

events for high dose IL-2 therapy in oncology. Developing technologies to overcome these limitations is critical to the use of IL-2 as a therapy.

[0017] One of ordinary skill in the art would recognize that the principles discussed above with regard to IL-2 and treating viral infections would equally apply to IL-2 and treating bacterial infections, or treating cancer.

[0018] Advances in the field of biomolecular engineering present researchers with unprecedented opportunities to apply molecular design strategies to modify naturally occurring proteins and generate new molecules for targeted disease therapy. In one area, the development of immunotherapeutics such as cytokine-based or antibody-based drugs has been empowered by evolving technologies and insights from protein engineering. Thus, there is a need to develop engineered anti-IL-2 antibodies that would be used to modulate the functions of IL-2 in certain disease states, for example but not limited to viral or bacterial infections, and cancer.

SUMMARY

[0019] In one aspectexample, disclosed herein is an isolated anti-IL-2 antibody comprising a heavy chain variable region (VH) and a light chain variable region (VL), wherein said VH comprises heavy chain complementarity determining regions (HCDRs) HCDR1, HCDR2 and HCDR3, said VL comprises light chain complementarity determining regions (LCDRs) LCDR1, LCDR2 and LCDR3, wherein said CDRs have the amino acid sequences of

(a) the HCDR1 comprises the amino acid sequence of SEQ ID NO:38, the HCDR2 comprises the amino acid sequence of SEQ ID NO:39, the HCDR3 comprises the amino acid sequence of SEQ ID NO:40, the LCDR1 comprises the amino acid sequence of SEQ ID NO:41, the LCDR2 comprises the amino acid sequence of SEQ ID NO:42, the LCDR3 comprises the amino acid sequence of SEQ ID NO:43;

(b) the HCDR1 comprises the amino acid sequence of SEQ ID NO:44, the HCDR2 comprises the amino acid sequence of SEQ ID NO:45, the HCDR3 comprises the amino acid sequence of SEQ ID NO:46, the LCDR1 comprises the amino acid sequence of SEQ ID NO:47, the LCDR2 comprises the amino acid sequence of SEQ ID NO:48, the LCDR3 comprises the amino acid sequence of SEQ ID NO:49;

(c) the HCDR1 comprises the amino acid sequence of SEQ ID NO:50, the HCDR2 comprises the amino acid sequence of SEQ ID NO:51, the HCDR3 comprises the amino acid sequence

of SEQ ID NO:52, the LCDR1 comprises the amino acid sequence of SEQ ID NO:53, the LCDR2 comprises the amino acid sequence of SEQ ID NO:54, the LCDR3 comprises the amino acid sequence of SEQ ID NO:55;

(d) the HCDR1 comprises the amino acid sequence of SEQ ID NO:56, the HCDR2 comprises the amino acid sequence of SEQ ID NO:57, the HCDR3 comprises the amino acid sequence of SEQ ID NO:58, the LCDR1 comprises the amino acid sequence of SEQ ID NO:59, the LCDR2 comprises the amino acid sequence of SEQ ID NO:60, the LCDR3 comprises the amino acid sequence of SEQ ID NO:61; or

(e) the HCDR1 comprises the amino acid sequence of SEQ ID NO:62, the HCDR2 comprises the amino acid sequence of SEQ ID NO:63, the HCDR3 comprises the amino acid sequence of SEQ ID NO:64, the LCDR1 comprises the amino acid sequence of SEQ ID NO:65, the LCDR2 comprises the amino acid sequence of SEQ ID NO:66, the LCDR3 comprises the amino acid sequence of SEQ ID NO:67.

