SUMMARY ~~OF THE INVENTION~~

[0008] Provided herein are stable aqueous pharmaceutical formulations comprising an antibody. The formulation comprises an antibody (e.g., an anti-PDL1 antibody), a buffer, sucrose, and a surfactant, wherein the formulation has a pH of about 5.0 to about 7.0.

[0009] In one aspect, provided herein is a stable aqueous pharmaceutical formulation, the formulation comprising an anti-PDL1 monoclonal antibody in a concentration of about 40 mg/ml to about 125 mg/ml, histidine acetate or sodium acetate in a concentration of about 15 mM to about 25 mM, sucrose in a concentration of about 60 mM to about 240 mM, polysorbate in a concentration of about 0.005% (w/v) to about 0.06% (w/v), and pH about 5.0 to about 6.3.

[0010] In some embodiments, the monoclonal antibody in the formulation is about 40 mg/ml to about 80 mg/ml. In some embodiments, the monoclonal antibody in the formulation is about 54 mg/ml to about 66 mg/ml. In some embodiments, the monoclonal antibody in the formulation is about 60 mg/ml. In some embodiments, the monoclonal antibody in the formulation is about 60 mg/ml to about 125 mg/ml. In some embodiments, the monoclonal antibody in the formulation is about 125 mg/ml.

[0011] In some embodiments, said histidine acetate or sodium acetate in the formulation is in a concentration of about 17 mM to about 22 mM. In some embodiments, said histidine acetate or sodium acetate in the formulation is in a concentration of about 20 mM.

[0012] In some embodiments, said sucrose in the formulation is about 60 mM to about 180 mM. In some embodiments, said sucrose in the formulation is about 120 mM. In some embodiments, said sucrose in the formulation is about 240 mM.

[0013] In some embodiments, the formulation has a pH of about 5.5 to about 6.1. In some embodiments, the formulation has a pH of about 5.5 or about 5.8.

[0014] In some embodiments, said polysorbate in the formulation is polysorbate 20. In some embodiments, said polysorbate (e.g., polysorbate 20) in the formulation is about 0.02% to about 0.04%.

[0015] In some embodiments, said monoclonal antibody in the formulation is about 60 mg/ml, sucrose in the formulation is about 120 mM, and pH is about 5.8. In some embodiments, said monoclonal antibody in the formulation is about 125 mg/ml, sucrose in the formulation is about 240 mM, and pH is about 5.5.

[0016] In some embodiments, the formulation comprises a monoclonal antibody (e.g., an anti-PDL1 antibody described herein) in an amount of about 60 mg/mL, histidine acetate in a concentration of about 20 mM, sucrose in a concentration of about 120 mM, and polysorbate

87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identity to the heavy chain variable region having the amino acid sequence of SEQ ID NO:8. In some embodiments, said monoclonal antibody in the formulation comprises a light chain variable region comprising the amino acid sequence of SEQ ID NO:7, and a heavy chain variable region comprising the amino acid sequence of SEQ ID NO:32. In some embodiments, said monoclonal antibody in the formulation comprises a light chain variable region having at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to the light chain variable region having the amino acid sequence of SEQ ID NO:7, and a heavy chain variable region having at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identity to the heavy chain variable region having the amino acid sequence of SEQ ID NO:32. In some embodiments, said monoclonal antibody in the formulation comprises a light chain comprising the amino acid sequence of SEQ ID NO:9, and a heavy comprising the amino acid sequence of SEQ ID NO:10. In some embodiments, said monoclonal antibody in the formulation comprises a light chain having at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to the light chain having the amino acid sequence of SEQ ID NO:9, and a heavy chain having at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identity to the heavy chain having the amino acid sequence of SEQ ID NO:10.

[0021] In some embodiments, the formulation comprising the antibody is stored in a glass vial or a metal alloy container. In some embodiments, the metal alloy is 316L stainless steel or hastelloy. In some embodiments, the formulation is stable at 2-8°C for at least 6 months, at least 12 months, at least 18 months or at least 24 months. In some embodiments, the antibody in the formulation retains, after storage, at least about 75%, at least about 80%, at least about 85%, at least about 90% of the biological activity before storage. In some embodiments, the biological activity is measured by antibody binding to PD-L1.

