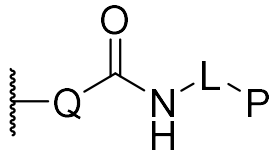
CLAIMS

What is claimed is:

1. A conjugate comprising a monoclonal antibody or antigen-binding fragment thereof and one or more immunomodulating oligonucleotides (P), wherein the monoclonal antibody or antigen-binding fragment is linked to one or more Q-tag peptides (Q) comprising at least one glutamine residue, and wherein each immunomodulating oligonucleotide is linked to a Q-tag peptide via an amide bond with the glutamine residue of the Q-tag peptide and a linker (L) as shown in Formula (A):

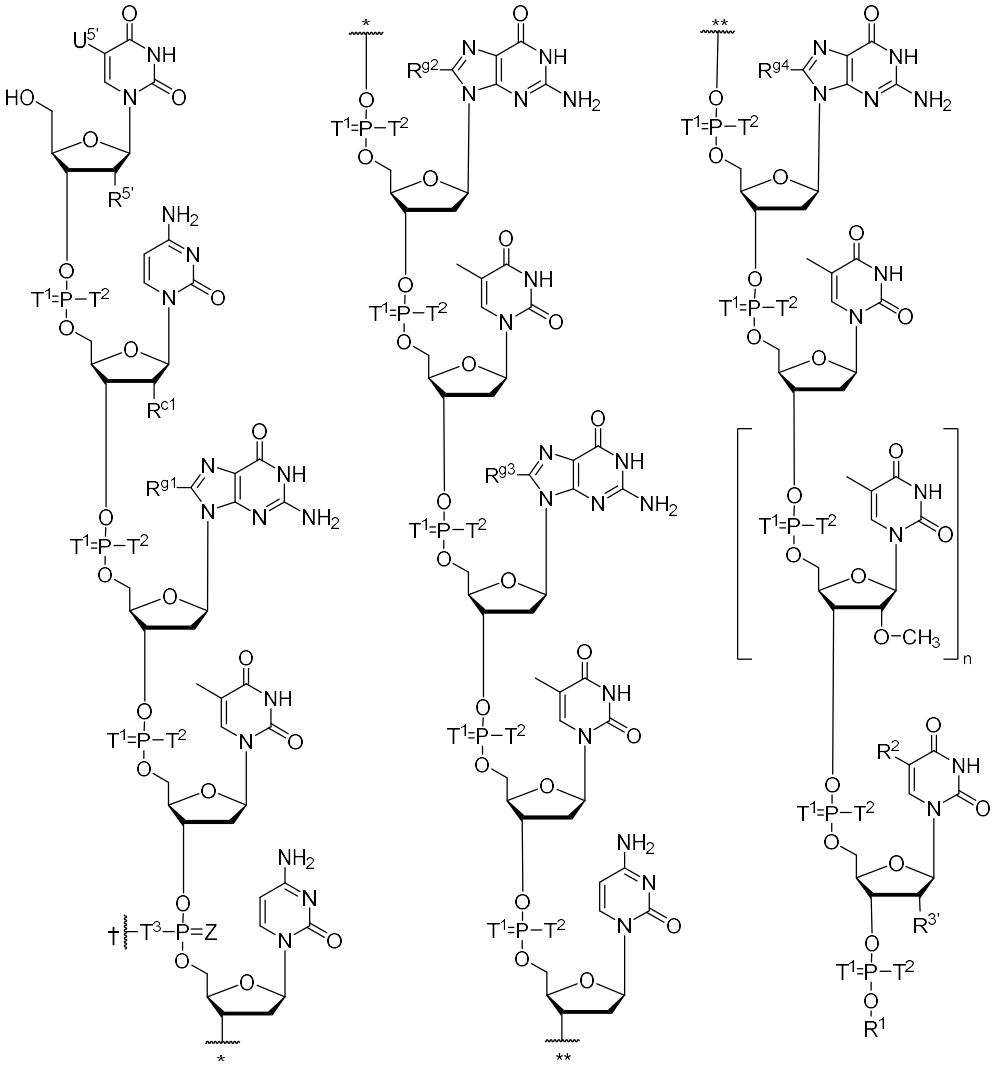


(A);

wherein ~~~ indicates the point of attachment of each Q to the antibody or antigen-binding fragment thereof (Ab); and wherein:

(a) each of the one or more Q-tag peptides (Q) comprises the amino acid sequence RPQGF (SEQ ID NO:47); and/or

(b) each P is independently an immunomodulating oligonucleotide having the structure

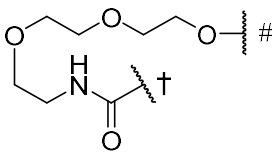


wherein

〰 * and 〰 ** indicate the points of attachment within the oligonucleotide, and wherein 〰 † indicates the point of attachment to the linker L;

each T^1 is independently O or S;

each T^2 is S^-;



T^3 is a group , wherein 〰 † indicates the point of attachment to L and wherein 〰 # indicates the point of attachment to the rest of the oligonucleotide;

Z is O or S;

$U^{5'}$ is –H or halogen;

$R^{5'}$ is -H or methoxy;

R^{c1} is -H or methoxy;

R^{g1}, R^{g2}, R^{g3}, and R^{g4} are H;

$R^{3'}$ is methoxy;

R^1 is $-(CH_2)_3$-OH;

R^2 is -H or methyl; and

n is an integer from 0 to 2.

2. The conjugate of claim 1, wherein the antibody or fragment thereof is a Fab, F(ab')2, Fab'-SH, Fv, scFv, single domain, single heavy chain, or single light chain antibody or antibody fragment; and/or wherein the antibody or fragment thereof is a humanized, human, or chimeric antibody or fragment thereof.

3. The conjugate of any one of claims 1 to 2, wherein the antibody or fragment thereof specifically binds human CD22; wherein optionally the antibody comprises a heavy chain variable (VH) domain and a light chain variable (VL) domain, and wherein:

(a) the VH domain comprises CDR-H1, CDR-H2, and CDR-H3 sequences from a VH domain sequence selected from the group consisting of SEQ ID Nos:64-67, and/or the VL domain comprises CDR-L1, CDR-L2, and CDR-L3 sequences from a VL domain sequence selected from the group consisting of SEQ ID Nos:68-91;

(b) the VH domain comprises a CDR-H1 comprising the sequence of SEQ ID NO:113, a CDR-H2 comprising the sequence of SEQ ID NO:115, and a CDR-H3 comprising the sequence of SEQ ID NO:116 or a CDR-H1 comprising the sequence of SEQ ID NO:114, a CDR-H2 comprising the sequence of SEQ ID NO:189, and a CDR-H3 comprising the sequence of SEQ ID NO:116, and/or the VL domain comprises a CDR-L1 comprising the sequence of SEQ ID NO:117, a CDR-L2 comprising the sequence of SEQ ID NO:119, and a CDR-L3 comprising the sequence of SEQ ID NO:120 or a CDR-L1 comprising the sequence of SEQ ID NO:118, a CDR-L2 comprising the sequence of SEQ ID NO:177, and a CDR-L3 comprising the sequence of SEQ ID NO:120; or

(c) the VH domain comprises an amino acid sequence selected from the group consisting of SEQ ID Nos:64-67 and/or the VL domain comprises an amino acid sequence selected from the group consisting of SEQ ID Nos:68-91.

4. The conjugate of any one of claims 1 to 2, wherein the antibody or fragment thereof specifically binds human Her2; wherein optionally the antibody comprises a heavy chain variable (VH) domain and a light chain variable (VL) domain, and wherein:

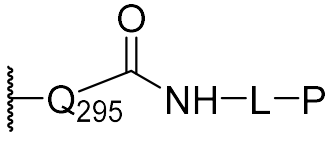
(a) the VH domain comprises CDR-H1, CDR-H2, and CDR-H3 sequences from the VH domain sequence of SEQ ID NO:168, and/or the VL domain comprises CDR-L1, CDR-L2, and CDR-L3 sequences from the VL domain sequence of SEQ ID NO:169;

(b) the VH domain comprises the sequence of SEQ ID NO:168 and/or the VL domain comprises the sequence of SEQ ID NO:169;

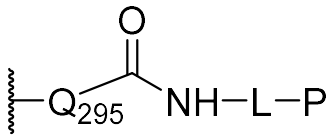
(c) the VH domain comprises CDR-H1, CDR-H2, and CDR-H3 sequences from the VH domain sequence of SEQ ID NO:170, and/or the VL domain comprises CDR-L1, CDR-L2, and CDR-L3 sequences from the VL domain sequence of SEQ ID NO:171; or

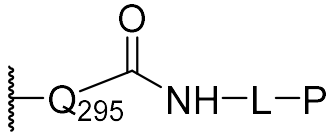
(d) the VH domain comprises the sequence of SEQ ID NO:170 and/or the VL domain comprises the sequence of SEQ ID NO:171.

5. The conjugate of any one of claims 1 to 4, wherein the antibody comprises an Fc region; wherein optionally the Fc region is a human IgG1, human IgG2, or human IgG4 Fc region; wherein optionally the Fc region is a wild-type human IgG1, wild-type human IgG2, or wild-type human IgG4 Fc region; optionally wherein the Fc region is:

(a) a human IgG1 Fc region comprising L234A, L235A, and/or G237A substitutions, amino acid position numbering according to EU index, optionally further comprising an N297A substitution, amino acid position numbering according to EU index, optionally wherein the conjugate further comprises an immunomodulating oligonucleotide P attached to the Q295 of the Fc region residue as shown in the following formula , wherein L is a linker moiety connected to Q295 of the Fc region via an amide bond;

(b) a human IgG2 Fc region comprising A330S and/or P331S substitutions, amino acid position numbering according to EU index, optionally further comprising an N297A substitution, amino acid position numbering according to EU index, optionally wherein the conjugate further comprises an immunomodulating oligonucleotide P attached to the Q295 of the Fc region residue

as shown in the following formula , wherein L is a linker moiety connected to Q295 of the Fc region via an amide bond; or

(c) a human IgG4 Fc region comprising S228P and/or L235E substitutions, amino acid position numbering according to EU index, optionally further comprising an N297A substitution, amino acid position numbering according to EU index, optionally wherein the conjugate further comprises an immunomodulating oligonucleotide P attached to the Q295 of the Fc region residue as shown in the following formula , wherein L is a linker moiety connected to Q295 of the Fc region via an amide bond; and

optionally wherein the antibody comprises an antibody heavy chain constant domain comprising an amino acid sequence selected from the group consisting of SEQ ID Nos: 92-107 and 178.