[0019a] In one aspect, the present disclosure refers to an isolated anti-IL-2 antibody comprising a heavy chain variable region (VH) and a light chain variable region (VL), wherein said VH comprises heavy chain complementarity determining regions (HCDRs) HCDR1, HCDR2 and HCDR3, said VL comprises light chain complementarity determining regions (LCDRs) LCDR1, LCDR2 and LCDR3, wherein said CDRs have the amino acid sequences of

(a) the HCDR1 comprises the amino acid sequence of SEQ ID NO:62, the HCDR2 comprises the amino acid sequence of SEQ ID NO:63, the HCDR3 comprises the amino acid sequence of SEQ ID NO:64, the LCDR1 comprises the amino acid sequence of SEQ ID NO:65, the LCDR2 comprises the amino acid sequence of SEQ ID NO:66, the LCDR3 comprises the amino acid sequence of SEQ ID NO:67;

(b) the HCDR1 comprises the amino acid sequence of SEQ ID NO:38, the HCDR2 comprises the amino acid sequence of SEQ ID NO:39, the HCDR3 comprises the amino acid sequence of SEQ ID NO:40, the LCDR1 comprises the amino acid sequence of SEQ ID NO:41, the LCDR2 comprises the amino acid sequence of SEQ ID NO:42, the LCDR3 comprises the amino acid sequence of SEQ ID NO:43;

(c) the HCDR1 comprises the amino acid sequence of SEQ ID NO:44, the HCDR2 comprises the amino acid sequence of SEQ ID NO:45, the HCDR3 comprises the amino acid sequence of SEQ ID NO:46, the LCDR1 comprises the amino acid sequence of SEQ ID NO:47, the LCDR2 comprises the amino acid sequence of SEQ ID NO:48, the LCDR3 comprises the amino acid sequence of SEQ ID NO:49;

(d) the HCDR1 comprises the amino acid sequence of SEQ ID NO:50, the HCDR2 comprises the amino acid sequence of SEQ ID NO:51, the HCDR3 comprises the amino acid sequence of SEQ ID NO:52, the LCDR1 comprises the amino acid sequence of SEQ ID NO:53, the LCDR2 comprises the amino acid sequence of SEQ ID NO:54, the LCDR3 comprises the amino acid sequence of SEQ ID NO:55; or

(e) the HCDR1 comprises the amino acid sequence of SEQ ID NO:56, the HCDR2 comprises the amino acid sequence of SEQ ID NO:57, the HCDR3 comprises the amino acid sequence of SEQ ID NO:58, the LCDR1 comprises the amino acid sequence of SEQ ID NO:59, the LCDR2 comprises the amino acid sequence of SEQ ID NO:60, the LCDR3 comprises the amino acid sequence of SEQ ID NO:61.

[0020] In a related ~~aspect~~example, the VH and VL have the amino acid sequences of:

- (a) the VH comprises the amino acid sequence of SEQ ID NO:10, the VL comprises the amino acid sequence of SEQ ID NO:11;
- (b) the VH comprises the amino acid sequence of SEQ ID NO:12, the VL comprises the amino acid sequence of SEQ ID NO:13;
- (c) the VH comprises the amino acid sequence of SEQ ID NO:14, the VL comprises the amino acid sequence of SEQ ID NO:15;
- (d) the VH comprises the amino acid sequence of SEQ ID NO:16, the VL comprises the amino acid sequence of SEQ ID NO:17;
- (e) the VH comprises the amino acid sequence of SEQ ID NO:18, the VL comprises the amino acid sequence of SEQ ID NO:19;
- (f) the VH comprises the amino acid sequence of SEQ ID NO:20, the VL comprises the amino acid sequence of SEQ ID NO:21;
- (g) the VH comprises the amino acid sequence of SEQ ID NO:22, the VL comprises the amino acid sequence of SEQ ID NO:23;
- (h) the VH comprises the amino acid sequence of SEQ ID NO:24, the VL comprises the amino acid sequence of SEQ ID NO:25;

(i) the VH comprises the amino acid sequence of SEQ ID NO:26, the VL comprises the amino acid sequence of SEQ ID NO:27; or

(j) the VH comprises the amino acid sequence of SEQ ID NO:36, the VL comprises the amino acid sequence of SEQ ID NO:37.

[0021] In another related [aspectexample](#), the antibody comprises an IgG, IgA, IgM, IgE, IgD, a Fv, a scFv, a Fab, a F(ab')₂, a minibody, a diabody, a triabody, a nanobody, or a single domain antibody.

