halo groups (preferably F), C_1-C_4 alkyl groups, each of which is optionally substituted with from one to three halo groups, preferably F, or one or two hydroxyl groups, or

O-C_1-C_4 alkyl groups, each of which alkyl groups is optionally substituted with from one to three halo groups, preferably F, or one or two hydroxyl groups, and K is independently 0-4 (0, 1, 2, 3 or 4), or

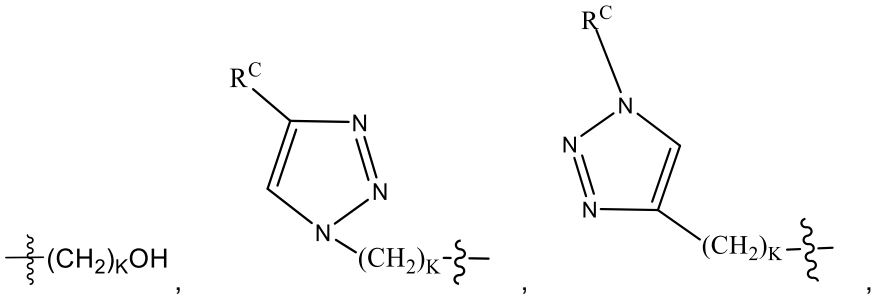
R_1 and R_3 are each independently a group according to the chemical structure:



, where R^7 is O-C_1-C_4 alkyl, which is optionally substituted with from 1 to 3 halo groups, preferably F and 1 or 2 hydroxy groups, or R^7 is a

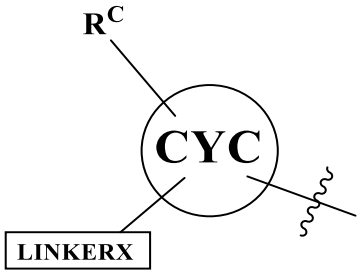
-$NR^{N3}R^{N4}$ group or a , or

R_1 and R_3 are each independently a group according to the structure:

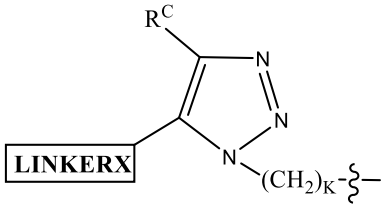




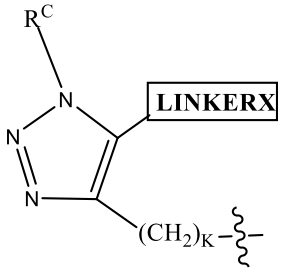
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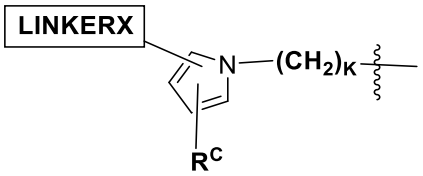
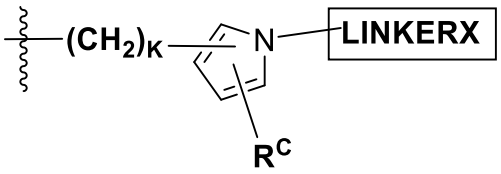
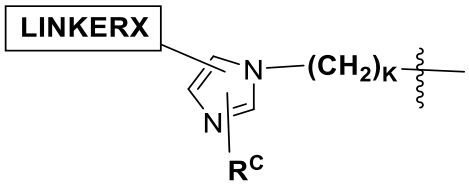
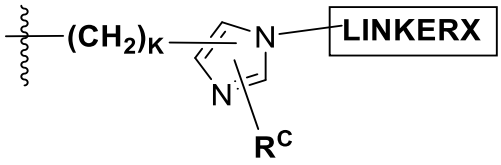
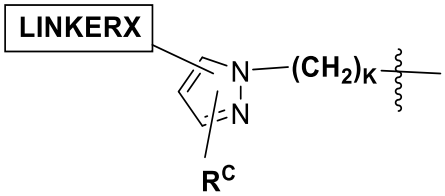
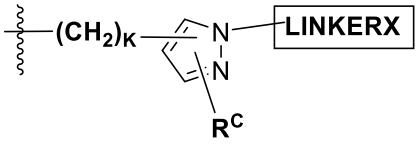
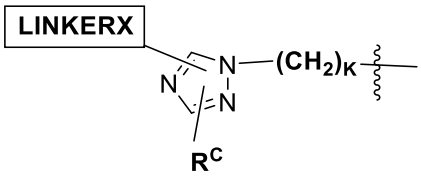
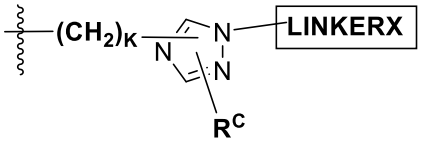
group according to the chemical structure:

