

chromatography. In another example of the formulation, after 12 months at 5° C the % heavy chain and light chain of the anti-CTLA4 antibody is $\geq 90\%$ as determined by reduced CE-SDS. In another example of the formulation, after 12 months at 5° C the % heavy chain and light chain of the anti-CTLA4 antibody is $\geq 95\%$ as determined by reduced CE-SDS. In another example of the formulation, after 12 months at 5° C the % intact IgG of the anti-CTLA4 antibody is $\geq 90\%$ as determined by non-reduced CE-SDS. In another example of the formulation, after 12 months at 5° C the % intact IgG of the anti-CTLA4 antibody is $\geq 95\%$ as determined by non-reduced CE-SDS.

In one example of any of the formulations described above, the formulation comprises an anti-CTLA4 antibody or antigen-binding fragment thereof comprising three light chain CDRs and three heavy chain CDRs, wherein the light chain CDRs comprise CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID NO:39, CDRL3 of SEQ ID NO:40 and the heavy chain CDRs comprise CDRH1 of SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDHR3 of SEQ ID NO: 37. In another example, the formulation comprises an anti-CTLA4 antibody or antigen binding fragment thereof comprising a heavy chain variable region comprising SEQ ID NO: 88 and a light chain variable region comprising SEQ ID NO: 48. In another example, the formulation comprises an anti-CTLA4 antibody or antigen binding fragment thereof comprising a heavy chain comprising SEQ ID NO: 99 and a light chain comprising SEQ ID NO: 100.

In one aspect, the present disclosure provides a formulation comprising: (i) 1 mg/ml to 100 mg/ml of an anti-CTLA4 antibody, or antigen binding fragment thereof; wherein the anti-CTLA4 antibody or antigen-binding fragment thereof comprises three light chain CDRs comprising CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID NO: 39, and CDRL3 of SEQ ID NO: 40 and three heavy chain CDRs comprising CDRH1 of SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDRH3 of SEQ ID NO: 37; (ii) 5 mM to 20 mM of L-histidine buffer; (iii) 6% to 8% w/v sucrose; (iv) 0.01 % to 0.10% w/v polysorbate 80; and (v) 1 mM to 20 mM L-methionine, wherein the formulation has a pH between 5.0 and 6.0.

In one example, the present disclosure provides a co-formulation of an anti-CTLA4 antibody, or antigen binding fragment thereof and an anti-human PD-1 antibody, or antigen binding fragment thereof, comprising (i) an anti-CTLA4 antibody, or antigen binding fragment thereof; (ii) an anti-human PD-1 antibody, or antigen binding fragment thereof, (iii) a buffer, (iii) a non-reducing sugar; (iv) a non-ionic surfactant; and an antioxidant. In an example, the co-formulation further comprises a chelator. In one example the chelator is EDTA. In another example, the chelator is DTPA. In one example of the co-formulation, the ratio of the anti-human PD-1 antibody to the anti-CTLA4 antibody is 1:2. In another example of the co-formulation, the ratio of the anti-human PD-1 antibody to the anti-CTLA4 antibody is 1:1. In a further example of the co-formulation, the ratio of the anti-human PD-1 antibody to

In one example, the co-formulation comprises about 21.1 mg/mL of the anti-PD1 antibody, about 7.9 mg/mL of the anti-CTLA4 antibody, 10 mM L-histidine buffer, about 7% w/v sucrose, about 0.02% w/v polysorbate 80, and about 10 mM L-methionine.