[0022] In a further related [aspectexample](#), the antibody comprises a heavy chain comprising a mutation that reduces binding to Fcγ receptor. In still a further related [aspectexample](#), the antibody comprising a heavy chain sequence and a light chain sequence,

(a) said heavy chain sequence set forth in SEQ ID NO: 68 and said light chain sequence set forth in SEQ ID NO: 69;

(b) said heavy chain sequence set forth in SEQ ID NO: 70 and said light chain sequence set forth in SEQ ID NO: 71; or

(c) said heavy chain sequence set forth in SEQ ID NO: 72 and said light chain sequence set forth in SEQ ID NO: 73.

[0023] In a related [aspectexample](#), disclosed herein is a composition comprising the an anti-IL-2 antibody as described herein and a pharmaceutically acceptable carrier. In further related [aspectexample](#), the composition is formulated to be at a pH between about pH 5.0 - 6.0 and comprises a buffer selected from a histidine buffer and a citrate buffer. In still a further related [aspectexample](#), the composition further comprising at least one of sucrose, methionine, or PS80, or any combination thereof. In yet a further related [aspectexample](#), the composition further comprises IL-2.

[0023a] In one aspect, the present disclosure refers to a composition comprising the antibody disclosed herein and a pharmaceutically acceptable carrier.

[0024] In one [aspectexample](#), provided herein is an isolated polynucleotide sequence encoding the heavy chain variable region of an anti-IL-2 antibody, wherein the VH amino acid sequences is set forth in the amino acid sequence of SEQ ID NO:10, 12, 14, 16, 18, 20, 22, 24, 26, or 36. In a related [aspectexample](#), provided herein is a vector comprising the polynucleotide sequence encoding a VH amino acid sequence set forth in the amino acid sequence of SEQ ID NO:10, 12, 14, 16, 18, 20, 22, 24, 26, or 36. In still another related [aspectexample](#), provided herein is a host cell comprising the vector comprising the polynucleotide sequence encoding a VH amino acid sequence set forth in the amino acid sequence of SEQ ID NO:10, 12, 14, 16, 18, 20, 22, 24, 26, or 36.

[0024a] In one aspect, the present disclosure refers to an isolated polynucleotide sequence encoding the heavy chain variable region of an anti-IL-2 antibody, wherein the VH amino acid sequences is set forth in the amino acid sequence of SEQ ID NO:26, 10, 12, 14, 16, 18, 20, 22, 24, or 36. In one aspect, the present disclosure refers to a vector comprising the polynucleotide sequence disclosed herein. In one aspect, the present disclosure refers to a host cell comprising the vector disclosed herein.

[0025] In one [aspectexample](#), provided herein is an isolated polynucleotide sequence encoding the light chain variable region of an anti-IL-2 antibody, wherein the VL amino acid sequences is set forth in the

amino acid sequence of SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27, or 37. In a related aspectexample, provided herein is a vector comprising the polynucleotide sequence encoding a VL amino acid sequence set forth in the amino acid sequence of SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27, or 37. In still another related aspectexample, provided herein is a host cell comprising the vector comprising the polynucleotide sequence encoding a VL amino acid sequence set forth in the amino acid sequence of SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27, or 37.

[0025a] In one aspect, the present disclosure refers to an isolated polynucleotide sequence encoding the light chain variable region of an anti-IL-2 antibody, wherein the VL amino acid sequences is set forth in the amino acid sequence of SEQ ID NO: 27, 11, 13, 15, 17, 19, 21, 23, 25, or 37.

[0026] In one aspectexample, provided herein is an isolated polynucleotide sequence encoding an anti-IL-2 scFv, wherein the polynucleotide sequence is set forth in SEQ ID NO: 1, 2, 3, 4, 5, 31, 32, 33, 34, or 35. In a related aspectexample, provided herein is a vector comprising the polynucleotide sequence encoding the scFv, wherein the polynucleotide sequence is set forth in SEQ ID NO: 1, 2, 3, 4, 5, 31, 32, 33, 34, or 35.. In still another related aspectexample, provided herein is a host cell comprising the vector comprising the polynucleotide sequence encoding the scFv, wherein the polynucleotide sequence is set forth in SEQ ID NO: 1, 2, 3, 4, 5, 31, 32, 33, 34, or 35.