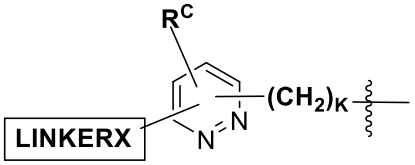


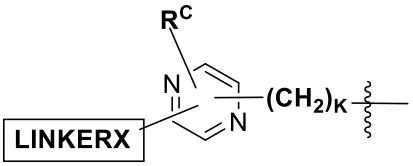
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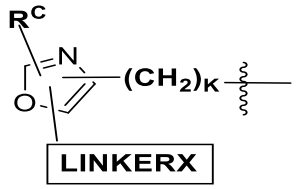


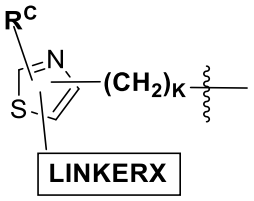
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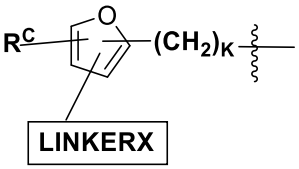

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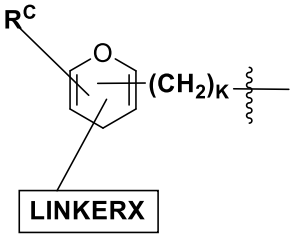

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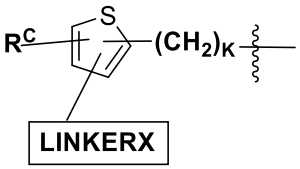

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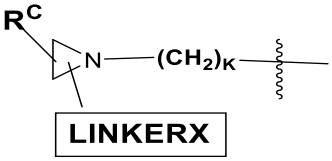

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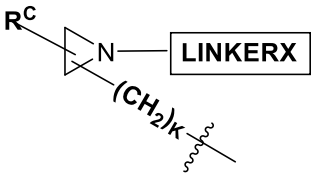

RC
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(CH2)K
S
LINKERX
,

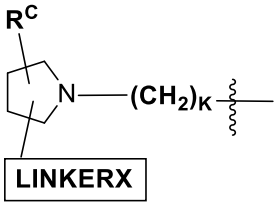

RC
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(CH2)K
LINKERX
,

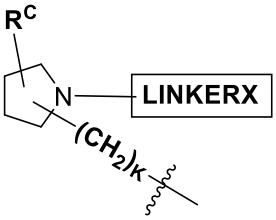

RC
O
(CH2)K
LINKERX
,

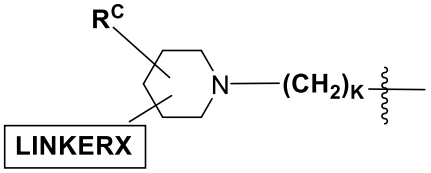
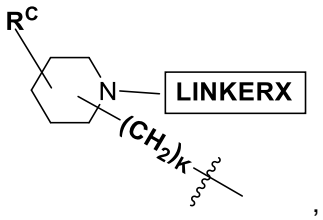
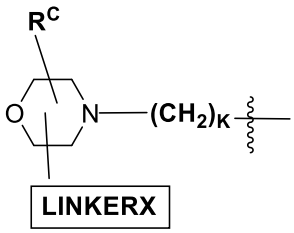
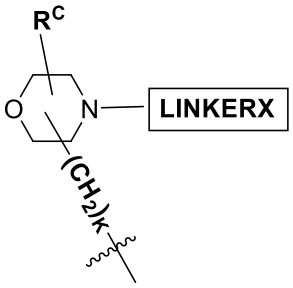
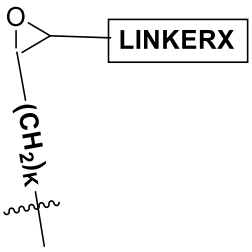
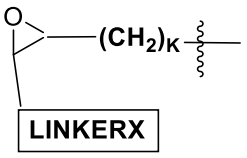
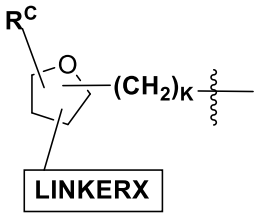
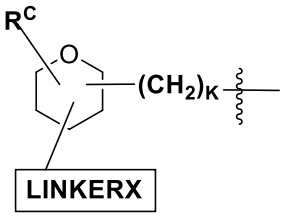
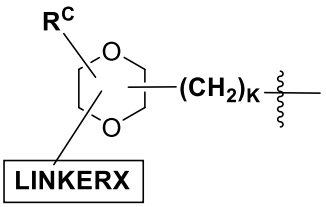
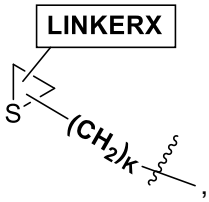
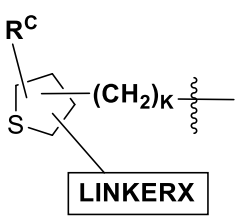
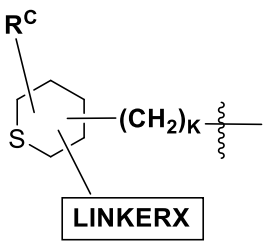

