

CLAIMS

1. An antibody that binds to NKp46, or an antibody fragment thereof comprising at least the antigen binding portion, wherein the antibody or antibody fragment comprises three complementarity determining regions (CDRs) of a heavy-chain (HC) variable region comprising SEQ ID No: 7 and three CDRs of a light-chain (LC) variable region comprising SEQ ID No: 8, or an analog or derivative thereof having at least 90% sequence identity with said antibody or fragment sequence.
2. The antibody or the antibody fragment according to claim 1, comprising a set of six CDRs wherein: HC CDR1 is EYSMH (SEQ ID No: 1); HC CDR2 is GISPNSGGTSYNQKFKG (SEQ ID No: 2); HC CDR3 is RDFHSSFDY (SEQ ID No: 3); LC CDR1 is RASQSIDYLH (SEQ ID No: 4); LC CDR2 is YASQSIG (SEQ ID No: 5); and LC CDR3 is QNGHSFPLT (SEQ ID No: 6).
3. The antibody or the antibody fragment according to any one of claims 1 or 2, comprising:
 - (1) a heavy chain variable region set forth in SEQ ID No: 7, or an analog having at least 95% sequence similarity with said heavy chain variable region sequence;
 - (2) ~~The antibody or the antibody fragment according to any one of claims 1 to 3, comprising~~ a light chain variable sequence set forth in SEQ ID No: 8, or an analog having at least 95% sequence similarity with said light chain variable region sequence; or
 - (3) a heavy chain and a light chain, wherein the heavy chain comprises SEQ ID No: 7 and the light chain comprises SEQ ID No: 8.
- ~~3. The antibody or the antibody fragment according to any one of claims 1 to 4, comprising a heavy chain and a light chain, wherein the heavy chain comprises SEQ ID No: 7 and the light chain comprises SEQ ID No: 8.~~
4. An antibody fragment according to any one of claims 1 to 3, wherein the antibody fragment is a single chain Fv (scFv); or wherein the
- ~~5. The antibody or antibody fragment according to any one of claims 1 to 6, wherein the antibody binds to human NKp46 with an affinity of 10^{-11} M to 10^{-16} M.~~

6. The antibody or the antibody fragment according to any one of claims 1 to ~~74~~, wherein the antibody is a humanized antibody; preferably.
- ~~7.5. The antibody or the antibody fragment according to claim 8, wherein~~ the humanized antibody comprises a heavy chain comprising SEQ ID No: 14, and a light chains comprising a sequence selected from the group consisting of SEQ ID Nos: 15 and 16.
8. A polynucleotide sequence encoding at least one sequence of a heavy chain or a light chain region of an antibody or antibody fragment according to any one of claims 1 to ~~75~~.
- ~~9. The polynucleotide sequence of claim 10, encoding an antibody heavy chain variable region, wherein the polynucleotide sequence comprises SEQ ID No: 9, or a variant thereof having at least 85% identity to said sequences.~~
- ~~The polynucleotide sequence of claim 11, encoding an antibody light chain variable region, wherein the polynucleotide sequence comprises SEQ ID No: 10, or a variant thereof having at least 85% identity to said sequences.~~
- ~~10.6. A plasmid comprising at least one polynucleotide sequence according to any one of claims 10 to 12.~~
- ~~11. A cell comprising a polynucleotide sequence according to any one of claims 10 to 12.~~
- ~~12. A cell capable of producing an antibody according to any one of claims 1 to 7.~~
- ~~13.7. A multi-specific antibody comprising a binding site of an antibody according to any one of claims 1 to 75.~~
- 20 ~~14.8. The multi-specific antibody of claim 167,~~ wherein the multi-specific antibody is a bi-specific antibody further comprises a binding site having specificity to a tumor antigen.
- ~~15.9. The multi-specific antibody of claim 167,~~ wherein the multi-specific antibody is a bi-specific antibody further comprises a binding site having specificity to a viral, bacterial or fungal antigen.
- 25 ~~16. The multi-specific antibody of claim 167,~~ wherein the multi-specific antibody is a tri-specific antibody further comprising a binding site specific to CD160 or CD16; or
- ~~17. The multi-specific antibody of claim 19,~~ further comprising a binding site specific to a tumor antigen;
- 10.
- 30 ~~18.11. The multi-specific antibody of claim 167,~~ said multi-specific antibody is fused or conjugated to a cytokine.
- ~~19.12. A pharmaceutical composition comprising as an active ingredient, at least one antibody or fragment thereof, or a multi-specific binding molecule according to any one of claims~~

