

WHAT IS CLAIMED IS:

1. An IL-2 mutant comprising mutations Y31V, A73L and H79Q compared to wild-type IL-2; wherein the wild-type IL-2 has an amino acid sequence as shown in SEQ ID NO: 1.

5 2. The IL-2 mutant according to claim 1, wherein the IL-2 mutant comprising mutations Y31V, A73L, H79Q and V91R compared to wild-type IL-2; wherein the wild-type IL-2 has an amino acid sequence as shown in SEQ ID NO: 1.

3. The IL-2 mutant according to claim 1 or 2, wherein the IL-2 mutant has an amino acid sequence as shown in any one of SEQ ID NO: 2, 22, 29, 32 or 37.

10 4. The IL-2 mutant according to claim 1 or 2, wherein the IL-2 mutant has a T_m value higher than that of the wild-type IL-2.

5. The IL-2 mutant according to claim 1 or 2, wherein the IL-2 mutant has a reduced binding ability to IL-2R $\beta\gamma$ subunit complex compared to the wild-type IL-2.

15 6. The IL-2 mutant according to claim 1 or 2, wherein the mutant has a reduced stimulation ability to non-regulatory T cells or NK cells compared to the wild-type IL-2; the stimulation can be selected from intracellular STAT5 phosphorylation or cell proliferation.

20 7. A fusion protein comprising a first polypeptide and a second polypeptide, wherein the first polypeptide is the IL-2 mutant according to any one of claims 1 to 6, and the second polypeptide is an Fc.

8. The fusion protein according to claim 7, wherein the Fc is a human IgG Fc.

9. The fusion protein according to claim 8, wherein the human IgG1 Fc

comprises mutations of C220S and N297G.

10. The fusion protein according to any one of claims 7 to 9, wherein C- terminus of the first polypeptide is linked to N-terminus of the second polypeptide with a linker.

11. The fusion protein according to claim 10, wherein the linker is (G₄S)₃.

5 12. The fusion protein according to claim 7, wherein the fusion protein comprises an amino acid sequence as shown in SEQ ID NO: 50.

13. A pharmaceutical composition comprising the mutant of any one of claims 1 to 6 or the fusion protein of any one of claims 7 to 12, and a pharmaceutically acceptable carrier, diluent or adjuvant.

10 14. The pharmaceutical composition according to claim 13, wherein the pharmaceutical composition is a pharmaceutical composition for intravenous or subcutaneous injection.

15 15. Use of the mutant of any one of claims 1 to 6 or the fusion protein of any one of claims 7 to 12 in the manufacture of a medicament for treating autoimmune disease, proliferative disease, or viral infection;

wherein the autoimmune disease is selected from rheumatoid arthritis, ankylosing spondylitis, systemic lupus erythematosus, cutaneous lupus erythematosus, lupus nephritis, IgA nephropathy, Sjogren's syndrome, polymyositis, dermatomyositis, scleroderma, psoriasis, plaque psoriasis, alopecia areata, multiple sclerosis, 20 amyotrophic lateral sclerosis, inflammatory bowel disease, ulcerative colitis, Crohn's disease, graft-versus-host disease, organ transplant rejection, autoimmune hepatitis, type I diabetes, autoimmune vasculitis, eczema or asthma;

wherein the proliferative disease is selected from neoplasm, solid tumor, hematological tumor, malignant ascites or malignant pleural effusion; wherein the solid tumor is selected from benign or malignant, primary or metastatic;

the malignant solid tumor is selected from epithelial cell carcinoma, endothelial
 5 cell carcinoma, squamous cell carcinoma, teratoma, lung tumor, papillomavirus-induced cancer, adenocarcinoma, carcinoma, melanoma, angiosarcoma, neuroblastoma, metastatic lung cancer, non-small cell lung cancer, small cell lung cancer, breast cancer, Merkel cell cancer, ovarian cancer, renal cell cancer, metastatic renal cancer, head and neck cancer, bladder cancer or non-muscle
 10 invasive bladder cancer;

the hematological tumor is selected from leukemia, lymphoma or multiple myeloma;

the viral infection is selected from HIV infection, novel coronavirus infection or HPV viral infection.

15 16. The use according to claim 15, wherein the medicament is a medicament for intravenous injection or subcutaneous injection.