RC
S
(CH2)K
LINKERX
,

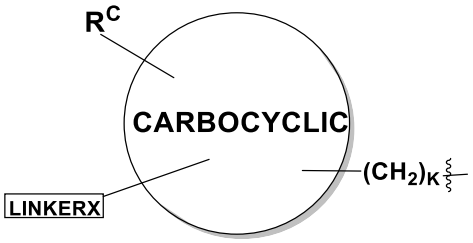

RC
N
(CH2)K
LINKERX
,

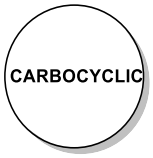

RC
N
LINKERX
(CH2)K
,


RC
N
(CH2)K
LINKERX
,


RC
N
LINKERX
(CH2)K
,

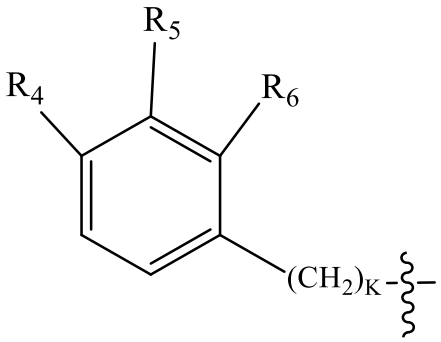

R^C
N
(CH2)K
LINKERX
,

R^C
N
LINKERX
(CH2)K
,

R^C
O
N
(CH2)K
LINKERX
,

R^C
O
N
LINKERX
(CH2)K
,

O
LINKERX
(CH2)K
,

O
(CH2)K
LINKERX
,

R^C
O
(CH2)K
LINKERX
,

R^C
O
(CH2)K
LINKERX
,

R^C
O
O
(CH2)K
LINKERX
,

LINKERX
S
(CH2)K
,

R^C
S
(CH2)K
LINKERX

R^C
S
(CH2)K
LINKERX
or
,

or R_1 and R_3 are each independently a 

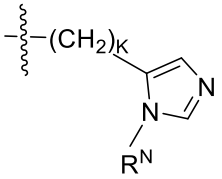
group, where 

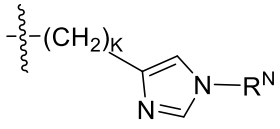
is a C_3-C_8 saturated carbocyclic group;

R^C is absent, H, C_1-C_4 alkyl which is optionally substituted with from 1-3 halo (preferably fluoro) groups or 1-2 hydroxyl groups, or a group according to the structure:

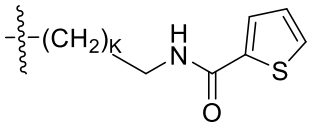
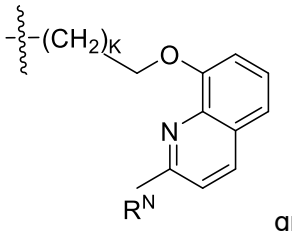


where R_4, R_5 and R_6 are each independently, H, halo (F, Cl, Br, I), CN, $NR^{N1}R^{N2}$, $-(CH_2)_KOH$, $-(CH_2)_KOC_1$-C_4 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, C_1-C_3 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, -O-C_1-C_3-alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, $-(CH_2)_KCOOH$, $-(CH_2)_KC(O)O$-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo, preferably F groups, O-C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, -C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, or