1 to ~~7~~5 and ~~16~~7 to ~~21~~11, and a pharmaceutical acceptable excipient, diluent, salt or carrier.

~~20-13.~~ The pharmaceutical composition of claim ~~22~~12, for use in ~~treating the treatment of~~ cancer ~~in a subject~~.

5 ~~21.~~ The pharmaceutical composition of claim ~~22~~12, for use in ~~treating the treatment of~~ an infection, ~~; preferably for use in treating.~~

~~22.~~ ~~The pharmaceutical composition of claim 22, for use in treating a wherein the infection~~ is a viral infection, a bacterial infection, or a fungal infection.

10 ~~23.~~ ~~A method of treating cancer, comprising administering to a subject in need thereof, a pharmaceutical composition according to claim 22.~~

~~24.~~ The method of claim 26, further comprising an additional anti-cancer therapy selected from surgery, chemotherapy, radiotherapy, and immunotherapy.

~~25.~~ The method of claim 26, further comprising administering to said subject an immuno-modulator, activated lymphocyte cell, kinase inhibitor, chemotherapeutic agent or any other anti-cancer agent.

15 ~~26.~~ The method of claim 26, wherein the immune modulator is an antibody against an immune checkpoint molecule.

~~27.~~ The method of claim 26, wherein the immune modulator is an antibody against PD-1.

~~28.~~ The method of claim 26, wherein the cancer is a solid cancer.

20 ~~29.~~ The method of claim 26, wherein treating results in preventing or reducing metastases formation, growth or spread in a subject.

~~30.~~ A method of diagnosing a cancer in a subject, the method comprising contacting a biological sample with an antibody or antibody fragment according to any one of claims ~~1 to 7~~.

25 ~~31.~~ A kit for diagnosing a cancer in a subject comprising at least one antibody or antibody fragment according to any one of claims ~~1 to 7~~.

~~32-14.~~ A method of treating an infection in a subject, comprising administering to a subject in need thereof, a pharmaceutical composition according to claim 23.

30 ~~33.~~ The method of claim 35, wherein the infection is a viral infection of a virus selected from the group consisting of coronavirus, influenza virus, Human Metapneumovirus (HMPV), Human cytomegalovirus (HCMV), Sendai virus, Newcastle disease virus, and poxvirus.

~~34.~~ The method of claim 36 wherein, the coronavirus is selected from the group consisting of: SARS and MERS.

~~35.~~ The method of claim 37 wherein, the coronavirus is COVID-19.

~~36-15.~~ A chimeric antigen receptor (CAR) comprising at least one antibody or antibody fragment according to any one of claims 1 to ~~7~~5.

~~37. The CAR according to claim 39, comprising at least one receptor domain selected from the group consisting of a CD8 Stalk domain, a CD28 TM domain, 4a 1BB domain, and a CD3ζ domain.~~

~~38. A population of lymphocytes engineered to express the CAR according to claim 40.~~

~~39. A population of T cells or NK cells engineered to express the CAR according to any one of claims 39 to 40.~~

~~A method of treating cancer comprising administering to a subject in need thereof, at least one cell expressing the CAR according to any one of claims 39 or 40, or a population of cells according to any one of claims 41 or 42.~~