6. The conjugate of any one of claims 1 to 5, wherein the antibody comprises a human lambda or human kappa light chain; wherein optionally the antibody comprises an antibody light chain constant domain comprising an amino acid sequence selected from the group consisting of SEQ ID Nos:108-110.

7. The conjugate of any one of claims 1 to 6, wherein:

(a) the antibody comprises two antibody heavy chains and two antibody light chains, and wherein one Q-tag is attached to one or both heavy chain(s) of the antibody, wherein optionally the Q-tag is fused to the C-terminus of the heavy chain of the antibody(ies) or within the Fc domain; or

(b) the antibody comprises two antibody heavy chains and two antibody light chains, and wherein one Q-tag is attached to one or both light chain(s) of the antibody.

8. The conjugate of any one of claims 1 to 7, wherein:

(a) the one or more Q-tags are naturally occurring; or

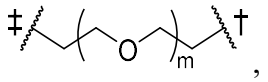
(b) the one or more Q-tags independently comprise a peptide sequence having between 5 and 15 amino acid residues; wherein optionally:

(i) the peptide sequence of each Q-tag is independently selected from the group consisting of SEQ ID NOs: 39-55; or

(ii) the peptide sequence of each Q-tag comprises the peptide sequence RPQGF (SEQ ID NO:47), optionally wherein the peptide sequence of each Q-tag independently comprises RPQGF (SEQ ID NO:47), RPQGFPP (SEQ ID NO:48), or RPQGFGPP (SEQ ID NO:49).

9. The conjugate of any one of claims 1 to 8, wherein the conjugate has a DAR of 1 or 2.

10. The conjugate of any one of claims 1 to 9, wherein the linker L comprises a polyethylene glycol moiety and/or the linker L is



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wherein m is an integer ranging from about 0 to about 50, and wherein ~~~ † indicates the point of attachment to T^3, and ~~~ ‡ indicates the point of attachment to the rest of the conjugate.

11. The conjugate of claim 10, wherein m is an integer from about 20 to about 25, wherein optionally m is 24.

12. The conjugate any one of claims 1 to 11, wherein the oligonucleotide P comprises at least one pair of geminal T^1 and T^2 wherein T^1 is S and T^2 is S^-; and wherein optionally the at least one pair of geminal T^1 and T^2 wherein T^1 is S and T^2 is S is located at the 3'-position of nucleoside residue 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15.

13. The conjugate of any one of claims 1 to 12, wherein the oligonucleotide P comprises at least two pairs of geminal T^1 and T^2 wherein T^1 is S and T^2 is S^-; and wherein optionally:

(a) $R^{5'}$ is H or methoxy;

(b) R^{c1} is H or methoxy;

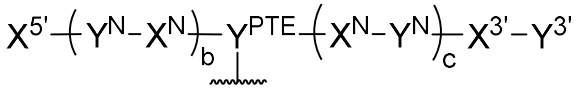
(c) R^2 is methyl or H;

(d) m is an integer from 20 to 25 and optionally 24; and/or

(e) $U^{5'}$ is bromo or H.

14. The conjugate of any one of claims 1 to 11, wherein each P independently comprises an oligonucleotide selected from ***Table 10***.

15. The conjugate of claim 1, wherein each of the one or more Q-tag peptides (Q) comprises the amino acid sequence RPQGF (SEQ ID NO:47); and wherein each immunomodulating oligonucleotide P is independently

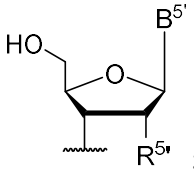


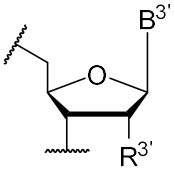
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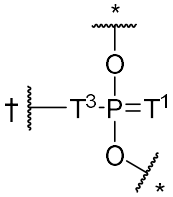
wherein

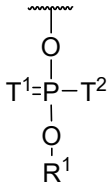
b and c are each independently an integer from 1 to 25; with the proviso that the sum of b and c is at least 5;

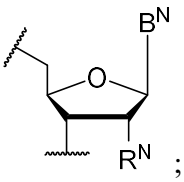
〰 * indicates the point of attachment of the immunomodulating oligonucleotide P to the rest of the conjugate;

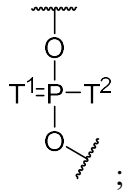
$X^{5'}$ is a 5' terminal nucleoside having the structure ;

$X^{3'}$ is a 3' terminal nucleoside having the structure ;

Y^{PTE} is an internucleoside phosphotriester having the structure , wherein * indicates the points of attachment to the rest of the oligonucleotide and 〰 † indicates the point of attachment to the linker L, or, if L is absent, 〰 † indicates the point of attachment to the Q tag peptide at the glutamine residue via an amide bond;

$Y^{3'}$ is a terminal phosphotriester having the structure ;

each X^N is independently a nucleoside having the structure ;

each Y^N is independently an internucleoside linker having the structure ;

wherein each B^N is independently a modified or unmodified nucleobase;

each R^N is independently -H or -O-C_{1-4}-alkyl, wherein the C_{1-4}-alkyl of the -O-C_{1-4}-alkyl is optionally further substituted by -O-C_1-C_4-alkyl;

$B^{5'}$ and $B^{3'}$ are independently a modified or unmodified nucleobase;

$R^{5'}$ and $R^{3'}$ are independently -H or -O-C_1-C_4-alkyl, wherein the C_{1-4}-alkyl of the -O-C_{1-4}-alkyl is optionally further substituted by -O-C_{1-4}-alkyl;

each T_1 is independently O or S;

each T_2 is independently O^- or S^-; and

T_3 is a group comprising an oligoethylene glycol moiety; and

R^1 is C_{1-4}-alkylene-hydroxy.

16. The conjugate of claim 15, wherein:

(a) b is 3;

(b) P comprises at least one modified nucleoside X^N and/or has at least one modified internucleoside linker Y^N, wherein at least one of T^1 or T^2 is S;

(c) P has at least one phosphorodithioate or phosphorothioate internucleoside linker;

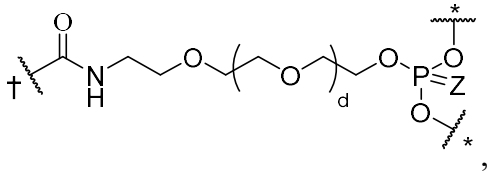
(d) P comprises 0, 1, 2 or 3 phosphorodithioate internucleoside linkers;

(e) P comprises a modified nucleoside selected from the group consisting of 2'-O-alkyl nucleoside, 2'-O-alkoxyalkyl nucleoside, 2'-deoxynucleoside and ribonucleoside, optionally wherein the modified nucleoside is selected from the group consisting of 5-bromo-2'-O-methyluridine, 5-bromo-2'-deoxyuridine, 2'-O-methyluridine, 2'-deoxyuridine, 2'-O-methylthymidine, 2'-O-methylcytidine, 2'-O-(2-methoxyethyl)thymidine and 8-oxo-7,8-dihydro-2'-deoxyguanosine;

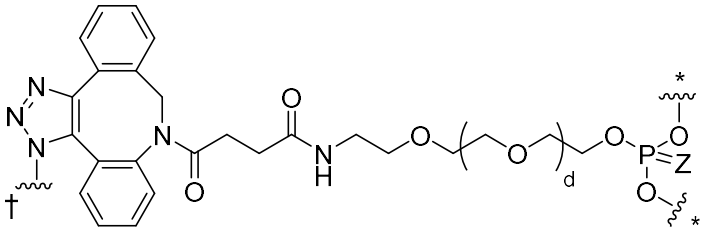
(f) $X^{5'}$ is a 5-bromo-2'-O-methyluridine, 5-bromo-2'-deoxyuridine, 2'-O-methyluridine or 2'-deoxyuridine;

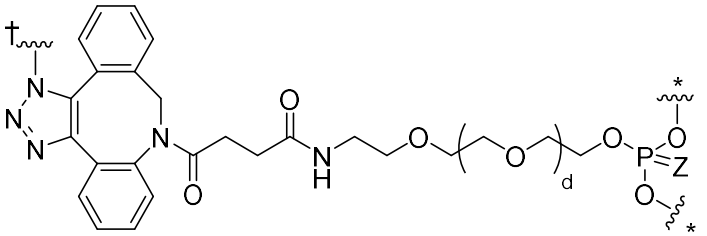
(g) $Y^{3'}$ or the Y^N at the 3' position of $X^{5'}$ comprises an unsubstituted or substituted phosphorothioate; and/or

(h) wherein Y^{PTE} is



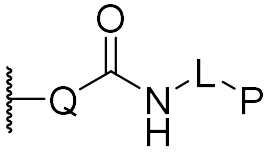
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, or


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wherein Z is O or S; d is an integer from 0 to 95, optionally d is an integer from 1 to 25; the two ~~~ * on the right side of the structure indicate the points of attachment to the adjacent nucleosides X^N in the oligonucleotide P, and the ~~~ † on the left side of the structure indicates the point of attachment to the linker L.