R^C is a 

group, a 

group a

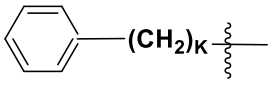
 group or a  group,

where R^N , R^{N1} and R^{N2} are each independently H or a C_1-C_3 alkyl group which is optionally substituted with from one to three halo groups, preferably F, or one or two hydroxyl groups;

K is independently 0-4 (0, 1, 2, 3 or 4), preferably 0 or 1;

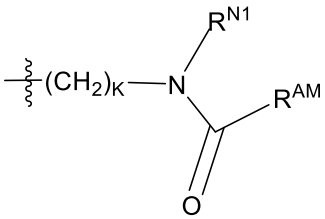
K' is 1-4, preferably 1;

R^{N3} is H, or a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups, preferably F or 1 or 2 hydroxy groups; and

R^{N4} is H, a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups, preferably F or 1 or 2 hydroxy groups, or R^{N4} is a  group, where K is preferably 1;

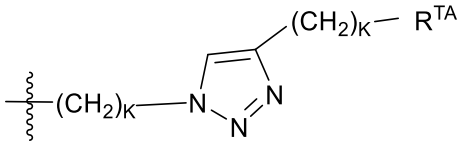
LINKERX is a linker group which comprises at least one glycan-specific IgG antibody moiety and links the at least one glycan-specific IgG antibody moiety to the cellular receptor binding moiety through the optional linker moiety, or

LINKERX is a linker group which contains at least one or more functional groups which can be used to covalently bond the linker group to at least one glycan-specific IgG antibody moiety or optional linker moiety;

R_2 is a  group where R^{N1} and K are the same as above;

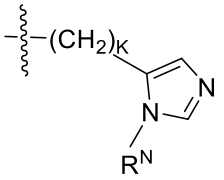
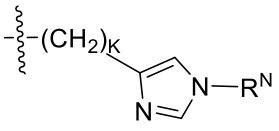
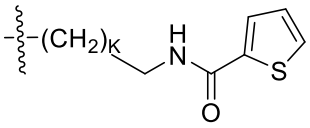
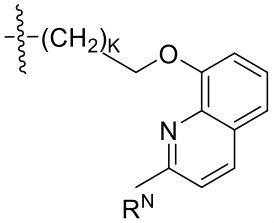
R^{AM} is H, a C_1-C_4 alkyl group optionally substituted with up to 3 halo groups (preferably F) and one or two hydroxyl groups, a -$(CH_2)_K$COOH group, a -$(CH_2)_K$C(O)O-C_1-C_4 alkyl group which is optionally substituted with from 1-3 halo, preferably F groups,

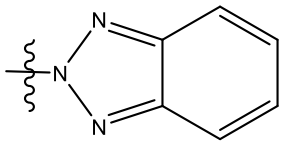
O-C(O)-C_1-C_4 alkyl group, which is optionally substituted with from 1-3 halo, preferably F groups, a -C(O)-C_1-C_4 alkyl group, which is optionally substituted with from 1-3 halo, preferably F groups, a -$(CH_2)_K$-$NR^{N3}R^{N4}$ group where R^{N3} is H, or a C_1-C_3 alkyl group which is optionally substituted with 1-3 halo groups, preferably F or 1 or 2 hydroxy groups, or