In one example of any of the formulations described above, the formulation comprises an anti-CTLA4 antibody or antigen-binding fragment thereof comprising three light chain CDRs and three heavy chain CDRs, wherein the light chain CDRs comprise CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID NO:39, CDRL3 of SEQ ID NO:40 and the heavy chain CDRs comprise CDRH1 of SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDHR3 of SEQ ID NO: 37. In another example, the formulation comprises an anti-CTLA4 antibody or antigen binding fragment thereof comprising a heavy chain variable region comprising SEQ ID NO: 88 and a light chain variable region comprising SEQ ID NO: 48. In another example, the formulation comprises an anti-CTLA4 antibody or antigen binding fragment thereof comprising a heavy chain comprising SEQ ID NO: 99 and a light chain comprising SEQ ID NO: 100. In one example of any of the formulations described above, the anti-human PD-1 antibody or antigen binding fragment thereof comprises three light chain CDRs and three heavy chain CDRs, wherein the light chain CDRs comprise CDRL1 of SEQ ID NO: 1, CDRL2 of SEQ ID NO:2, CDRL3 of SEQ ID NO:3 and the heavy chain CDRs comprise CDRH1 of SEQ ID NO: 6, CDRH2 of SEQ ID NO: 7, and CDHR3 of SEQ ID NO: 8. In another example, the formulations comprise an anti-human PD1 antibody or antigen binding fragment thereof comprising a light chain variable region comprising SEQ ID NO: 4 and a heavy chain variable region comprising SEQ ID NO: 9. In another example, the formulations comprise an anti-human PD1 antibody or antigen binding fragment thereof comprising a light chain comprising SEQ ID NO: 5 and a heavy chain comprising SEQ ID NO: 10. In one example of any of the formulations described above, the anti-human PD-1 antibody or antigen binding fragment thereof is pembrolizumab. In another example, the anti-human PD-1 antibody or antigen binding fragment thereof is nivolumab.

In one aspect, the present disclosure provides a formulation comprising: (i) 1 mg/ml to 100 mg/ml of an anti-CTLA4 antibody, or antigen binding fragment thereof; wherein the anti-CTLA4 antibody or antigen-binding fragment thereof comprises three light chain CDRs comprising CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID NO: 39, and CDRL3 of SEQ ID NO: 40 and three heavy chain CDRs comprising CDRH1 of SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDRH3 of SEQ ID NO: 37; (ii) 1 mg/ml to 100 mg/ml of an anti-PD1 antibody, or antigen binding fragment thereof; wherein the anti-human PD-1 antibody or antigen binding fragment thereof comprises three light chain CDRs comprising CDRL1 of SEQ ID NO:1, CDRL2 of SEQ ID NO:2 and CDRL3 of SEQ ID NO:3 and three heavy chain CDRs comprising CDRH1 of SEQ ID NO:6, CDRH2 of SEQ ID NO:7 and CDRH3 of SEQ ID NO:8; (iii) a buffer; (iv) a non-reducing sugar; (v) a non-ionic surfactant; and (vi) an anti-oxidant,

wherein the buffer is a L-histidine buffer, the non-reducing sugar is sucrose, the non-ionic surfactant is polysorbate 80, and the anti-oxidant is L-methionine, the formulation comprises: (i) 5 mM to 20 mM of L-histidine buffer; (ii) 6% to 8% w/v sucrose; (iii) 0.01 % to 0.10% w/v polysorbate 80; and (iv) 1 mM to 20 mM L-methionine.

5 In one example of any of the co-formulations described above, the formulation comprises (i) an anti-CTLA4 antibody or antigen-binding fragment thereof comprising three light chain CDRs and three heavy chain CDRs, wherein the light chain CDRs comprise CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID NO:39, CDRL3 of SEQ ID NO:40 and the heavy chain CDRs comprise CDRH1 of SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDHR3 of SEQ ID NO: 37 and (ii) an anti-human PD-1 antibody or antigen binding fragment thereof comprising three light chain CDRs and three heavy chain CDRs, wherein the light chain CDRs comprise CDRL1 of SEQ ID NO: 1, CDRL2 of SEQ ID NO:2, CDRL3 of SEQ ID NO:3 and the heavy chain CDRs comprise CDRH1 of SEQ ID NO: 6, CDRH2 of SEQ ID NO: 7, and CDHR3 of SEQ ID NO: 8.

