

WHAT IS CLAIMED:

1. An anti-CD22 construct comprising an antibody moiety that specifically binds to CD22, wherein the antibody moiety comprises:

(a) a light chain variable region (V<sub>L</sub>) comprising a light chain complementarity determining region (LC-CDR) 1, an LC-CDR2, and an LC-CDR3 of the light chain variable region of SEQ ID NO:218 or 212; and

(b) a heavy chain variable region (V<sub>H</sub>) comprising a heavy chain complementarity determining region (HC-CDR) 1, an HC-CDR2, and an HC-CDR3 of the heavy chain variable region of SEQ ID NO:219 or 213.

2. The anti-CD22 construct of claim 1, wherein the antibody moiety comprises one or more of:

- the LC-CDR1 having a sequence of HDIRNY (SEQ ID NO:214),
- the LC-CDR2 having a sequence of AAS (SEQ ID NO:215),
- the LC-CDR3 having a sequence of QQYDGLPLT (SEQ ID NO:216),
- the HC-CDR1 having a sequence of GFTFSNYA (SEQ ID NO:209),
- the HC-CDR2 having a sequence of ISGSGGST (SEQ ID NO:210), and
- the HC-CDR3 having a sequence of ARYGSAAWMDS (SEQ ID NO:217).

3. The anti-CD22 construct of claim 2, wherein the light chain variable region has a sequence having at least 90% identity to the sequence of

DIQLTQSPSSLSTSVGDRVTITCQASHDIRNYLNWYQQKPGKAPNLLIYAASNLTGVPSR  
FSGRSGGTDFTLTISSLQPEDIATYYCQQYDGLPLTFGQGTRLEIKR (SEQ ID NO:218),  
and/or wherein the heavy chain variable region has a sequence having at least 90% identity to the sequence of

QVQLVESGGGLVQPGGSLRLSCAASGFTFSNYAMSWVRQAPGKGLEWVSSISGSGGSTY  
YADSVKGRFTISRDTSKNTLYLQMNSLRAEDTAVYYCARYGSAAWMDSWGQGLTVTS  
S (SEQ ID NO:219).

4. The anti-CD22 construct of claim 1, wherein the antibody moiety comprises one or more of:

- the LC-CDR1 having a sequence of SSNIGNNY (SEQ ID NO:206),
- the LC-CDR2 having a sequence of ENN (SEQ ID NO:207),
- the LC-CDR3 having a sequence of GTWDSSLSAGAV (SEQ ID NO:208),
- the HC-CDR1 having a sequence of GFTFSNYA (SEQ ID NO:209),

the HC-CDR2 having a sequence of ISGSGGST (SEQ ID NO:210), and  
the HC-CDR3 having a sequence of ARPYYDD (SEQ ID NO:211).

5. The anti-CD22 construct of claim 1 or 4, wherein the light chain variable region has a sequence having at least 90% identity to the sequence of

QSVVTQPPSVSAAPGQKVTISCSGSSSNIGNNYVSWYQQLPGTAPKLLIYENNKRPSPGIPD  
RFSGSKSGTSATLGITGLQTGDEADYYCGTWDSSLSAGAVFGGGTKLTVLG (SEQ ID  
NO:212), and/or wherein the heavy chain variable region has a sequence having at least 90%  
identity to the sequence of

EVQLVESGGGLVQPGGSLRLSCAASGFTFSNYAMSWVRQAPGKGLEWVSAISGSGGSTY  
YADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARPYYDDWGQGLTVTVSS (SEQ  
ID NO:213).

6. The anti-CD22 construct of claim 1, wherein the construct is a full-length antibody, a Fab, a Fab', a F(ab')<sub>2</sub>, an Fv, a single chain Fv (scFv) antibody, a tandem scFv, a diabody (Db), a single chain diabody (scDb), a dual-affinity retargeting (DART) antibody, a dual variable domain (DVD) antibody, a knob-into-hole (KiH) antibody, a dock and lock (DNL) antibody, a chemically cross-linked antibody, a heteromultimeric antibody, or a heteroconjugate antibody.

7. The anti-CD22 construct of claim 1, wherein the construct further comprises a second antibody moiety that specifically binds to a second antigen, and wherein the second antigen is an antigen on the surface of a T cell, a natural killer cell, a neutrophil, a monocyte, a macrophage, or a dendritic cell.

8. A chimeric anti-CD22 construct comprising the anti-CD22 construct of claim 1, wherein the anti-CD22 construct is either (a) a chimeric antigen receptor (CAR) or (b) a chimeric antibody-T cell receptor (caTCR) comprising an extracellular domain that binds to CD22 and a T cell receptor (TCR) module (TCRM) comprising TCR transmembrane domains.