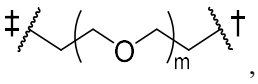
17. A conjugate comprising an antibody or antigen-binding fragment thereof (Ab) and one or more immunomodulating oligonucleotides (P), wherein the antibody or antigen-binding fragment is linked to one or more Q-tag peptides (Q) comprising a Q-tag peptide sequence RPQGF (SEQ ID NO:47), and wherein each immunomodulating oligonucleotide is linked to a Q-tag peptide via an amide bond with the glutamine residue of the Q-tag peptide and a linker (L) as shown in Formula (A)


(A),

wherein:

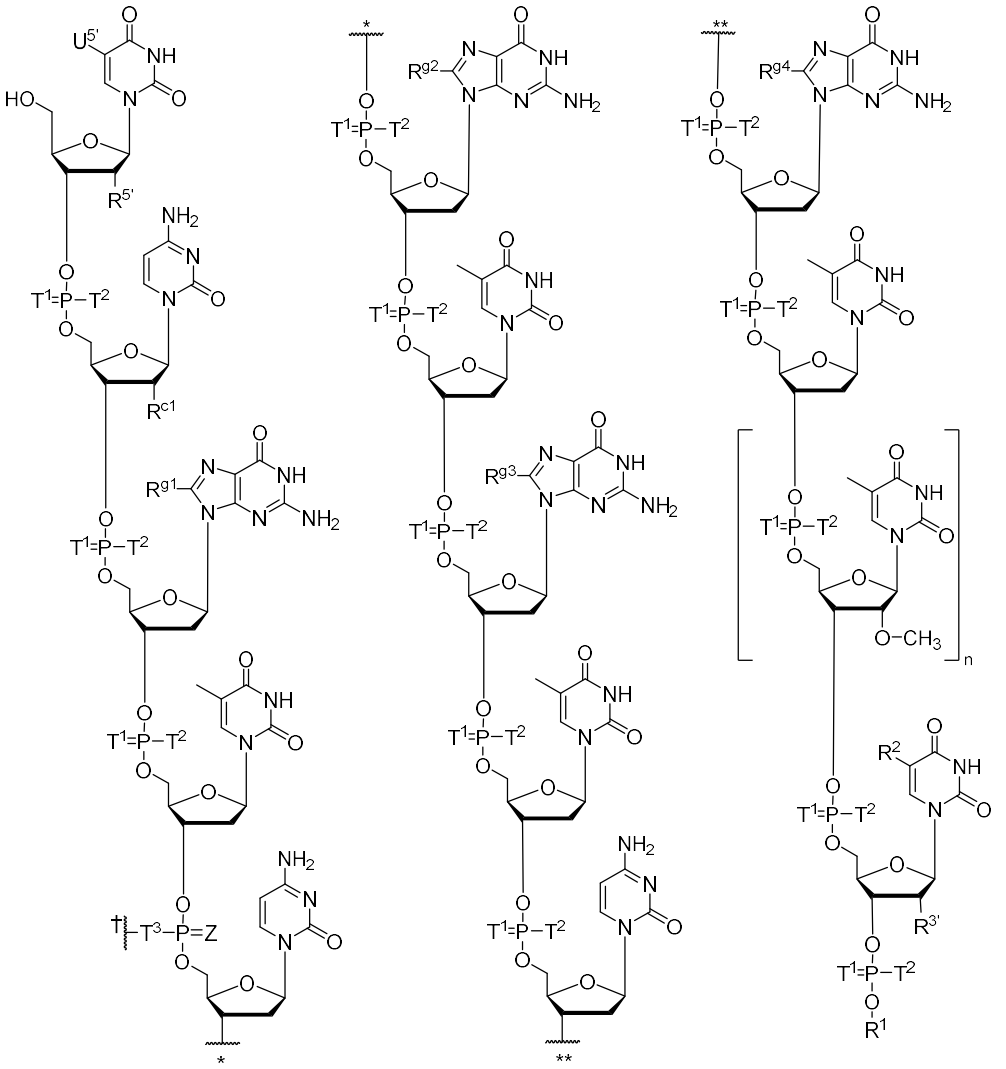
~~~ indicates the point of attachment of each Q to the antibody or antigen-binding fragment thereof (Ab)

each Q independently comprises a Q-tag peptide sequence RPQGF (SEQ ID NO:47);

each L is independently a bond or a linker moiety 
,
~~~

wherein m is an integer ranging from about 0 to about 50, and wherein ~~~ † indicates the point of attachment to P, and ~~~ ‡ indicates the point of attachment to the rest of the conjugate connected to Q via an amide bond with the glutamine residue; and

each P is independently an immunomodulating oligonucleotide having the structure



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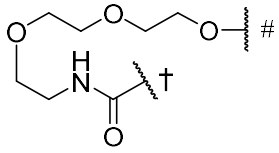
wherein ~~~ * and ~~~ ** indicate the points of attachment within the oligonucleotide, and wherein ~~~ † indicates the point of attachment to the linker L;

each T^1 is independently O or S;

each T^2 is S^-;

provided that each P comprises one or two pairs of geminal T^1 and T^2 wherein T^1 is S and T^2 is S, and the one or two pairs of geminal T^1 and T^2 are between nucleoside residues 2 and 3, between nucleoside residues 3 and 4, between nucleoside residues 5 and 6, between nucleoside

residues 6 and 7, between nucleoside residues 7 and 8, between nucleoside residues 8 and 9, between nucleoside residues 9 and 10, or between nucleoside residues 10 and 11;

T^3 is a group , wherein 〰 † indicates the point of attachment to L and wherein 〰 # indicates the point of attachment to the rest of the oligonucleotide;

Z is O or S;

$U^{5'}$ is –H or halogen;

$R^{5'}$ is -H;

R^{c1} is -H;

R^{g1}, R^{g2}, R^{g3}, and R^{g4} are H;

$R^{3'}$ is methoxy;

R^1 is $-(CH_2)_3$-OH;

R^2 is -methyl; and

n is 1,

wherein Ab is an antibody or antigen-binding fragment thereof that binds a tumor associated antigen.

18. The conjugate of claim 17, wherein the tumor associated antigen is:

(a) expressed by a cancer cell, wherein optionally the cancer cell is a B cell cancer, solid tumor, breast cancer, colorectal cancer, lung cancer, non-small cell lung carcinoma (NSCLC), renal cell carcinoma (RCC), head and neck cancer, head and neck squamous cell carcinoma (HNSCC), hepatocellular carcinoma (HCC), bile duct carcinoma, esophageal cancer, cervical cancer, cervical squamous cell carcinoma, Merkle cell carcinoma, endometrial cancer, ovarian cancer, pancreatic cancer, melanoma, cutaneous melanoma, sarcoma, lymphoma, leukemia, acute lymphoblastic leukemia (ALL), hairy cell leukemia, diffuse large B cell lymphoma (DLBCL), small cell lung cancer (SCLC), cutaneous squamous cell carcinoma, urothelial cancer, or gastric cancer cell;

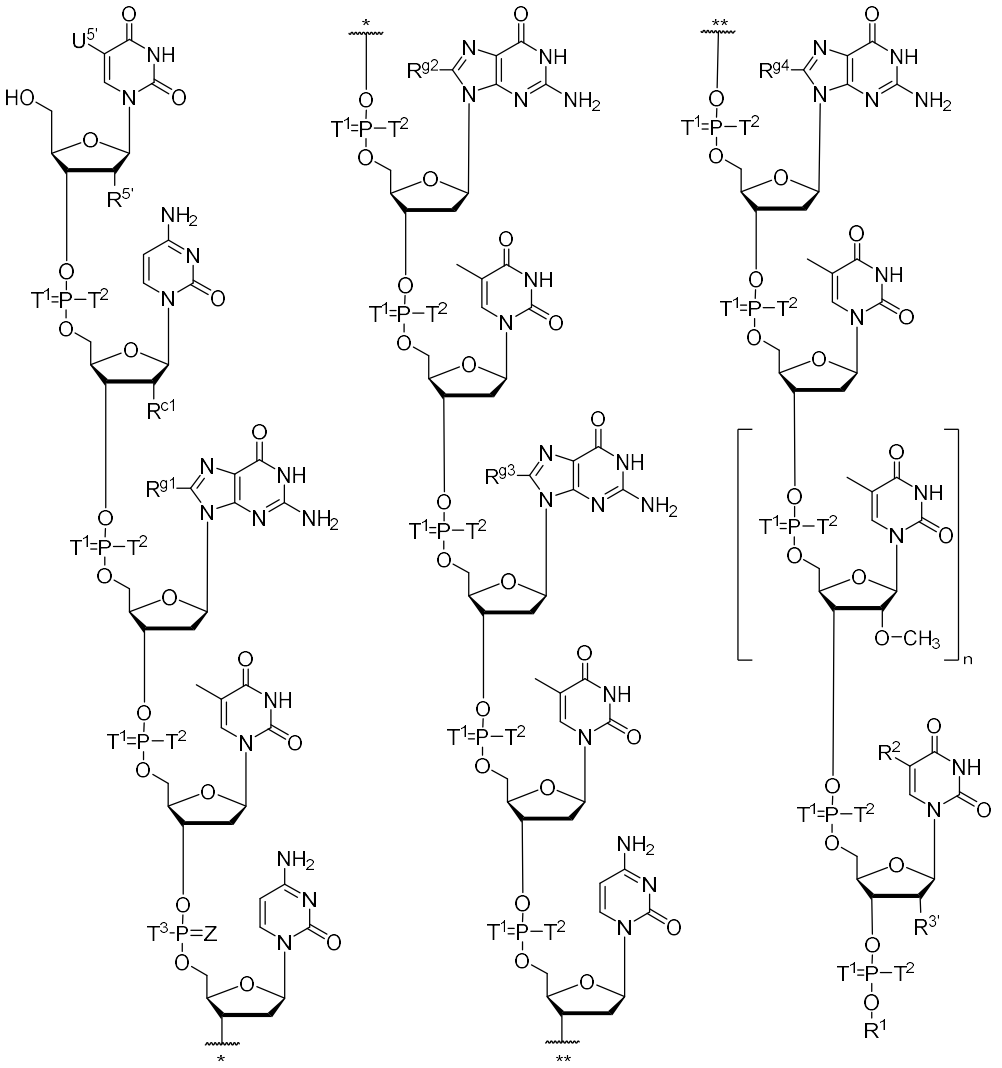
(b) expressed by a cancer-associated stromal cell, wherein optionally the cancer is a B cell cancer, solid tumor, breast cancer, colorectal cancer, lung cancer, non-small cell lung carcinoma (NSCLC), renal cell carcinoma (RCC), head and neck cancer, head and neck squamous cell carcinoma (HNSCC), hepatocellular carcinoma (HCC), bile duct

carcinoma, esophageal cancer, cervical cancer, cervical squamous cell carcinoma, Merkle cell carcinoma, endometrial cancer, ovarian cancer, pancreatic cancer, melanoma, cutaneous melanoma, sarcoma, lymphoma, leukemia, acute lymphoblastic leukemia (ALL), hairy cell leukemia, diffuse large B cell lymphoma (DLBCL), small cell lung cancer (SCLC), cutaneous squamous cell carcinoma, urothelial cancer, or gastric cancer; or