15 In one example of any of the co-formulations described above, the formulation comprises (i) an anti-CTLA4 antibody or antigen binding fragment thereof comprising a heavy chain variable region comprising SEQ ID NO: 88 and a light chain variable region comprising SEQ ID

WHAT IS CLAIMED IS:

1. A formulation comprising:
 - (i) 1 mg/ml to 100 mg/ml of an anti-CTLA4 antibody, or antigen binding
5 fragment thereof; wherein the anti-CTLA4 antibody or antigen-binding fragment thereof
comprises three light chain CDRs comprising CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID
NO: 39, and CDRL3 of SEQ ID NO: 40 and three heavy chain CDRs comprising CDRH1 of
SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDRH3 of SEQ ID NO: 37;
 - (ii) 5 mM to 20 mM of L-histidine buffer;
 - 10 (iii) 6% to 8% w/v sucrose;
 - (iv) 0.01 % to 0.10% w/v polysorbate 80; and
 - (v) 1 mM to 20 mM L-methionine,wherein the formulation has a pH between 5.0 and 6.0.
- 15 2. The formulation of claim 1, comprising 8 mM to 12 mM of L-histidine
buffer.
3. The formulation of any of claims 1-2, comprising 5 mM to 10 mM of L-
methionine.
- 20 4. The formulation of any of claims 1-3, comprising polysorbate 80 at a
weight ratio of approximately 0.02% w/v.
5. The formulation of any of claims 1-4, wherein the concentration of the
25 anti-CTLA4 antibody or antigen binding fragment thereof is 1-50 mg/ml.
6. The formulation of any of claims 1-4, wherein the concentration of the
anti-CTLA4 antibody or antigen binding fragment thereof is 1.25 mg/ml, 2.5 mg/ml, 2.9 mg/ml,
25 mg/ml, or 50 mg/ml.
- 30 7. The formulation of claim 1 comprising 50 mg/mL of the anti-CTLA4
antibody, 10 mM L-histidine buffer, 7% w/v sucrose, 0.02% polysorbate 80, and 10 mM L-
methionine.

8. The formulation of claim 1 comprising 2.9 mg/mL of the anti-CTLA4 antibody, 10 mM L-histidine buffer, 7% w/v sucrose, 0.02% polysorbate 80, and 10 mM L-methionine.

5 9. The formulation of any of claims 1-8, wherein the formulation has a pH of 5.3 to 5.8.

10 10. The formulation of claim 9, wherein the formulation has a pH of 5.5 to 5.6.

11. The formulation of any of claims 1-10, further comprising an anti-PD1 antibody or antigen binding fragment thereof, wherein the anti-human PD-1 antibody or antigen binding fragment thereof comprises three light chain CDRs comprising CDRL1 of SEQ ID NO:1, CDRL2 of SEQ ID NO:2 and CDRL3 of SEQ ID NO:3 and three heavy chain CDRs
15 comprising CDRH1 of SEQ ID NO:6, CDRH2 of SEQ ID NO:7 and CDRH3 of SEQ ID NO:8.

12. The formulation of any of claims 1-11, wherein after 12 months at 5°C:

(i) the % monomer of the anti-CTLA4 antibody is $\geq 95\%$ as determined by size exclusion chromatography;

20 (ii) the % heavy chain and light chain of the anti-CTLA4 antibody is $\geq 90\%$ as measured by reduced CE – SDS;

(iii) the % heavy chain and light chain of the anti-CTLA4 antibody is $\geq 95\%$ as measured reduced CE – SDS;

25 (iv) the % intact IgG of the anti-CTLA4 antibody is $\geq 90\%$ as measured by non-reduced CE-SDS; and/or

(v) % intact IgG of the anti-CTLA4 antibody is $\geq 95\%$ as measured by non-reduced CE-SDS.

13. A formulation comprising:

30 (i) 1 mg/ml to 100 mg/ml of an anti-CTLA4 antibody, or antigen binding fragment thereof; wherein the anti-CTLA4 antibody or antigen-binding fragment thereof comprises three light chain CDRs comprising CDRL1 of SEQ ID NO: 38, CDRL2 of SEQ ID NO: 39, and CDRL3 of SEQ ID NO: 40 and three heavy chain CDRs comprising CDRH1 of SEQ ID NO: 35, CDRH2 of SEQ ID NO: 36, and CDRH3 of SEQ ID NO: 37;

(ii) 1 mg/ml to 100 mg/ml of an anti-PD1 antibody, or antigen binding fragment thereof; wherein the anti-human PD-1 antibody or antigen binding fragment thereof comprises three light chain CDRs comprising CDRL1 of SEQ ID NO:1, CDRL2 of SEQ ID NO:2 and CDRL3 of SEQ ID NO:3 and three heavy chain CDRs comprising CDRH1 of SEQ ID NO:6,