9. The anti-CD22 construct of claim 8, wherein the anti-CD22 construct is a CAR, and wherein: (A) the CAR comprises an anti-CD22 antibody moiety, a transmembrane domain, and an immune cell signaling domain, wherein the anti-CD22 antibody moiety is a scFv comprising the LC-CDR1, the LC-CDR2, and the LC-CDR3 having the sequences of SEQ ID NOS:214-216, respectively, the HC-CDR1, the HC-CDR2, and the HC-CDR3 having the sequences of SEQ ID NOS:209, 210, and 217, respectively; or (b) the CAR comprises an anti-CD22 antibody moiety, a transmembrane

domain, and an immune cell signaling domain, wherein the anti-CD22 antibody moiety is a scFv comprising the LC-CDR1, the LC-CDR2, and the LC-CDR3 having the sequences of SEQ ID NOS:206-208, respectively, the HC-CDR1, the HC-CDR2, and the HC-CDR3 having the sequences of SEQ ID NOS:209-211, respectively.

10. The anti-CD22 construct of claim 8, wherein the anti-CD22 construct is a caTCR, and wherein: (a) the caTCR comprises LC-CDR1, LC-CDR2, and LC-CDR3 having the sequences of SEQ ID NOS:214-216, respectively, and HC-CDR1, HC-CDR2, and HC-CDR3 having the sequences of SEQ ID NOS:209, 210, and 217, respectively; or (b) the caTCR comprises LC-CDR1, LC-CDR2, and LC-CDR3 having the sequences of SEQ ID NOS:206-208, respectively, and HC-CDR1, HC-CDR2, and HC-CDR3 having the sequences of SEQ ID NOS:209-211, respectively.

11. The anti-CD22 construct of claim 8, wherein the anti-CD22 construct is a caTCR, and wherein:

(1) the extracellular domain comprises:

(a) a first polypeptide comprising a first antigen-binding region comprising a heavy chain variable region ( $V_H$ ) and a  $C_{H1}$  constant domain; and

(b) a second polypeptide chain comprising a second antigen-binding region comprising a light chain variable region ( $V_L$ ) and a  $C_L$  constant domain,

wherein the  $V_H$  and the  $C_{H1}$  constant domain of the first antigen-binding region and the  $V_L$  and the  $C_L$  constant domain of the second antigen-binding region form a Fab-like antigen-binding module that specifically binds to CD22; or

(2) the extracellular domain further comprises at least one additional antibody moiety that specifically binds to at least one non-CD22 antigen.

12. The anti-CD22 construct of claim 8, wherein the anti-CD22 construct is a caTCR, and wherein the caTCR is expressed in combination with a chimeric signaling receptor (CSR).

13. An anti-CD22 construct which is a chimeric signaling receptor (CSR) further comprising:

(a) the anti-CD22 construct of claim 1;

(b) a transmembrane module; and

(c) a co-stimulatory immune cell signaling module that is capable of providing a costimulatory signal to the immune cell,

wherein the CSR lacks a functional primary immune cell signaling domain.

14. The anti-CD22 construct of claim 13, wherein:

(a) the anti-CD22 antibody moiety comprises the LC-CDR1, the LC-CDR2, and the LC-CDR3 having the sequences of SEQ ID NOS:214-216, respectively, the HC-CDR1, the HC-CDR2, and the HC-CDR3 having the sequences of SEQ ID NOS:209, 210, and 217, respectively; or

(b) the anti-CD22 antibody moiety comprises the LC-CDR1, the LC-CDR2, and the LC-CDR3 having the sequences of SEQ ID NOS:206-208, respectively, the HC-CDR1, the HC-CDR2, and the HC-CDR3 having the sequences of SEQ ID NOS:209-211, respectively.

15. The anti-CD22 construct of claim 13, wherein the CSR is expressed in combination with a caTCR or CAR.

16. A nucleic acid molecule encoding one or more polypeptides contained in the anti-CD22 construct of claim 1.

17. A pharmaceutical composition comprising a therapeutically effective amount of the anti-CD22 construct of claim 1 and one or more pharmaceutically acceptable carriers or excipients.

18. Use of the anti-CD22 construct of claim 1 in the manufacture of a medicament for treating a B-cell malignancy or a disease or disorder characterized by CD22 overexpression in a subject in need thereof, wherein a therapeutically effective amount of the medicament is to be administered to the subject.

19. Use of the nucleic acid molecule of claim 16 in the manufacture of a medicament for treating a B-cell malignancy or a disease or disorder characterized by CD22 overexpression in a subject in need thereof, wherein the nucleic acid molecule is to be introduced into one or more primary cells isolated from a subject, and wherein the one or more primary cells comprising the nucleic acid molecule is to be administered to the subject.

20. A method of diagnosing a subject having a B-cell malignancy, comprising:

(a) contacting a sample derived from the subject with the anti-CD22 construct of claim 1;  
and

(b) determining the number of cells bound with the anti-CD22 construct in the sample,

wherein a value for the number of cells bound with the anti-CD22 construct above a threshold level indicates that the subject has the B-cell malignancy.

21. The anti-CD22 construct of claim 1 or the nucleic acid molecule of claim 16 for use in therapy.