[0026a] In one aspect, the present disclosure refers to an isolated polynucleotide sequence encoding an anti-IL-2 scFv, wherein the polynucleotide sequence is set forth in SEQ ID NO: 35, 1, 2, 3, 4, 5, 31, 32, 33, or 34.

[0027] In one aspectexample, disclosed herein is a method of treating a disease or a condition in a subject, comprising the step of administering to the subject a composition comprising an anti-IL-2 antibody as described in detail herein, wherein said antibody promotes differential growth of subsets of immune cells and decreases undesirable effects caused by IL-2, thereby treating said disease or condition in said subject.

[0027a] In one aspect, the present disclosure refers to use of a composition comprising the anti-IL-2 antibody disclosed herein, in the manufacture of a medicament for the treatment of a disease or a condition in a subject, wherein said antibody promotes differential growth of subsets of immune cells and decreases undesirable effects caused by IL-2.

[0028] In a related aspectexample, the composition comprises the anti-IL-2 antibody and IL-2, or the anti-IL-2 antibody complexed with IL-2.

[0029] In another related aspectexample, the disease comprises a viral infection, a bacterial infection, or a cancer. In a further related aspectexample, the viral infection is caused by SARS CoV-2; norovirus; rotavirus; hepatitis virus A, B, C, D, or E; rabies virus; West Nile virus; enterovirus; echovirus; coxsackievirus; herpes simplex virus (HSV); HSV-2; varicella-zoster virus; mosquito-borne viruses; arbovirus; St. Louis encephalitis virus; California encephalitis virus; lymphocytic choriomeningitis virus; human immunodeficiency virus (HIV); poliovirus; zika virus; rubella virus; cytomegalovirus; human papillomavirus (HPV); enterovirus D68; severe acute respiratory syndrome (SARS) coronavirus; Middle East respiratory syndrome coronavirus; Epstein-Barr virus; influenza virus; respiratory syncytial virus; polyoma viruses including JC virus; BK virus); Ebola virus; Dengue virus; or any combination thereof.

[0030] In another related [aspectexample](#), the condition comprises a weak immune system and said treatment prophylactically boosts the immune system, or said condition comprises IL-2 induced pulmonary edema or IL-2 induced vascular leakage.

[0031] In another related [aspectexample](#), the condition comprises a genetic predisposition that increases likelihood of cancer in said subject. In a further related [aspectexample](#), the genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising a tumor suppressor gene or a mismatch repair (MMR) gene, or a combination thereof. In another further related [aspectexample](#), the genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising BRCA1, BRAC2, MLH1, MSH2, MSH6, PMS1, PMS2, TP53, or CHEK2, or a combination thereof.

[0032] In another related [aspectexample](#), the immune cells comprise one or more of naïve T cells, memory T cells, CD8⁺ T cells, NK cells, or Natural Killer T cells.

[0033] In yet another related [aspectexample](#), the undesirable effect caused by IL-2 comprises one or more of activation of regulatory T cells, apoptosis of CD25⁺ T effector cells, IL-2 induced pulmonary edema, pneumonia, or IL-2-induced vascular leakage.

[0034] In a further related [aspectexample](#), the anti-IL-2 antibody inhibits IL-2 binding to CD25.

[0035] In yet another further related [aspectexample](#), the subject is further treated with one or more immune checkpoint inhibitors targeting one or more immune checkpoints. In still a further related [aspectexample](#), the subject is treated with said immune checkpoint inhibitors concurrently, before, or after treatment with said anti-IL-2 antibody. In another related [aspectexample](#), the immune checkpoint comprises PD-1, PDL-1, CTLA-4, TIGIT, TIM-3, B7-H3, CD73, LAG3, CD27, CD70, 4-1BB, GITR, OX40, SIRP-alpha (CD47), CD39, ILDR2, VISTA, BTLA, or VTCN-1.