(c) selected from the group consisting of CD19, CD20, CD22, CD25, CD30, CD33, CD38, CD40, CD44, CD45R (B220), CD49, CD52, CD56, CD70, CD74, CD79a, CD79b, CD93, CD123, CD138, CD163, CD205, CD206, CD274, CD303, and CD304, folate receptor alpha, folate receptor beta, mesothelin, PSMA, Her-2, EGFR, CLDN18.2, 5T4, CD47, nectin 4, transferrin receptor, integrin, cripto, EphA2, AGS-5, AGS-16, CanAg, EpCAM, IL4 receptor, IL2 receptor, Lewis Y, GPNMB, DLL3, GCC, GPA33, tissue factor (TF), PD-L1, and Trop2.

19. The conjugate of any one of claims 17-18, wherein m is an integer from about 20 to about 25; optionally wherein m is 24.

20. An immunomodulating oligonucleotide of Formula (C):



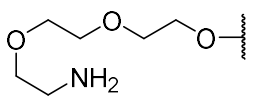
(C),

wherein

〰 * and 〰 ** indicate the points of attachment within the oligonucleotide;

each T^1 is independently O or S;

each T^2 is S^-;

T^3 is a group  , wherein m is an integer from 0 to 50 and wherein 〰 indicates the point of attachment to the rest of the oligonucleotide;

Z is O or S;

$U^{5'}$ is –H or halogen;

$R^{5'}$ is -H or methoxy;

R^{c1} is -H or methoxy;

R^{g1}, R^{g2}, R^{g3}, and R^{g4} are H;

$R^{3'}$ is methoxy;

R^1 is $-(CH_2)_3$-OH;

R^2 is -H or methyl; and

n is an integer from 0 to 2,

or a pharmaceutically acceptable salt thereof.

21. The immunomodulating oligonucleotide of claim 20, wherein:

(a) Z is S;

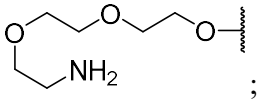
(b) the oligonucleotide comprises at least one pair of geminal T^1 and T^2 wherein T^1 is S and T^2 is S^-;

(c) the oligonucleotide comprises at least two pairs of geminal T^1 and T^2 wherein T^1 is S and T^2 is S^-;

(d) $R^{5'}$ is H or methoxy;

(e) R^{c1} is H or methoxy;

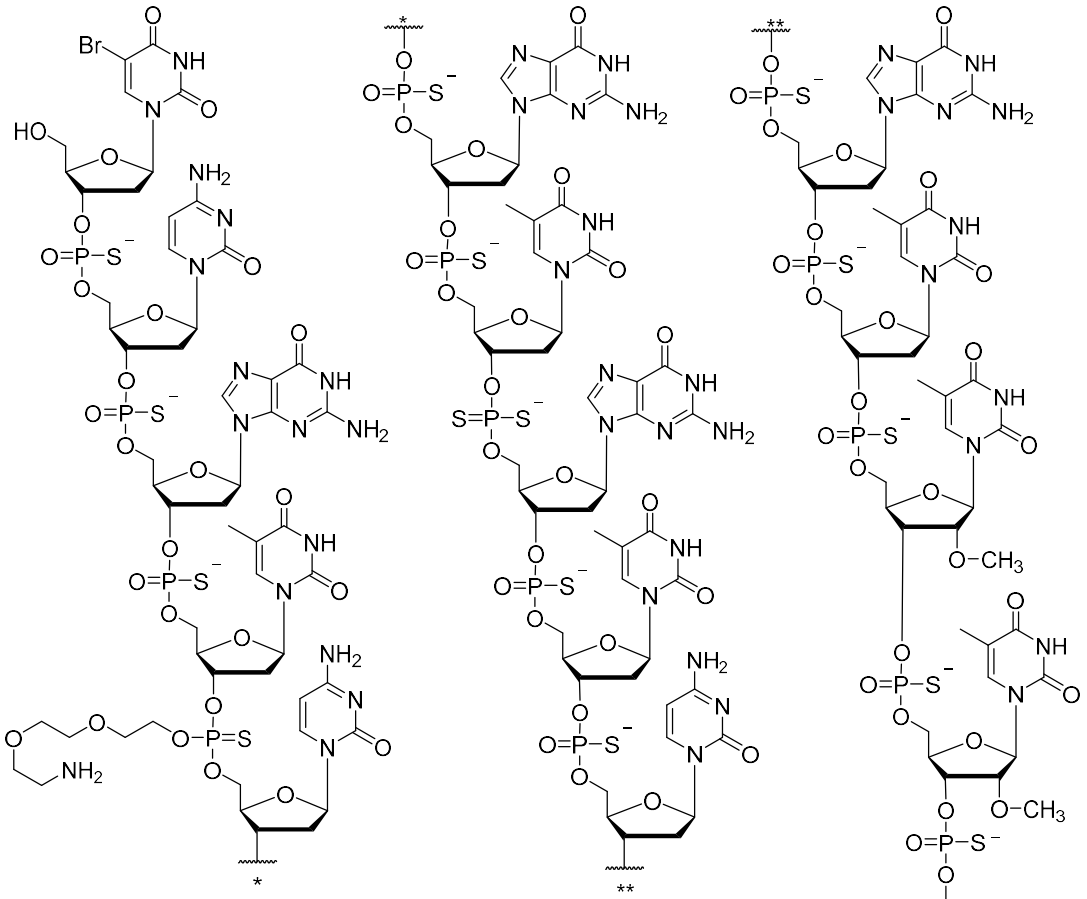
(f) R^2 is methyl or H;

(g) T^3 is 

; and/or

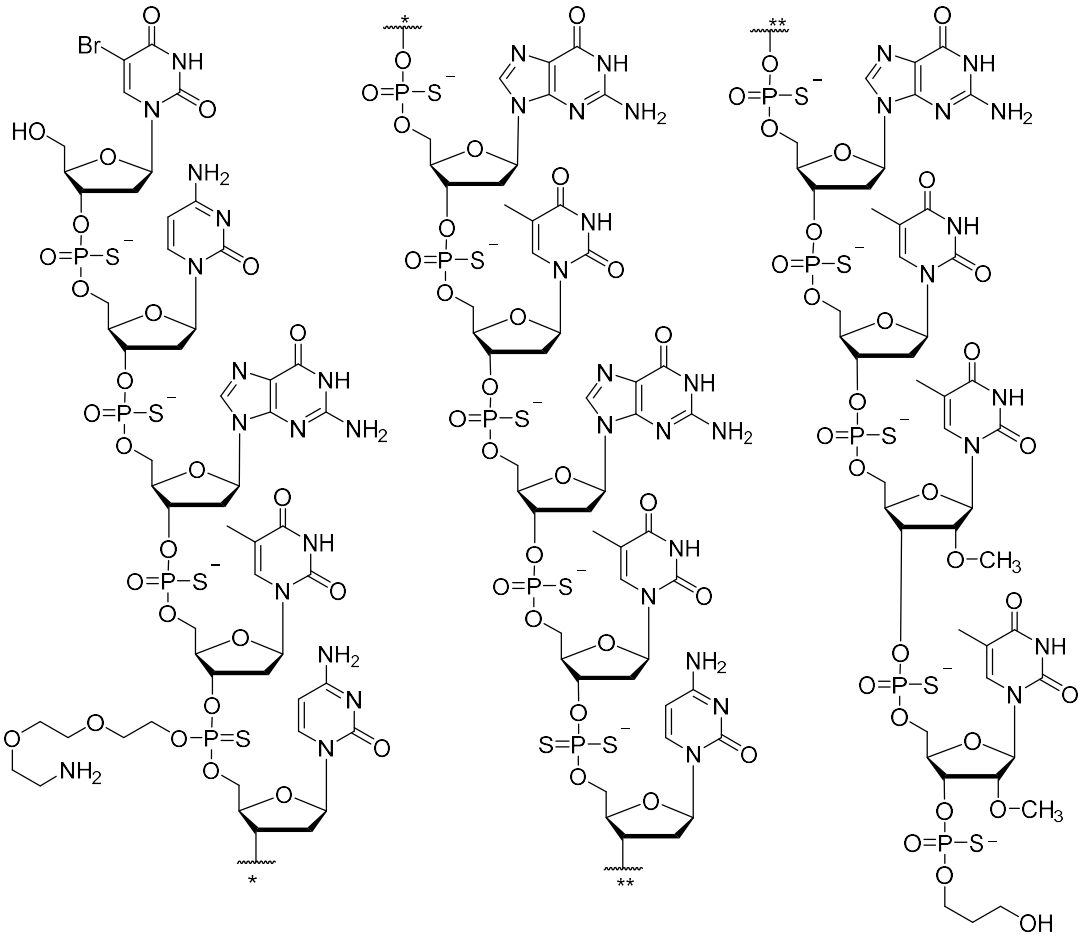
(h) $U^{5'}$ is H or a halogen, optionally bromo.