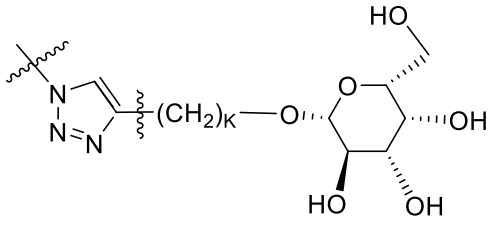
R_2 is a  group,

wherein R^{TA} is H, CN, $NR^{N1}R^{N2}$, -$(CH_2)_K$OH, -$(CH_2)_K$OC_1-C_4 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, -$(CH_2)_K$COOH, -$(CH_2)_K$C(O)O-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo, preferably F groups, O-C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, -C(O)-C_1-C_4 alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, or R^{TA} is a C_3-C_{10} aryl or a three- to ten-membered heteroaryl group containing up to 5 heteroaryl atoms, each of said aryl or heteroaryl groups being optionally substituted with up to three (preferably 1) CN, $NR^{N1}R^{N2}$, -$(CH_2)_K$OH, -$(CH_2)_K$OC_1-C_4 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups, C_1-C_3 alkyl, which is optionally substituted with from 1-3 halo (F, Cl, Br, I, preferably F) groups or 1 or 2 hydroxy groups, -O-C_1-C_3-alkyl, which is optionally substituted with from 1-3 halo, preferably F groups, -$(CH_2)_K$COOH, -$(CH_2)_K$C(O)O-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo, preferably F groups, O-C(O)-C_1-C_4 alkyl, which is optionally

substituted with from 1-3 halo, preferably F groups or -$(CH_2)_K$C(O)-C_1-C_4 alkyl which is optionally substituted with from 1-3 halo, preferably F groups, or

R^{TA} is a  group, a  group, a  group or a  group, or

R^{TA} is a  group which is optionally substituted with up to three, preferably 1 C_1-C_3 alkyl groups which are optionally substituted with up to three halo (preferably F) groups, or

R^{TA} is a  group,

wherein R^N , R^{N1} and R^{N2} are each independently H or a C_1-C_3 alkyl group which is optionally substituted with from one to three halo groups, preferably F, or one or two hydroxyl groups and

wherein each -$(CH_2)_K$ group is optionally substituted with 1-4, preferably 1 or 2, C_1-C_3 alkyl groups which are optionally substituted with from 1-3 fluoro groups or 1-2 hydroxyl groups;

and K is independently 0-4 (0, 1, 2, 3 or 4), preferably 0 or 1, or

a pharmaceutically acceptable salt, stereoisomer, solvate or polymorph thereof.

14. The compound of Claims 12 or 13, wherein

X is -O-C(R^{N1})(R^{N1}),

C(R^{N1})(R^{N1})-O-, -S-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-S-, N(R^{N1})-C(R^{N1})(R^{N1}),

C(R^{N1})(R^{N1})-N(R^{N1}) or C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1}) when X is 2 atoms in length,

X is -O-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-O-C(R^{N1})(R^{N1})-,

-O-C(R^{N1})(R^{N1})-O-, -O-C(R^{N1})(R^{N1})-S-, -O-C(R^{N1})(R^{N1})-N(R^{N1})-,

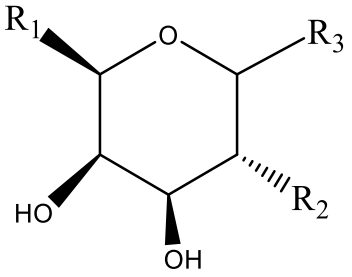
-S-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-S-C(R^{N1})(R^{N1})-, C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})-S, -S-C(R^{N1})(R^{N1})-S-, -S-C(R^{N1})(R^{N1})-O-, -S-C(R^{N1})(R^{N1})-N(R^{N1})-, N(R^{N1})-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-N(R^{N1})-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})- N(R^{N1}), N(R^{N1})-C(R^{N1})(R^{N1})-N(R^{N1}) or C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})- C(R^{N1})(R^{N1}) when X is 3 atoms in length, or

X is-O-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-O-C(R^{N1})(R^{N1})-(R^{N1})(R^{N1})-, -O-C(R^{N1})(R^{N1})-O-C(R^{N1})(R^{N1})-, -S-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})- C(R^{N1})(R^{N1})-, C(R^{N1})(R^{N1})-S-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})-, C(R^{N1})(R^{N1})-(R^{N1})(R^{N1})-S-C(R^{N1})(R^{N1})-, -S-C(R^{N1})(R^{N1})-S-C(R^{N1})(R^{N1})-, N(R^{N1})-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})- C(R^{N1})(R^{N1})-, C(R^{N1})(R^{N1})-N(R^{N1})-C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1}), C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})- N(R^{N1}), N(R^{N1})-C(R^{N1})(R^{N1})-N(R^{N1}) or C(R^{N1})(R^{N1})-C(R^{N1})(R^{N1})- C(R^{N1})(R^{N1}) when X is 4 atoms in length,

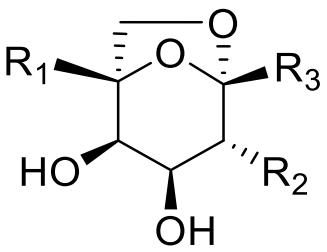
wherein R^{N1} is the same as set forth in claim 12 or 13 above.