[0036] In one [aspectexample](#), provided herein is a method of immunizing a subject, wherein said immunization comprises administration of a vaccine comprising an adjuvant, said adjuvant comprising an IL-2 antibody adjuvant, said anti-IL-2 antibody comprising an anti-IL-2 antibody as disclosed herein. In a related [aspectexample](#), the IL-2 antibody adjuvant comprises the anti-IL-2 antibody and IL-2, or comprises an anti-IL-2 antibody complexed with IL-2. In a further related [aspectexample](#), the subject has a weakened immune system.

[0036a] In one aspect, the present disclosure refers to use of an anti-IL-2 adjuvant in the preparation of a vaccine for the immunization of a subject, said anti-IL-2 antibody comprising the anti-IL-2 antibody disclosed herein.

[0037] In a related [aspectexample](#), a method of immunization comprises immunizing a subject suffering from a condition comprises a genetic predisposition that increases likelihood of cancer in said subject. In a further related [aspectexample](#), the genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising a tumor suppressor gene or a mismatch repair (MMR) gene, or a

combination thereof. In another further related ~~aspect~~~~example~~, the genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising BRCA1, BRAC2, MLH1, MSH2, MSH6, PMS1, PMS2, TP53, or CHEK2, or a combination thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] The patent or patent application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

[0039] The present disclosure of engineered anti-IL-2 antibodies, both as to their generation and method of use, together with objects, features, and advantages thereof, may best be understood by reference to the following detailed description when read with the accompanying drawings in which:

[0040] **FIG. 1.** Presents a schematic representation of IL-2 mechanism of action and its dual role in controlling immune response.

[0041] **FIG. 2.** Presents a schematic representation of anti-IL-2 antibodies-directed immunotherapy.

[0042] **FIGs. 3A and 3B** present a schematic representation of the progression of COVID-19 infection and potential anti-IL-2 therapy as an adjuvant intervention. **Fig. 3A** is adapted from Shi Y et al., (2020) *COVID-19 infection: the perspectives on immune responses*. Cell Death & Differentiation volume 27, pages1451–1454 (doi:10.1038/s41418-020-0530-3), Fig. 1.

[0043] **FIGs. 4A-4D** present representative SPR sensorgram of JES6.1 antibody binding to human IL-2 (**FIG. 4A**), mouse IL-2 (**FIG. 4B**), and of JES6.1RMC antibody binding to human IL-2 (**FIG. 4C**) and mouse IL-2 (**FIG. 4D**).

[0044] **FIGs. 5A-5C** present results of IL-2 binding of YSD clones expressing JES6.1 antibody in scFv format. X axis fluorescence levels correspond to scFv expression level of Jes6.1, Y axis fluorescence levels correspond to binding of human or mouse IL-2. **FIG. 5A** shows negative control without IL-2. **FIG. 5B** shows JES6.1 YSD clones with 1000 nM human IL-2. **FIG. 5C** shows YSD expressing mouse IL-2 incubated with 100nM labeled JES6.1.

[0045] **FIG. 6A** presents binding of isolated yeast-surface display clones to IL-2 (0.1 nM). Mean Fluorescence Intensity (Em 655nm) was normalized to the yeast surface expression levels. Negative YSD clones were labeled with 500nM hIL-2.

[0046] **FIG. 6B** presents non-specific binding of YSD clones to mixture of OX40/PD-1/TNFR2. The clones were labeled with the 500nM mixture. TNFR2 binding yeast clone served as positive control.