22. The immunomodulating oligonucleotide of claim 20, wherein the oligonucleotide is:



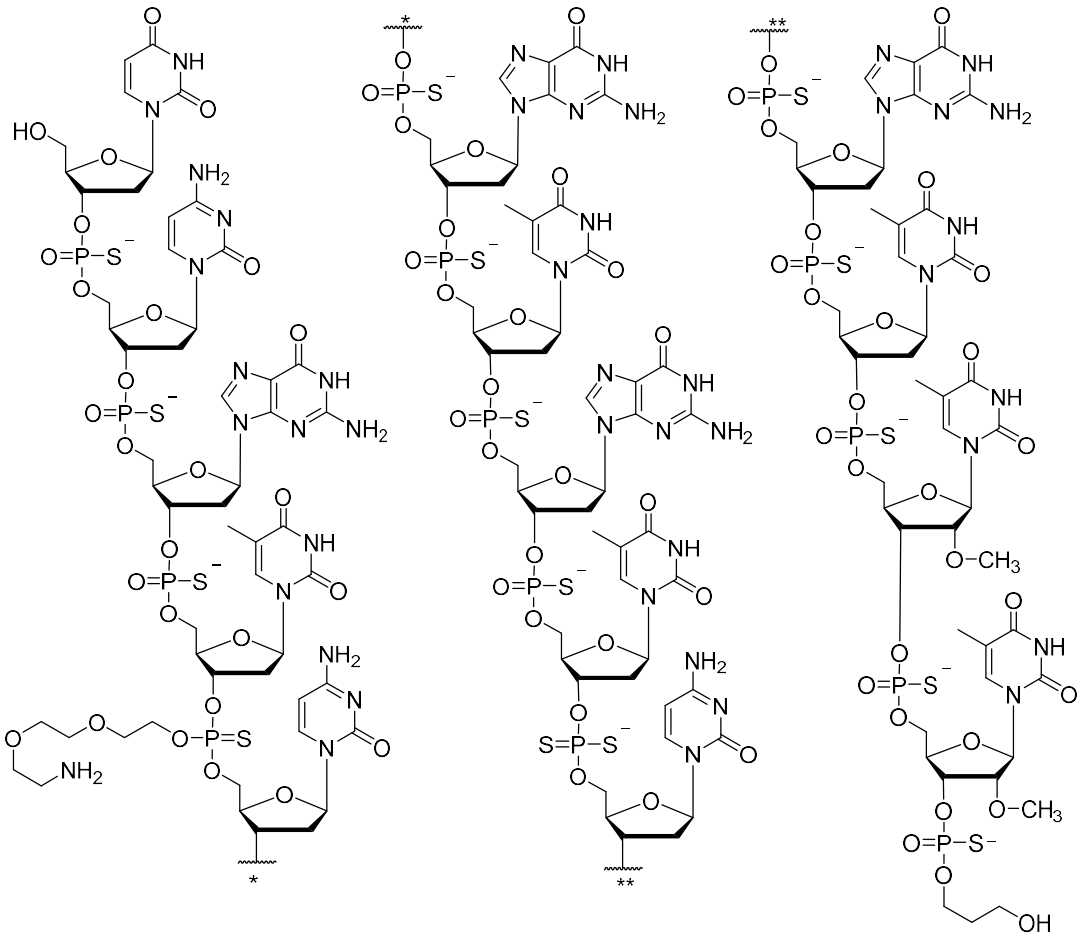
(a)

;



(b)

;



(c)

; or

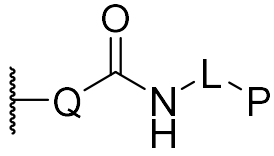
(d) selected from the group consisting of the oligonucleotides of Table 10, or a pharmaceutically acceptable salt thereof.

23. A conjugate comprising a protein, at least one Q tag peptide sequence comprising a glutamine residue, and at least one immunomodulatory oligonucleotide, wherein the Q-tag peptide sequence is naturally occurring or synthetic, and wherein each immunomodulatory oligonucleotide is linked to a Q-tag via an amide bond with the glutamine residue, wherein at least one Q-tag peptide sequence is selected from the group consisting of SEQ ID NOs: 40-55.

24. The conjugate of claim 23, wherein the immunomodulatory oligonucleotide has a sequence selected from the group consisting of the oligonucleotides of ***Table 10*** and ***Table 12***; and/or the protein is an antibody comprising a light chain variable domain (VL)

and a heavy chain variable domain (VH), and wherein VH comprises the sequence SEQ ID NO: 56; and VL comprises the sequence SEQ ID NO: 57.

25. A conjugate comprising an anti-CD22 antibody (Ab) and an immunomodulating oligonucleotide (P), wherein the Ab comprises two antibody light chains, two antibody heavy chains, and two Q-tag peptides (Q) having at least one glutamine residue; wherein one Q-tag peptide is linked to the C-terminus of each of the two antibody heavy chains; wherein one of the two Q-tag peptides is linked to the immunomodulating oligonucleotide via an amide bond with the glutamine residue of the Q-tag peptide and a linker (L) as shown in Formula (A):

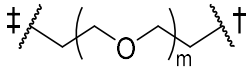


(A),

wherein ~~~ indicates the point of attachment of Q to the antibody (Ab);

wherein each heavy chain of the Ab comprises a heavy chain variable (VH) domain comprising the amino acid sequence of SEQ ID NO:65, and each light chain of the Ab comprises a light chain variable (VL) domain comprising an amino acid sequence selected from the group consisting of SEQ ID Nos:68, 73, and 87;