15. The compound of Claims 12 or 13, wherein X is OCH_2 or CH_2O and R^{N1} is H.

16. The compound of any one of Claims 1-11, wherein the cellular receptor binding moiety comprises an ASGPR binding group according to the chemical structure:

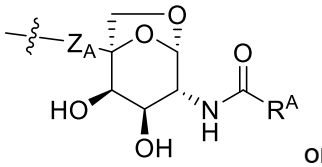


or

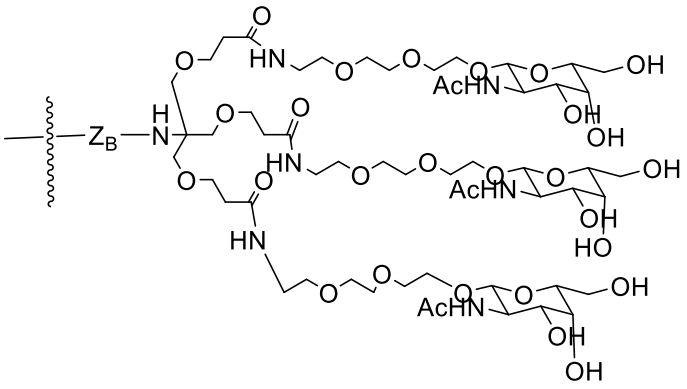


where R_1, R_2 and R_3 are the same as in Claim 12, or a pharmaceutically acceptable salt, stereoisomer, solvate or polymorph thereof.

17. The compound of Claim 16, wherein the cellular receptor binding moiety has the following structure:



or



;

where R^A is a C_1-C_3 alkyl group which is optionally substituted with 1-5 halo (preferably fluoro) groups (preferably R^A is a methyl or ethyl group which is optionally substituted with from 1-3 fluoro groups);

Z_A is $-(CH_2)_{IM}$, $-O-(CH_2)_{IM}$, $S-(CH_2)_{IM}$, $NR_M-(CH_2)_{IM}$, $C(O)-(CH_2)_{IM}-$, a PEG group containing from 1 to 8 preferably 1-4 ethylene glycol residues or a $-C(O)(CH_2)_{IM}NR_M$ group (preferably a PEG containing group comprising from 1 to 8 ethylene glycol, preferably 2-4 ethylene glycol residues) where IM and R_M are the same as above; and

Z_B is absent, $(CH_2)_{IM}$, $C(O)$-$(CH_2)_{IM}$- or $C(O)$-$(CH_2)_{IM}$-$NR_{M,}$ where IM and R_M are the same as above.

18. The compound of Claim 17, wherein R^A is a methyl or ethyl group which is optionally substituted with from 1-3 fluoro groups.

19. The compound of Claims 17 or 18, wherein Z_A is a PEG group containing from 1 to 4 ethylene glycol residues.

20. The compound of Claim 18, wherein the methyl or ethyl group is substituted with from 1-3 fluoro groups.

21. The compound of Claim 16, wherein the ASGPR binding group is N-acetyl-D-galactosamine.

22. The compound of any one of Claims 1-9, wherein the cellular receptor binding moiety is a low density lipoprotein receptor-related protein 1 (LRP1), a low density lipoprotein receptor (LDLR), a FcγRI binding group, a FcRN binding group, a transferrin receptor binding group, or a macrophage scavenger receptor binding group.

23. A pharmaceutical composition comprising an compound of any one of claims 1-22.

24. The pharmaceutical composition of any one of Claims 1-23 for use in removing galactose-deficient IgA1 in a patient or subject in need.

25. The pharmaceutical composition of claim 23 for use in treating a disease state and/or condition which is associated with the upregulation of galactose-deficient IgA1 in a patient or subject in need.

26. The pharmaceutical composition for use according to Claim 25, wherein the disease state and/or condition which is associated with the upregulation of galactose-deficient IgA1 is an autoimmune disease.

27. The pharmaceutical composition for use according to Claim 26, wherein the autoimmune disease is IgA nephropathy.

28. Use of an effective amount of the agent of any one of Claims 1-23 in the manufacture of a medicament for use in treating an autoimmune disease in a patient in need.

29. The use of Claim 28, wherein the autoimmune disease is IgA nephropathy.