[0047] **FIG. 7** shows purification of BDG17.023 IgG. The antibody was run on a GE superdex 200

CLAIMS

~~What is claimed is:~~

1. An isolated anti-IL-2 antibody comprising a heavy chain variable region (VH) and a light chain variable region (VL), wherein said VH comprises heavy chain complementarity determining regions (HCDRs) HCDR1, HCDR2 and HCDR3, said VL comprises light chain complementarity determining regions (LCDRs) LCDR1, LCDR2 and LCDR3, wherein said CDRs have the amino acid sequences of
 - (a) the HCDR1 comprises the amino acid sequence of SEQ ID NO:62, the HCDR2 comprises the amino acid sequence of SEQ ID NO:63, the HCDR3 comprises the amino acid sequence of SEQ ID NO:64, the LCDR1 comprises the amino acid sequence of SEQ ID NO:65, the LCDR2 comprises the amino acid sequence of SEQ ID NO:66, the LCDR3 comprises the amino acid sequence of SEQ ID NO:67;
 - ~~(a)~~(b) the HCDR1 comprises the amino acid sequence of SEQ ID NO:38, the HCDR2 comprises the amino acid sequence of SEQ ID NO:39, the HCDR3 comprises the amino acid sequence of SEQ ID NO:40, the LCDR1 comprises the amino acid sequence of SEQ ID NO:41, the LCDR2 comprises the amino acid sequence of SEQ ID NO:42, the LCDR3 comprises the amino acid sequence of SEQ ID NO:43;
 - ~~(b)~~(c) the HCDR1 comprises the amino acid sequence of SEQ ID NO:44, the HCDR2 comprises the amino acid sequence of SEQ ID NO:45, the HCDR3 comprises the amino acid sequence of SEQ ID NO:46, the LCDR1 comprises the amino acid sequence of SEQ ID NO:47, the LCDR2 comprises the amino acid sequence of SEQ ID NO:48, the LCDR3 comprises the amino acid sequence of SEQ ID NO:49;
 - ~~(c)~~(d) the HCDR1 comprises the amino acid sequence of SEQ ID NO:50, the HCDR2 comprises the amino acid sequence of SEQ ID NO:51, the HCDR3 comprises the amino acid sequence of SEQ ID NO:52, the LCDR1 comprises the amino acid sequence of SEQ ID NO:53, the LCDR2 comprises the amino acid sequence of SEQ ID NO:54, the LCDR3 comprises the amino acid sequence of SEQ ID NO:55; or
 - ~~(d)~~(e) the HCDR1 comprises the amino acid sequence of SEQ ID NO:56, the HCDR2 comprises the amino acid sequence of SEQ ID NO:57, the HCDR3 comprises the amino acid sequence of SEQ ID NO:58, the LCDR1 comprises the amino acid

sequence of SEQ ID NO:59, the LCDR2 comprises the amino acid sequence of SEQ ID NO:60, the LCDR3 comprises the amino acid sequence of SEQ ID NO:61; ~~or~~
(e) ~~the HCDR1 comprises the amino acid sequence of SEQ ID NO:62, the HCDR2 comprises the amino acid sequence of SEQ ID NO:63, the HCDR3 comprises the amino acid sequence of SEQ ID NO:64, the LCDR1 comprises the amino acid sequence of SEQ ID NO:65, the LCDR2 comprises the amino acid sequence of SEQ ID NO:66, the LCDR3 comprises the amino acid sequence of SEQ ID NO:67.~~

2. The antibody of claim 1, wherein the VH and VL have the amino acid sequences of
(a) the VH comprises the amino acid sequence of SEQ ID NO:26, the VL comprises the amino acid sequence of SEQ ID NO:27;
~~(a)(b)~~ the VH comprises the amino acid sequence of SEQ ID NO:10, the VL comprises the amino acid sequence of SEQ ID NO:11;
~~(b)(c)~~ the VH comprises the amino acid sequence of SEQ ID NO:12, the VL comprises the amino acid sequence of SEQ ID NO:13;
~~(e)(d)~~ the VH comprises the amino acid sequence of SEQ ID NO:14, the VL comprises the amino acid sequence of SEQ ID NO:15;
~~(d)(e)~~ the VH comprises the amino acid sequence of SEQ ID NO:16, the VL comprises the amino acid sequence of SEQ ID NO:17;
~~(e)(f)~~ the VH comprises the amino acid sequence of SEQ ID NO:18, the VL comprises the amino acid sequence of SEQ ID NO:19;
~~(f)(g)~~ the VH comprises the amino acid sequence of SEQ ID NO:20, the VL comprises the amino acid sequence of SEQ ID NO:21;
~~(g)(h)~~ the VH comprises the amino acid sequence of SEQ ID NO:22, the VL comprises the amino acid sequence of SEQ ID NO:23;
~~(h)(i)~~ the VH comprises the amino acid sequence of SEQ ID NO:24, the VL comprises the amino acid sequence of SEQ ID NO:25; or
~~(i) the VH comprises the amino acid sequence of SEQ ID NO:26, the VL comprises the amino acid sequence of SEQ ID NO:27; or~~
(j) the VH comprises the amino acid sequence of SEQ ID NO:36, the VL comprises the amino acid sequence of SEQ ID NO:37.