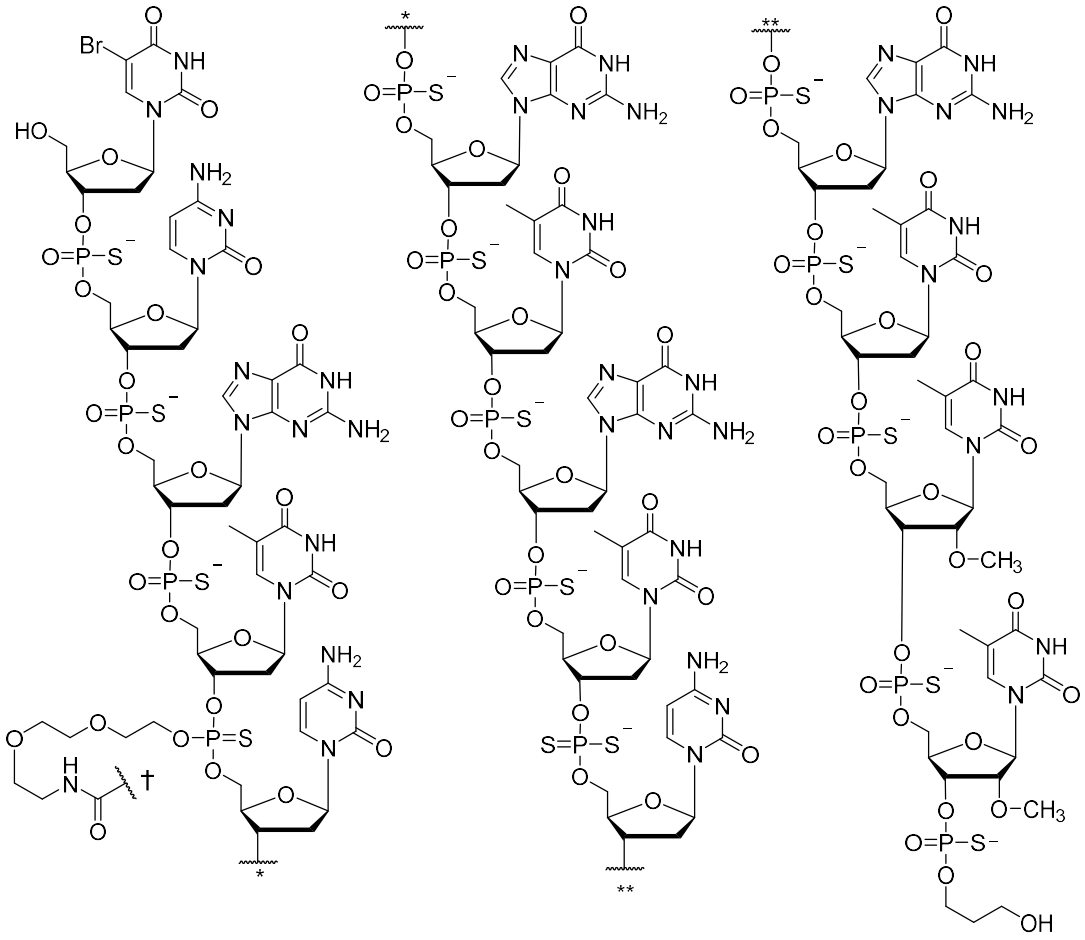
wherein the linker L is



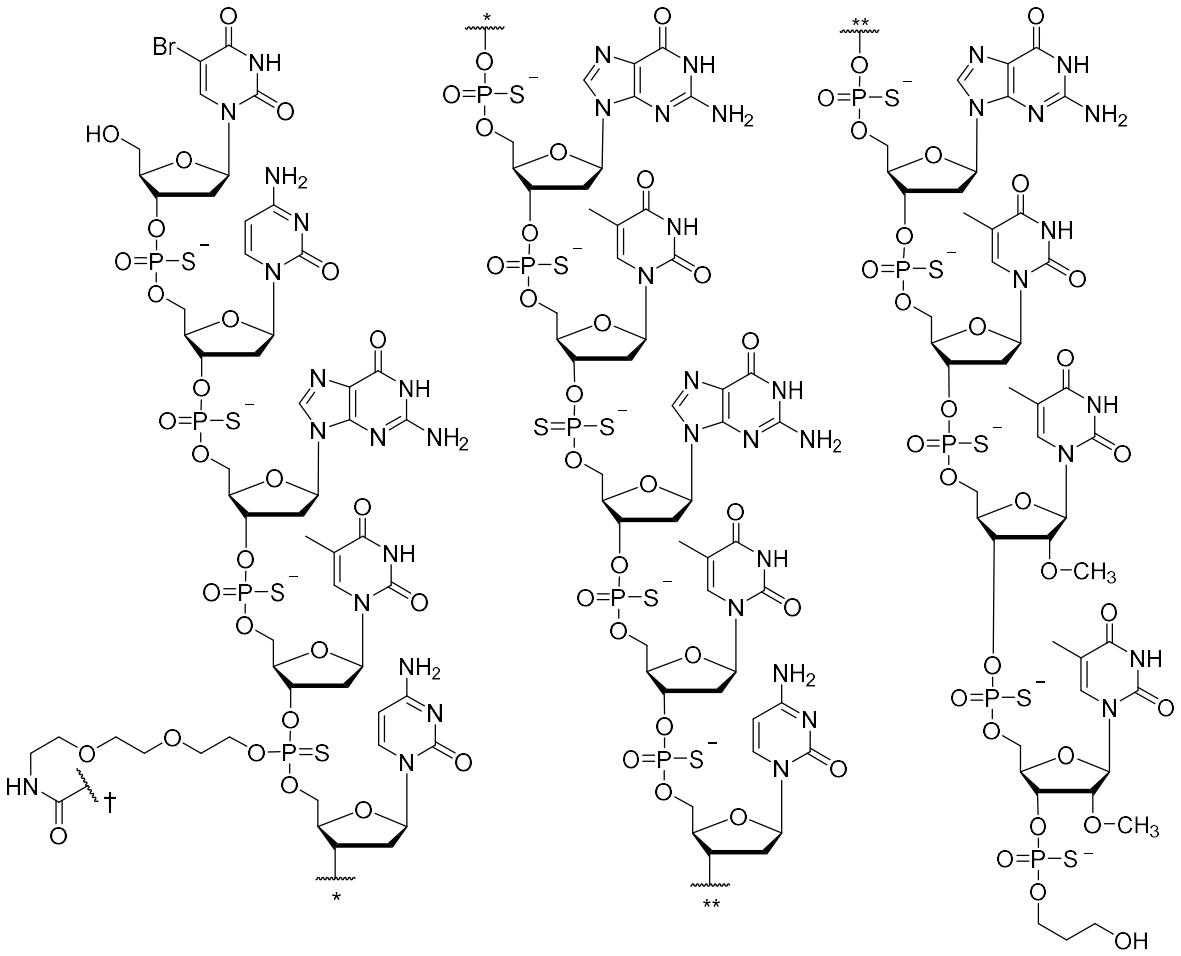
,

wherein m is 24, and wherein ~~~ † indicates the point of attachment to the oligonucleotide P, and ~~~ ‡ indicates the point of attachment to the glutamine residue of the Q-tag; and

wherein the oligonucleotide P comprises the structure:



or



or a pharmaceutically acceptable salt thereof, wherein ~~* and ~~** indicate the points of attachment within the oligonucleotide, and wherein ~~† indicates the point of attachment to the linker L.

26. The conjugate of claim 25, wherein:

(a) each heavy chain of the Ab comprises a heavy chain variable (VH) domain comprising the amino acid sequence of SEQ ID NO:65, and wherein each light chain of the Ab comprises a light chain variable (VL) domain comprising the amino acid sequence of SEQ ID NO:68;

(b) each heavy chain of the Ab comprises a heavy chain variable (VH) domain comprising the amino acid sequence of SEQ ID NO:65, and wherein each light chain of the Ab comprises a light chain variable (VL) domain comprising the amino acid sequence of SEQ ID NO:73; or

(c) each heavy chain of the Ab comprises a heavy chain variable (VH) domain comprising the amino acid sequence of SEQ ID NO:65, and wherein each light chain of the Ab comprises a light chain variable (VL) domain comprising the amino acid sequence of SEQ ID NO:87.

27. The conjugate of claim 25 or claim 26, wherein each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49).

28. The conjugate of claim 25, wherein:

(a) each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:179, and each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:181;

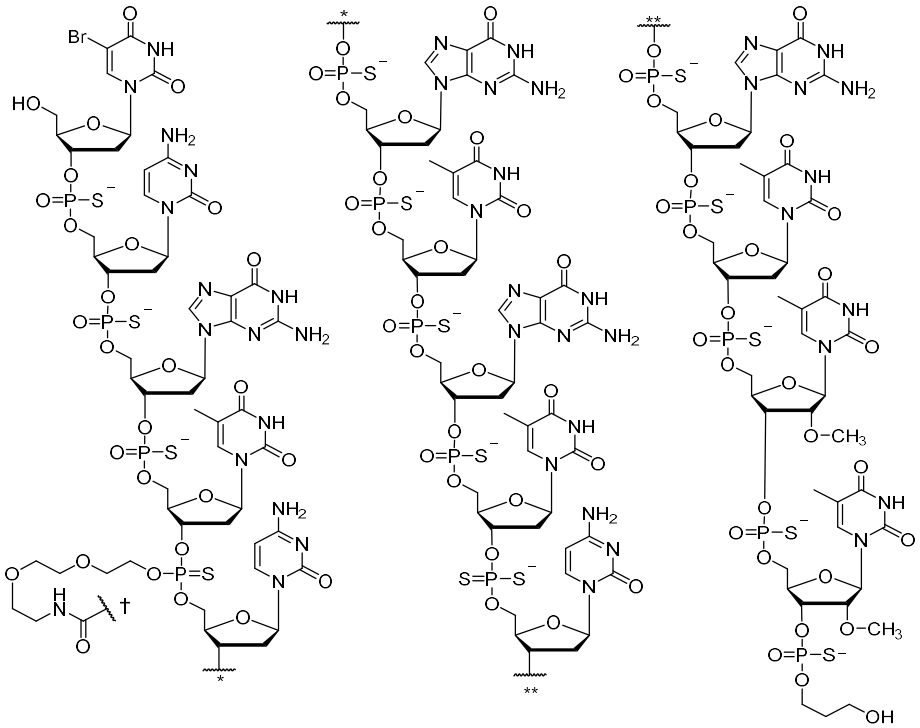
(b) each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:179, and each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:182;

(c) each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:180, and each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:181; or

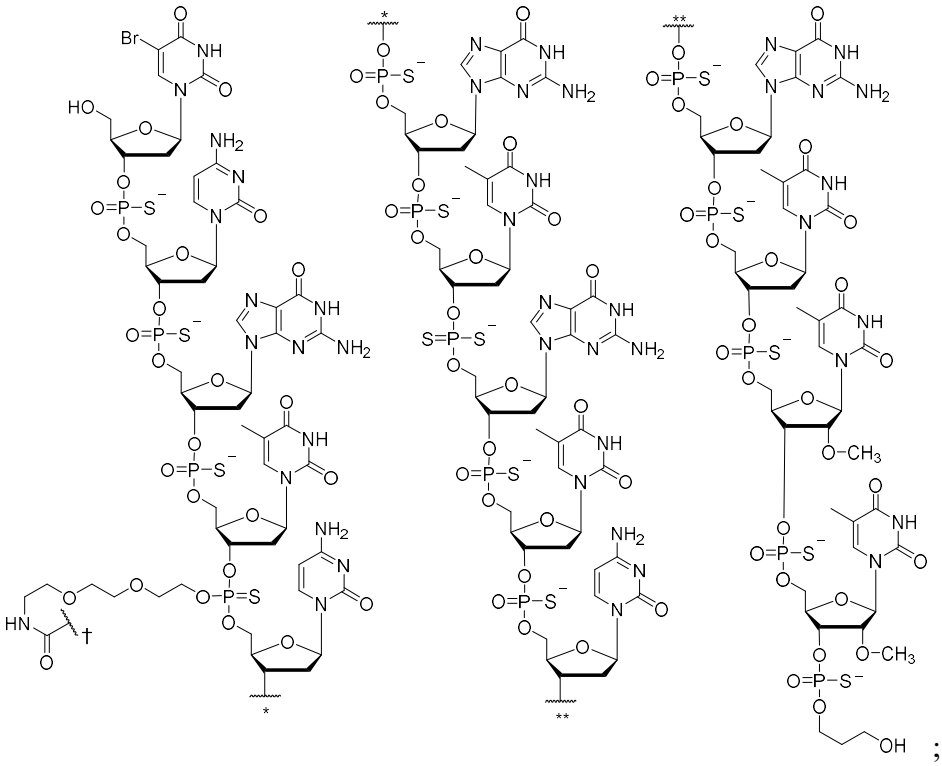
(d) each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:180, and each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:182.

29. The conjugate of claim 25, wherein:

(a) each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49), each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:179, each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:182, and the oligonucleotide P comprises the structure:

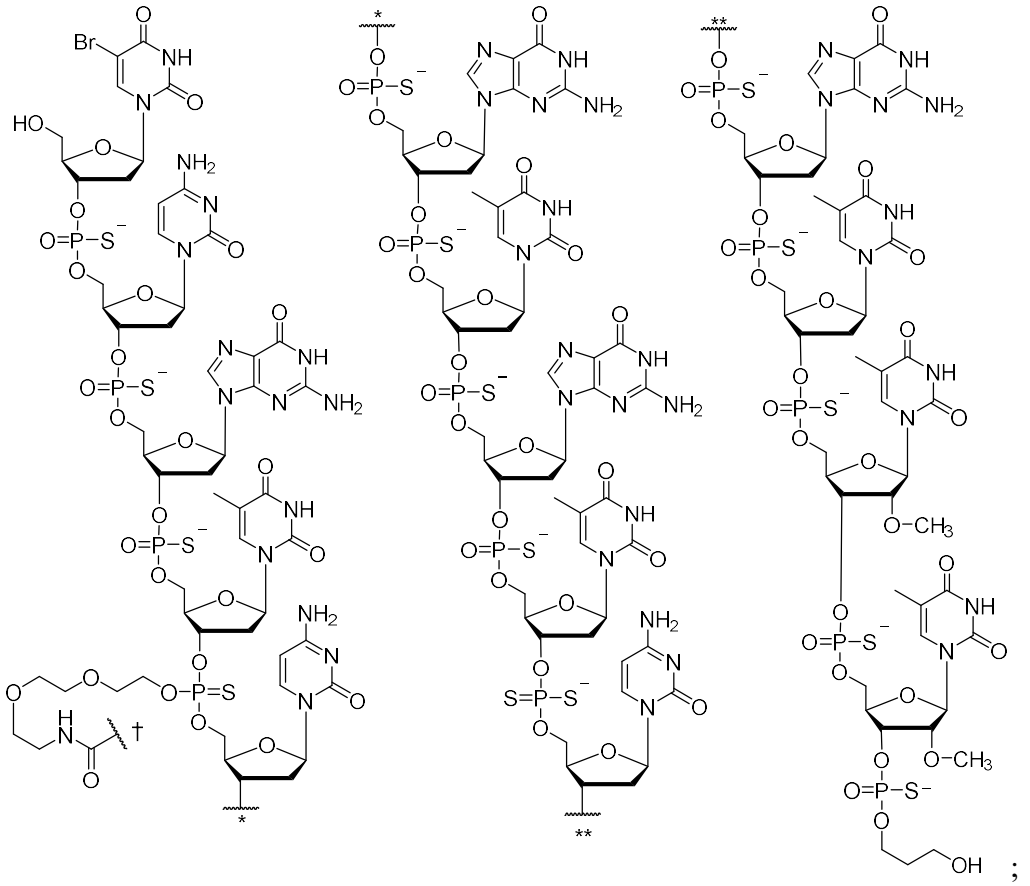


(b) each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49), each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:179, each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:182, and the oligonucleotide P comprises the structure:

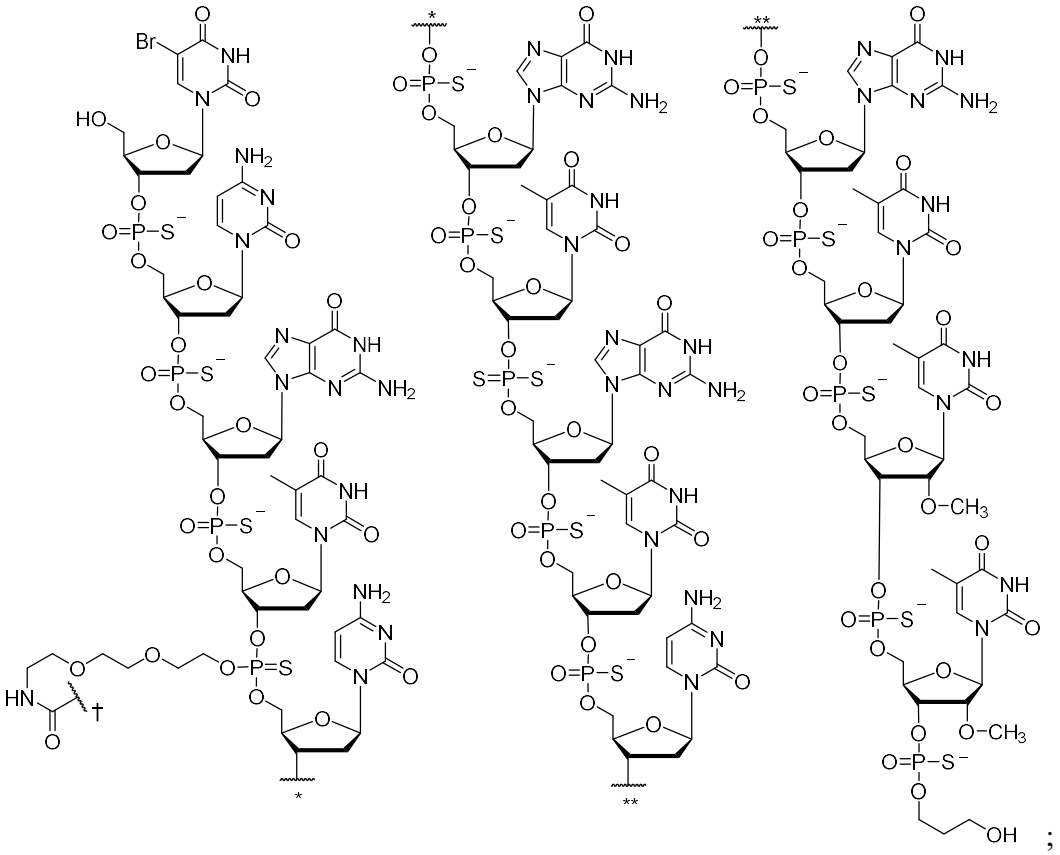


;

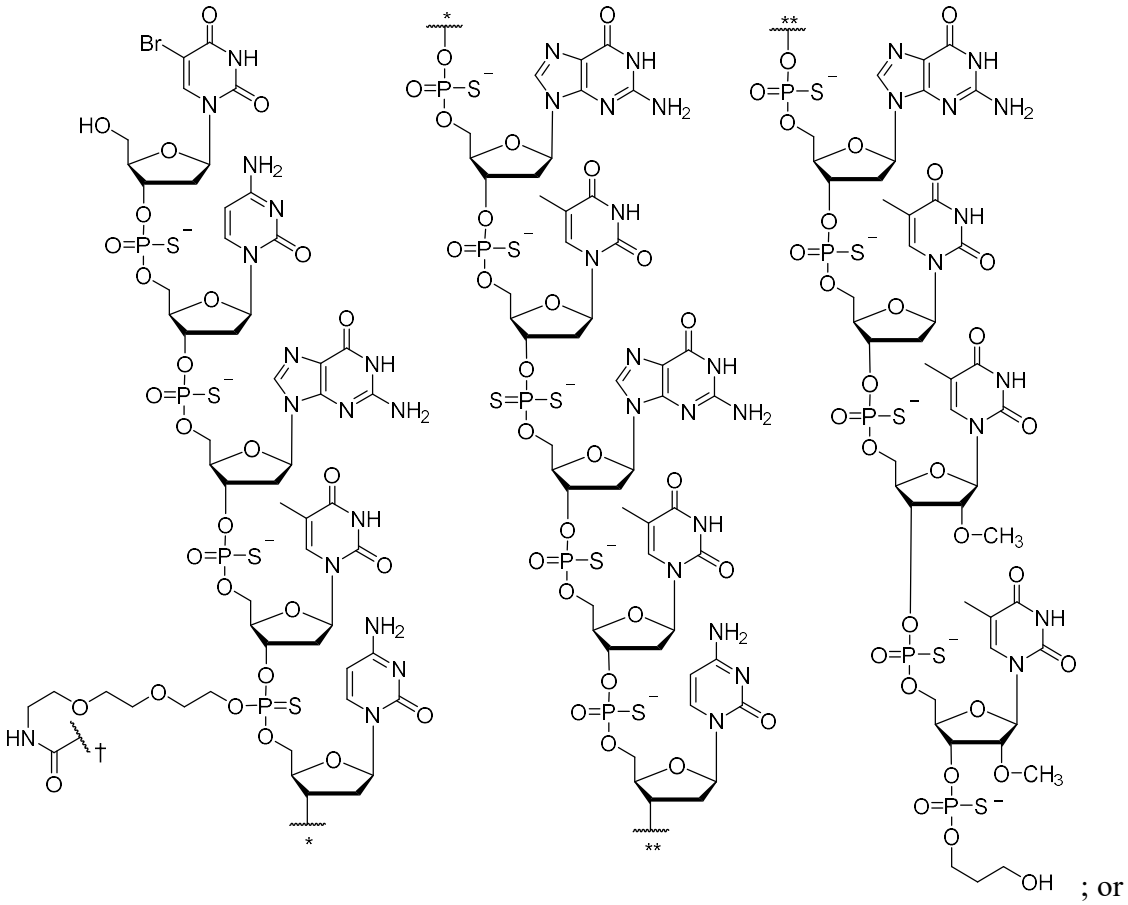
(c) each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49), each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:180, each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:182, and the oligonucleotide P comprises the structure:



(d) each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49), each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:180, each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:182, and the oligonucleotide P comprises the structure:



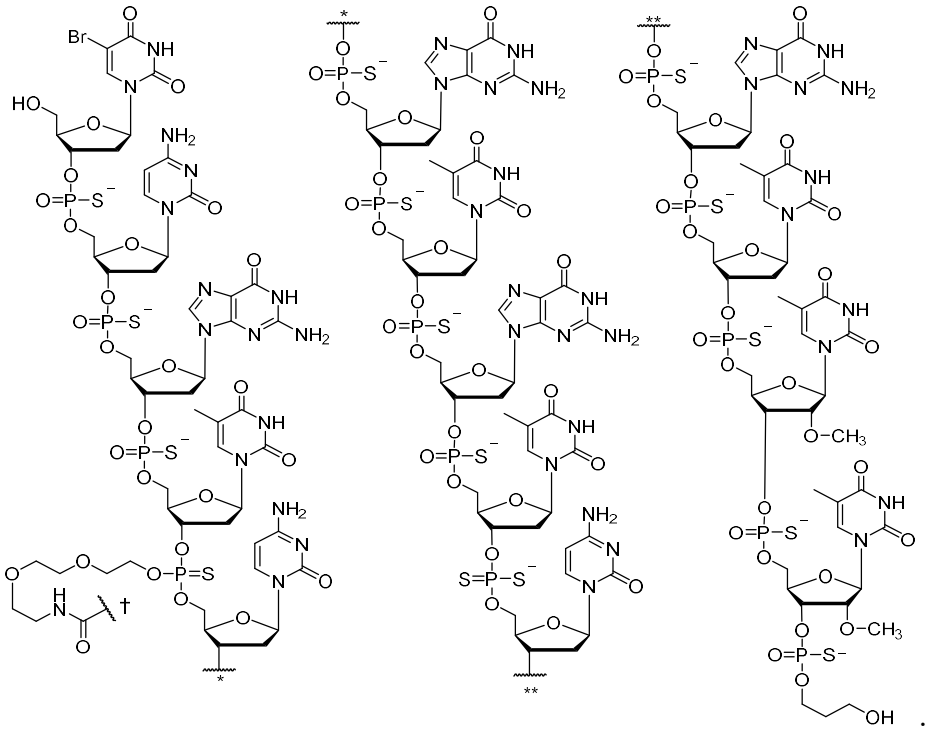
(e) each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49), each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:180, each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:181, and the oligonucleotide P comprises the structure:



; or

(f) each of the two Q-tag peptides comprises the amino acid sequence RPQGFGPP (SEQ ID NO:49), each heavy chain of the Ab including Q comprises the amino acid sequence of SEQ ID NO:180, each light chain of the Ab comprises the amino acid sequence of SEQ ID NO:181, and

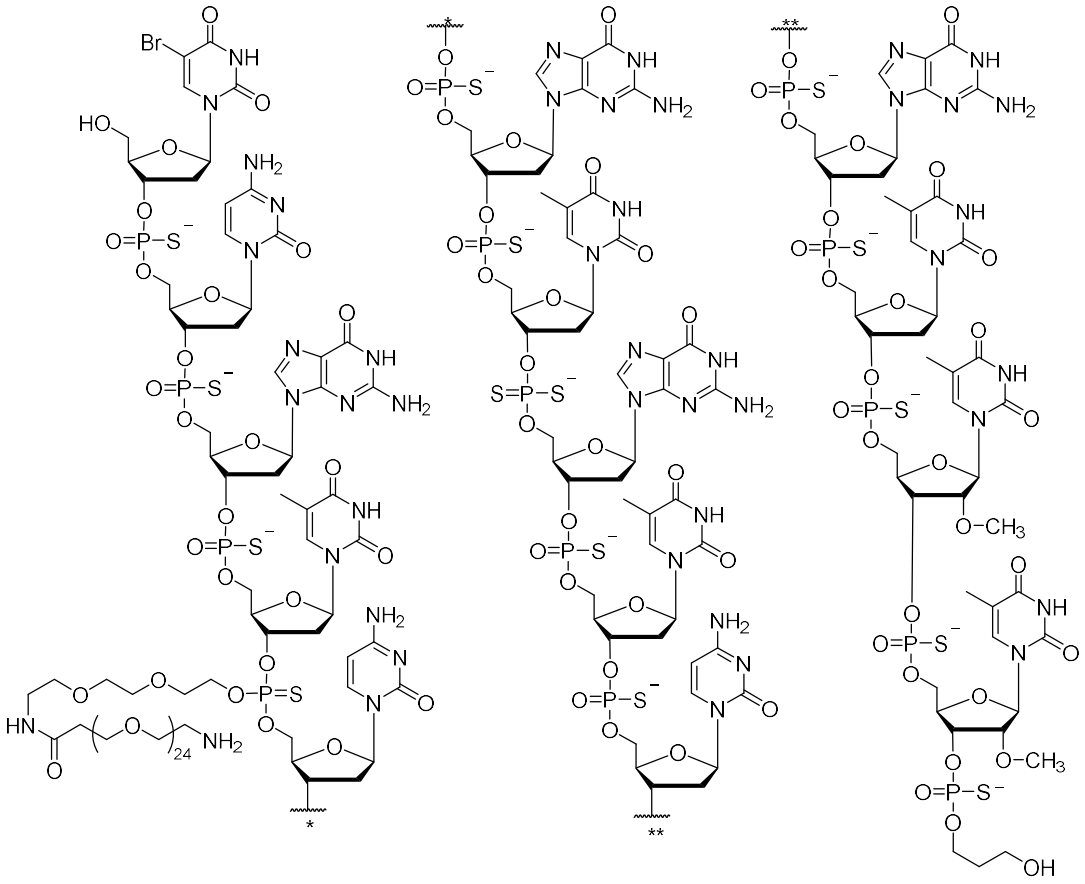
the oligonucleotide P comprises the structure:



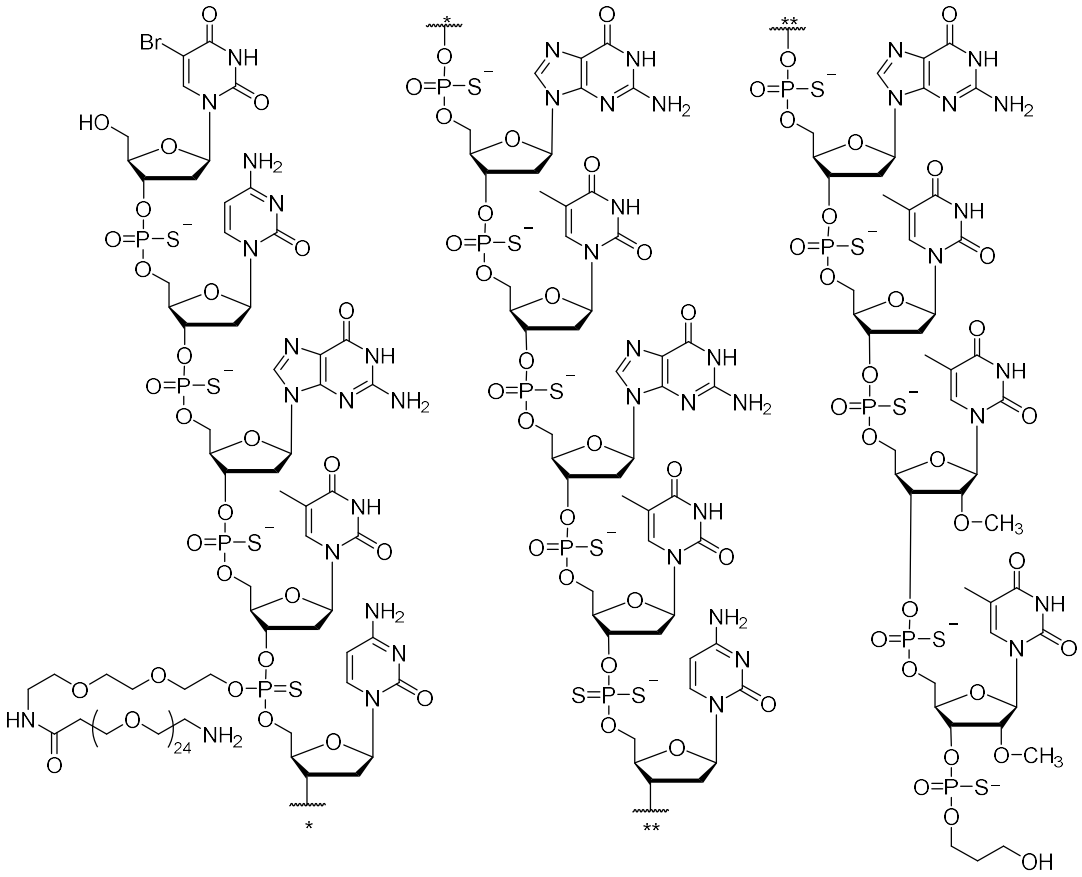
30. A pharmaceutical composition comprising: (a) a conjugate according to any one of claims 1-19 and 23-29; or (b) an immunomodulating oligonucleotide according to any one of claims 20-22; and a pharmaceutically acceptable carrier.

31. An antibody or antigen binding fragment thereof that binds to CD22, wherein the antibody or fragment comprises a heavy chain variable (VH) domain and a light chain variable (VL) domain, wherein the VH domain comprises a VH domain sequence selected from the group consisting of SEQ ID Nos:64-67; and
wherein the VL domain comprises a VL domain sequence selected from the group consisting of SEQ ID Nos:68-91.

32. A method for preparing a conjugate that comprises an antibody (Ab) and an immunomodulating oligonucleotide (P), comprising:
contacting the Ab with the oligonucleotide P in the presence of a transglutaminase;
wherein the Ab comprises two antibody light chains, two antibody heavy chains, and two Q-tag peptides (Q) having at least one glutamine residue; wherein one Q-tag peptide is linked to the C-terminus of each of the two antibody heavy chains; and
wherein the oligonucleotide P comprises the structure:



or



or a pharmaceutically acceptable salt thereof, wherein ~~* and ~~** indicate the points of attachment within the oligonucleotide.

33. The method of claim 32, wherein the antibody specifically binds to CD22.

34. The method of claim 32 or claim 33, further comprising separating the conjugate having a DAR of 1 from free oligonucleotide, unconjugated antibody, and conjugates having a DAR of 2.

35. Use of the conjugate according to any one of claims 1-19 and 23-29, immunomodulating oligonucleotide according to any one of claims 20-22, pharmaceutical composition of claim 30, or antibody of claim 31, in the manufacture of a medicament for treating cancer in an individual.

36. The use of claim 35, wherein the cancer is a B cell cancer, solid tumor, breast cancer, colorectal cancer, lung cancer, non-small cell lung carcinoma (NSCLC), renal cell carcinoma (RCC), head and neck cancer, head and neck squamous cell carcinoma (HNSCC), hepatocellular carcinoma (HCC), bile duct carcinoma, esophageal cancer, cervical cancer, cervical squamous cell carcinoma, Merkle cell carcinoma, endometrial

cancer, ovarian cancer, pancreatic cancer, melanoma, cutaneous melanoma, sarcoma, lymphoma, leukemia, acute lymphoblastic leukemia (ALL), hairy cell leukemia, diffuse large B cell lymphoma (DLBCL), small cell lung cancer (SCLC), cutaneous squamous cell carcinoma, urothelial cancer, or gastric cancer.

37. The use of any one of claims 35-36, wherein the antibody or conjugate specifically binds an antigen expressed by the cancer or cancer-associated stroma.

38. The use of any one of claims 35-37, wherein an immune checkpoint inhibitor is to be further administered; wherein the cancer is refractory or resistant to the immune checkpoint inhibitor when administered in the absence of the conjugate; and wherein the antibody or antigen-binding fragment thereof binds to human CD22; wherein optionally the immune checkpoint inhibitor is a PD-1 inhibitor or a PD-L1 inhibitor.