[0010] In one aspect, provided herein is a binding agent comprising: a heavy chain variable (VH) region and a light chain variable (VL) region, the VH region comprising complementarity determining regions HCDR1, HCDR2 and HCDR3 disposed in heavy chain variable region framework regions and the VL region comprising LCDR1, LCDR2 and LCDR3 disposed in light chain variable region framework regions, the VH and VL CDRs having amino acids sequences of SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, KVS and SEQ ID NO: 22, respectively.

[0010a] In some examples, provided is a binding agent that includes a heavy chain variable (VH) region and a light chain variable (VL) region, the VH region comprising complementarity determining regions HCDR1, HCDR2 and HCDR3 disposed in heavy chain variable region framework regions and the VL region comprising LCDR1, LCDR2 and LCDR3 disposed in light chain variable region framework regions, the VH and VL CDRs having amino acids sequences selected from the sets of amino acid sequences set forth in the group consisting of: SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, FAS and SEQ ID NO: 7, respectively; SEQ ID NO: 10, SEQ ID NO: 11, SEQ ID NO: 12, SEQ ID NO: 13, RTS and SEQ ID NO: 14, respectively; and SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, KVS and SEQ ID NO: 22, respectively.

[0011] In some embodiments, provided herein is a pharmaceutical composition comprising the binding agent of the present disclosure and a pharmaceutically acceptable carrier.

[0012] In some embodiments, provided herein is a nucleic acid encoding the binding agent of the present disclosure.

[0013] In some examples, provided herein is a vector comprising the nucleic acid described of the present disclosure.

[0014] In some embodiments, provided herein is a vector comprising the nucleic acid of the present disclosure.

[0015] In some embodiments, provided herein is a cell line comprising the binding agent, the vector, or the nucleic acid of the present disclosure.

[0016] In some embodiments, provided herein is a conjugate that comprises the binding agent, at least one linker attached to the binding agent; at least one drug unit, wherein each drug unit is attached to a linker, wherein the linker optionally comprises at least one polar group.

[0017] In some examples, for the conjugate of the present disclosure, the linker is derived from a linker compound, or a stereoisomer or salt thereof, and the linker compound comprises: a linker unit; a stretcher group connected to the linker unit; an optional amino acid unit; and the at least one polar group; wherein: the stretcher group has an attachment site to the binding agent and an attachment site to the amino acid unit (when present) or the linker subunit; the amino

acid unit (when present) has an attachment site to the stretcher unit and an attachment site to the linker unit; and the linker unit has an attachment site to the amino acid unit (when present) or to the stretcher unit and to the at least one drug unit.

[0018] In some examples, for the conjugate of the present disclosure, the linker unit is non-cleavable.

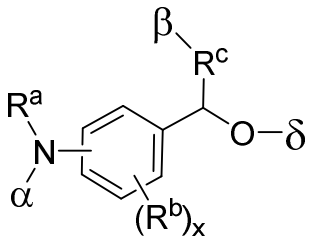
[0019] In some examples, for the conjugate of the present disclosure, the linker unit is cleavable by including a cleavable group.

[0020] In some examples, for the conjugate of the present disclosure, the polar group is attached to the amino acid unit.

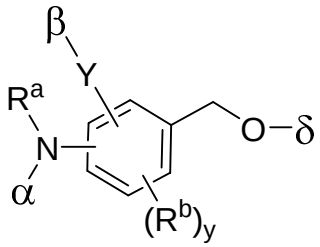
[0021] In some examples, for the conjugate of the present disclosure, the polar group is attached to the stretcher group.

[0022] In some examples, for the conjugate of the present disclosure, the linker compound comprises:

(a) the linker unit, which has from 1 to 4 attachment sites for the drug units and having one of the following structures (i) or (ii):



(i)



(ii) ;

(b) the at least one polar group, each comprises a polymer unit, and

(c) the stretcher group, which has an attachment site for the binding agent;

wherein:

α— is an attachment site to an enzyme-cleavable group;

β— is an attachment site to the at least one polar group;

δ— is H, an attachment site to at least one of the drug units, or an attachment site to a linking group attached to the at least one of the drug units;

the polymer unit comprises a polyamide, a polyether, or a combination thereof, wherein the polyether comprises a hydroxyl group, a polyhydroxyl group, a sugar group, a carboxyl group, or combinations thereof;

each R^a independently is H or C_1-C_6 alkyl;

each R^b independently is halo, C_{1-6} alkyl, an attachment site to at least one of the drug units, or an attachment site to at least one of the polar groups;

x is 0, 1, 2, 3 or 4;

y is 0, 1, 2 or 3;

R^c is a bond, -C(O)-, -S(O)-, -SO_2-, C_{1-6} alkylene, C_{1-6} alkynylene, triazolyl or combinations thereof; and

Y is a bond, -O-, -S-, -N(R^a)-, -C(O)-, -S(O)-, -SO_2-C_1-C_6 alkylene, C_1-C_6 alkenylene, C_1-C_6 alkynylene, triazolyl or combinations thereof.

[0023] In some embodiments, provided herein is a pharmaceutical composition comprising the

conjugate of the present disclosure and a pharmaceutically acceptable carrier.

[0024] In one aspect, provided herein is a use of the binding agent of the present disclosure, the conjugate of the present disclosure, or the pharmaceutical composition of the present disclosure in the manufacture of a medicament for (i) treating a PTK7+ cancer; or (ii) use of the conjugate of the present disclosure or the pharmaceutical composition of the present disclosure in the manufacture of a medicament for treating an autoimmune disease.

[0024a] In some examples, provided herein is a method of treating a PTK7+ cancer, comprising administering to a subject in need thereof a therapeutically effective amount of the binding agent, the pharmaceutical composition, the conjugate, or the pharmaceutical composition of the present disclosure.

[0025] In some examples, provided herein is a use of the conjugate or the pharmaceutical composition of the present disclosure for the treatment of PTK7+ cancer in a subject.

[0026] Additional features will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art upon examination of the following and the accompanying drawings or may be learned by production or operation of the examples. The features of the present disclosure may be realized and attained by practice or use of various aspects of the methodologies, instrumentalities, and combinations set forth in the detailed examples discussed below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The present disclosure is further described in terms of exemplary embodiments. These exemplary embodiments are described in detail with reference to the drawings. It should be noted that the drawings are not to scale. These embodiments are non-limiting exemplary embodiments, in which like reference numerals represent similar structures throughout the several views of the drawings, and wherein:

[0028] FIG. 1 is a graph illustrating ELISA binding assay results of humanized antibodies 2C5, 2C8, 13C4 and cofetuzumab on human PTK7;

[0029] FIG. 2 is a graph illustrating ELISA binding assay results of humanized antibodies 2C5, 2C8, 13C4 and cofetuzumab on cyno PTK7;

[0030] FIG. 3 is a graph illustrating ELISA binding assay results of humanized antibodies 2C5, 2C8, 13C4 and cofetuzumab on mouse PTK7;

[0031] FIG. 4 is a graph illustrating ELISA binding assay results of humanized antibodies 2C5, 2C8, 13C4 and cofetuzumab on rat PTK7;

[0032] FIG. 5 is a graph illustrating binding activity of antibodies to cell lines PA-1 by FACS;

[0033] FIG. 6 is a graph illustrating binding activity of antibodies to cell lines MDA-MB-468 by FACS;

[0034] FIG. 7 is a graph illustrating binding activity of antibodies to cell lines MDA-MB-231 by FACS;

[0035] FIG. 8 is a graph illustrating binding activity of antibodies to cell lines MDA-MB-453 by FACS;