3. The antibody of claim 1 or claim 2, wherein the antibody comprises an IgG, IgA, IgM, IgE, IgD, a Fv, a scFv, a Fab, a F(ab')₂, a minibody, a diabody, a triabody, a nanobody, or a single domain antibody.
4. The antibody of any of claims 1-3, wherein said antibody comprises a heavy chain comprising a mutation that reduces binding to Fcγ receptor.
5. The antibody of claim 4, said antibody comprising a heavy chain sequence and a light chain sequence,
 - (a) said heavy chain sequence set forth in SEQ ID NO: 68 and said light chain sequence set forth in SEQ ID NO: 69;
 - (b) said heavy chain sequence set forth in SEQ ID NO: 70 and said light chain sequence set forth in SEQ ID NO: 71; or
 - (c) said heavy chain sequence set forth in SEQ ID NO: 72 and said light chain sequence set forth in SEQ ID NO: 73.
6. A composition comprising the antibody of any of claims 1-5 and a pharmaceutically acceptable carrier.
7. The composition of claim 6, wherein the composition is formulated to be at a pH between about pH 5.0 - 6.0 and comprises a buffer selected from a histidine buffer and a citrate buffer.
8. The composition of claim 7, said composition further comprising at least one of sucrose, methionine, or PS80, or any combination thereof.
9. The composition of any of claims 6-8, said composition further comprising IL-2.
10. An isolated polynucleotide sequence encoding the heavy chain variable region of an anti-IL-2 antibody, wherein the VH amino acid sequences is set forth in the amino acid sequence of SEQ ID NO:26, 10, 12, 14, 16, 18, 20, 22, 24,26, or 36.

11. A vector comprising the polynucleotide sequence of claim 10.
12. A host cell comprising the vector of claim 11.
13. An isolated polynucleotide sequence encoding the light chain variable region of an anti-IL-2 antibody, wherein the VL amino acid sequences is set forth in the amino acid sequence of SEQ ID NO: 27, 11, 13, 15, 17, 19, 21, 23, 25, ~~27~~, or 37.
14. A vector comprising the polynucleotide sequence of claim 13.
15. A host cell comprising the vector of claim 14.
16. An isolated polynucleotide sequence encoding an anti-IL-2 scFv, wherein the polynucleotide sequence is set forth in SEQ ID NO: 35, 1, 2, 3, 4, 5, 31, 32, 33, or 34, ~~or 35~~.
17. A vector comprising the polynucleotide sequence of claim 16.
18. A host cell comprising the vector of claim 17.
19. ~~A method of treating a disease or a condition in a subject, comprising the step of administering to the subject~~Use of a composition comprising the anti-IL-2 antibody of any of claims 1-5, in the manufacture of a medicament for the treatment of a disease or a condition in a subject, wherein said antibody promotes differential growth of subsets of immune cells and decreases undesirable effects caused by IL-2, ~~thereby treating said disease or condition in said subject~~.
20. The ~~method-use~~ of claim 19, wherein said composition comprises the anti-IL-2 antibody and IL-2, or the anti-IL-2 antibody complexed with IL-2.
21. The ~~method-use~~ of claim 19 or claim 20, wherein the disease comprises a viral infection, a bacterial infection, or a cancer.