5 CDRH2 of SEQ ID NO:7 and CDRH3 of SEQ ID NO:8;

(iii) a buffer;

(iv) a non-reducing sugar;

(v) a non-ionic surfactant; and

(vi) an anti-oxidant,

10 wherein the buffer is a L-histidine buffer, the non-reducing sugar is sucrose, the non-ionic surfactant is polysorbate 80, and the anti-oxidant is L-methionine, the formulation comprises:

(i) 5 mM to 20 mM of L-histidine buffer;

(ii) 6% to 8% w/v sucrose;

(iii) 0.01 % to 0.10% w/v polysorbate 80; and

15 (iv) 1 mM to 20 mM L-methionine.

14. The formulation of claim 13, wherein the anti-CTLA4 antibody or antigen binding fragment thereof comprises a heavy chain variable region comprising SEQ ID NO: 88, and a light chain variable region comprising SEQ ID NO: 48.

20 15. The formulation of any of claims 13-14, wherein the anti-human PD-1 antibody or antigen binding fragment thereof comprises a V_L region which comprises the amino acid sequence set forth in SEQ ID NO:4, and a V_H region which comprises the amino acid sequence set forth in SEQ ID NO:9.

25 16. The formulation of any of claims 13-15, wherein the formulation comprises an anti-human PD-1 antibody that is pembrolizumab.

30 17. The formulation of claim 13-16, wherein the ratio of the anti-PD1 antibody to the anti-CTLA4 antibody is 1:2, 1:1, 2:1, 10:1, 1:10, 8:3, or 8:1.

18. The formulation of claim 17, wherein the ratio of the anti-PD1 antibody to the anti-CTLA4 antibody is 8:1.

19. The formulation of any of claims 13-18, wherein the formulation has a pH between 5.0 and 6.0.

20. The formulation of any of claims 13-19, comprising 8mM to 12 mM of L-histidine buffer.

21. The formulation of any of claims 13-20, comprising 5 mM to 10 mM of L-methionine.

22. The formulation of any of claims 13-21, comprising polysorbate 80 at a weight ratio of approximately 0.02% w/v.

23. The formulation of any one of claims 13-22, wherein the concentration of the anti-CTLA4 antibody or antigen binding fragment thereof is 1.25 mg/ml, 2.5 mg/ml, 2.9 mg/ml, 5 mg/ml, 7.9 mg/ml, 10 mg/ml, 12.5 mg/ml, 25 mg/ml, 50 mg/ml, 75 mg/ml, or 100 mg/ml.

24. The formulation of any of claims 13-22, wherein the concentration of the anti-CTLA4 antibody or antigen binding fragment thereof is 1-25 mg/ml.

25. The formulation of any of claims 13-24, wherein the concentration of the anti-PD1 antibody or antigen binding fragment thereof is 25 mg/mL, 22.7 mg/mL, 2.27 mg/mL, 21.1 mg/mL or 23.5 mg/mL.

26. The formulation of any of claims 13-24, wherein the concentration of the anti-PD1 antibody or antigen binding fragment thereof is 1-25 mg/ml.

27. The formulation of any of claims 13-26, comprising 23.5 mg/mL of the anti-PD1 antibody and 2.9 mg/mL anti-CTLA4 antibody, 10 mM L-histidine buffer, 7% w/v sucrose, 0.02% w/v polysorbate 80, and 10 mM L-methionine.

28. The formulation of any of claims 1-27, further comprising a chelator, wherein the chelator is diethylenetriaminepentaacetic acid (DTPA).

29. The formulation of any of claims 1-28, wherein the formulation is contained in a glass vial or an injection device.

5 30. The formulation of any of claim 1-29, that is a liquid formulation, or that is frozen to at least below -70° C, or that is a reconstituted solution from a lyophilized formulation.

10 31. The formulation of any one of claims 1-30 for use in treatment of cancer or chronic infection.

32. Use of the formulation of any one of claims 1-30 for the preparation of a medicament for treating cancer or for treating chronic infection.