[0022] In some embodiments, the formulation described herein is sterile. In some embodiments, the formulation described herein is suitable to be administered to a subject. In some embodiments, the formulation described herein is for intravenous (IV) administration.

[0023] ~~In another aspect,~~Also provided herein is an article of manufacture or kit comprising a container holding any of the stable aqueous pharmaceutical formulation described above and herein. In one aspect, provided herein is an article of manufacture comprising a container holding any one of the stable aqueous pharmaceutical formulations described above and herein. In some embodiments, the container is a glass vial or a metal alloy container. In some embodiments, the metal alloy is 316L stainless steel or hastelloy.

[0024] ~~In another aspect,~~Further provided herein is a method of treating a disease or disorder in a subject comprising administering an effective amount of the formulation described herein to the subject, wherein the disease or disorder is selected from the group consisting of infection, cancer, and inflammatory disease. In one aspect, provided herein is use of any one of the formulations as described above and herein in the manufacture of a medicament for treating a disease or disorder in a subject, wherein the disease or disorder is selected from the group consisting of infection, cancer, and inflammatory disease.

[0025] It is to be understood that one, some, or all of the properties of the various embodiments described herein may be combined to form other embodiments of the present ~~invention~~disclosure. These and other aspects of the invention will become apparent to one of skill in the art. These and other embodiments of the ~~invention~~ disclosure are further described by the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] **FIG. 1** is a series of graphs showing statistical analysis of stability data of α-PDL1 formulations at 40°C by ICIEF using JMP software. **A)** Average main peak rate loss from fractional factorial design of experiments (DOE). **B)** Main peak analysis from fractional factorial DOE. Main peak contains α-PDL1 charged species with the same pH as the pI (isoelectric point) of the molecule.

[0027] **FIG. 2** is a series of graphs showing statistical analysis of stability data of α-PDL1 formulations at 25°C by ICIEF using JMP software. **A)** Average main peak rate loss from fractional factorial design of experiments (DOE). **B)** Main peak analysis from fractional factorial DOE. Main peak contains α-PDL1 charged species with the same pH as the pI (isoelectric point) of the molecule.

[0028] **FIG. 3** is a series of graphs showing statistical analysis of stability data of α-PDL1 formulations at 40°C by SE-HPLC using JMP software. **A)** Average main peak rate loss from fractional factorial design of experiments (DOE). **B)** Main peak analysis from fractional factorial DOE. Main peak contains α-PDL1 monomer.

[0029] **FIG. 4** is a series of graphs showing statistical analysis of stability data of α-PDL1 formulations at 25°C by SE-HPLC using JMP software. **A)** Average main peak rate loss from fractional factorial design of experiments (DOE). **B)** Main peak analysis from fractional factorial DOE. Main peak contains α-PDL1 monomer.

[0030] **FIG. 5** is a graph showing lack of significant PS20 degradation of various α-PDL1 formulations stored at various temperatures and time. Graph of percent (%) PS20 remaining in the formulation as detected by evaporative light scattering detector (ELSD) in F1 through

36. The formulation of claim 1, wherein said monoclonal antibody is in an amount of about 125 mg/mL, said histidine acetate is in a concentration of about 20 mM, said sucrose is in a concentration of about 240 mM, and said polysorbate is polysorbate 20 in a concentration of 0.02%, and said formulation has a pH of about 5.5.

37. An article of manufacture comprising a container holding the stable aqueous pharmaceutical formulation of any one of claims 1-36.

38. The article of claim 37, wherein the container is a glass vial or a metal alloy container.

39. The article of claim 38, wherein the metal alloy is 316L stainless steel or hastelloy.

40. ~~A method of treating a disease or disorder in a subject comprising administering an effective amount~~Use of the formulation of any one of claims 1-36 in the manufacture of a medicament for treating a disease or disorder in a ~~to the~~ subject, wherein the disease or disorder is selected from the group consisting of infection, cancer, and inflammatory disease.

41. The formulation of any one of claims 1-36, wherein the monoclonal antibody comprises a N297A or D265A/N297A substitution in the constant region, numbering of the residue is that of the EU index as in Kabat.