22. The ~~method-use~~ of any of claims 19-21, wherein said condition comprises a weak immune system and said treatment prophylactically boosts the immune system.
23. The ~~method-use~~ of any of claims 19-21, wherein said condition comprises a genetic predisposition that increases likelihood of cancer in said subject.
24. The ~~method-use~~ of claim 23, wherein said genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising a tumor suppressor gene or a mismatch repair (MMR) gene, or a combination thereof.
25. The ~~method-use~~ of claim 23, wherein said genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising BRCA1, BRAC2, MLH1, MSH2, MSH6, PMS1, PMS2, TP53, or CHEK2, or a combination thereof.
26. The ~~method-use~~ of any of claims 19-25, wherein the immune cells comprise one or more of naïve T cells, memory T cells, CD8⁺ T cells, NK cells, or Natural Killer T cells.
27. The ~~method-use~~ of any of claims 19-26, wherein said undesirable effect caused by IL-2 comprises one or more of activation of regulatory T cells, apoptosis of CD25⁺ T effector cells, IL-2 induced pulmonary edema, IL-2 induced pneumonia, or IL-2-induced vascular leakage.
28. The ~~method-use~~ of any of claims 19-27, wherein said anti-IL-2 antibody inhibits IL-2 binding to CD25.
29. The ~~method-use~~ of any of claims 19-28, wherein said ~~subject is~~use further comprises treatment ~~treated~~-with one or more immune checkpoint inhibitors targeting one or more immune checkpoints.
30. The ~~method-use~~ of claim 29, wherein said treatment ~~subject is treated~~-with said one or more immune checkpoint inhibitors comprises concurrently, before, or after treatment with said

anti-IL-2 antibody.

31. The ~~method-use~~ of claim 29 or claim 30, wherein said immune checkpoint comprises PD-1, PDL-1, CTLA-4, TIGIT, TIM-3, B7-H3, CD73, LAG3, CD27, CD70, 4-1BB, GITR, OX40, SIRP-alpha (CD47), CD39, ILDR2, VISTA, BTLA, or VTCN-1, or a combination thereof.
32. The ~~method-use~~ of any of claims 21-31, wherein the viral infection is caused by SARS CoV-2; norovirus; rotavirus; hepatitis virus A, B, C, D, or E; rabies virus; West Nile virus; enterovirus; echovirus; coxsackievirus; herpes simplex virus (HSV); HSV-2; varicella-zoster virus; mosquito-borne viruses; arbovirus; St. Louis encephalitis virus; California encephalitis virus; lymphocytic choriomeningitis virus; human immunodeficiency virus (HIV); poliovirus; zika virus; rubella virus; cytomegalovirus; human papillomavirus (HPV); enterovirus D68; severe acute respiratory syndrome (SARS) coronavirus; Middle East respiratory syndrome coronavirus; Epstein-Barr virus; influenza virus; respiratory syncytial virus; polyoma viruses including JC virus; BK virus); Ebola virus; Dengue virus; or any combination thereof.
33. ~~A method of immunizing a subject, wherein said immunization comprises administration of a vaccine comprising an adjuvant~~Use of an anti-IL-2 adjuvant in the preparation of a vaccine for the immunization of a subject, said adjuvant comprising an IL-2 antibody adjuvant, said anti-IL-2 antibody comprising the anti-IL-2 antibody of any of claims 1-5.
34. The ~~method-use~~ of claim 33, wherein said IL-2 antibody adjuvant comprises the anti-IL-2 antibody and IL-2, or comprises an anti-IL-2 antibody complexed with IL-2.
35. The ~~method-use~~ of claim 33 or claim 34, wherein said subject has a weakened immune system.
36. The ~~method-use~~ of any of claims 33-35, wherein said subject has a genetic predisposition that increases likelihood of cancer in said subject.

- 37. The ~~method~~-use of claim 36, wherein said genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising a tumor suppressor gene or a mismatch repair (MMR) gene, or a combination thereof.
- 38. The ~~method~~-use of claim 36, wherein said genetic predisposition comprises a change in expression or activity of a gene product, said gene comprising BRCA1, BRAC2, MLH1, MSH2, MSH6, PMS1, PMS2, TP53, or CHEK2, or a combination thereof.