

CLAIMS

1. A fusion protein, comprising a therapeutic protein connected to a mutant Interleukin-2 (IL2) polypeptide, wherein the therapeutic protein is an entire anti-PDL1 antibody comprising a pair of heavy chains and a pair of light chains, wherein the mutant IL2 polypeptide is connected to the C-terminals of the heavy chains, wherein the mutant IL2 polypeptide comprises an amino acid sequence identical to the amino acid sequences selected from SEQ ID NO: 25 or SEQ ID NO: 27.
2. The fusion protein of claim 1, wherein the mutant IL2 polypeptide is connected to the C-terminals of the heavy chains through a linker sequence.
3. The fusion protein of claim 1, wherein the anti-PDL1 antibody is an antibody of any available isotype or any known mutant forms of Fc region that mediates or enhances ADCC and/or CDC function.
4. The fusion protein of claim 1, wherein the anti-PDL1 antibody is an antibody of IgG1 isotype.
5. The fusion protein of claim 1, wherein the anti-PDL1 antibody comprises a heavy chain variable region and a light chain variable region where their respective sequences consist essentially of the following pairings: (a) SEQ ID NO: 3 and SEQ ID NO: 6; (b) SEQ ID NO: 9 and SEQ ID NO: 12.
6. The fusion protein of claim 1, wherein the anti-PDL1 antibody comprises a heavy chain and a light chain where their respective sequences consist essentially of the following pairings: (a) SEQ ID NO: 2 and SEQ ID NO: 5; (b) SEQ ID NO: 8 and SEQ ID NO: 11.
7. The fusion protein of claim 2, wherein the linker sequence is a serine-glycine linker.
8. The fusion protein of claim 7, wherein the linker sequence is SEQ ID NO: 19.
9. A pharmaceutical composition comprising the fusion protein of any of claims 1-8, and a pharmaceutically acceptable excipient, carrier or diluent.
10. A nucleic acid molecule that encodes the fusion protein of any of claims 1-8, wherein the nucleic acid molecule is a DNA molecule or RNA molecule.

11. Pharmaceutical composition according to claim 9 for use in therapy, said use comprising a therapeutically effective amount of the pharmaceutical composition of claim 9 is to be administered to a subject in need thereof for a condition.
12. Pharmaceutical composition according to claim 9 for use in therapy, said use comprising a therapeutically effective amount of the pharmaceutical composition of claim 9 in combination with (a) antibodies targeting at least another immunosuppressive pathways; (b) chemotherapy, targeted therapy or radiation therapy; (c) another mechanism of blocking an immunosuppressive pathway; or (d) another immunotherapy agent is to be administered to a subject in need thereof for a condition.
13. The use of any of claims 11-12, wherein said condition is a mammalian cancer.
14. The use of any of claims 13, wherein said cancer is selected from the group consisting of melanoma, lung cancer, renal cancer, head neck cancer, gastric cancer, lymphoma, ovarian cancer, colon cancer, breast cancer, lung cancer, myelomas, brain tumors, leukemias, lymphomas, bladder cancer, liver cancer, urothelial carcinoma, cutaneous carcinoma, pancreatic cancer, and combinations thereof.
15. A mammalian expression system that produces fusion protein of any of claims 1-8.
16. A mutant IL2 polypeptide that is less selective towards a high-affinity receptor of a wild type IL2, wherein said mutant IL2 polypeptide comprises an amino acid sequence identical to a sequence selected from SEQ ID NO: 25 or SEQ ID NO: 27.