WHAT IS CLAIMED:

1. An isolated antibody, or antigen-binding thereof, that binds to a first group of C10orf54 proteins or chimeric proteins designated CC1 (SEQ ID NO: 1079), CC4 (SEQ ID NO: 1245), CC5 (SEQ ID NO: 1246), CC8 (SEQ ID NO: 1249), and CC10 (SEQ ID NO: 1251), and does not bind to a second group of C10orf54 proteins or chimeric proteins designated CC2 (SEQ ID NO: 1243), CC3 (SEQ ID NO: 1244), CC6 (SEQ ID NO: 1247), CC7 (SEQ ID NO: 1248), and CC9 (SEQ ID NO: 1250).

2. The antibody of claim 1, or antigen-binding thereof, wherein said antibody is a monoclonal antibody.

3. The antibody of any one of claims 1 or 2, or antigen-binding thereof, wherein said antibody is the antibody 26A, comprising:

- a heavy chain comprising the following three CDRs, respectively CDR-H1 having the sequence SEQ ID NO: 1296, CDR-H2 having a sequence selected from SEQ ID NO: 1358, SEQ ID NO. 1556, SEQ ID NO. 1557, SEQ ID NO. 1558, and SEQ ID NO. 1559, and CDR-H3 having the sequence SEQ ID No. 1393; and

- a light chain comprising the following three CDRs, respectively CDR-L1 having the sequence SEQ ID No. 1435, CDR-L2 having a sequence selected from SEQ ID NO: 1476, SEQ ID NO. 1630, SEQ ID NO. 1631, SEQ ID NO. 1632, and SEQ ID NO. 1633, and CDR-L3 having the sequence SEQ ID No.1499.

4. The antibody of any one of claims 1 to 3, or antigen-binding thereof, wherein said antibody is humanized.

5. An antibody according to claim 4, or antigen-binding thereof, said antibody comprising a heavy chain variable domain of sequence selected between amino acid sequences SEQ ID NO. 1529, SEQ ID NO. 1530, and SEQ ID NO. 1531, and a light chain variable domain of sequence selected between amino acid sequences SEQ ID NO. 1532, SEQ ID NO. 1533, and SEQ ID NO. 1534.

6. The antibody of any one of claims 1 to 5, wherein the antibody is a Fab Fragment, $F(ab')_2$ fragment, single chain Fv (sFv), diabody, triabody, or minibody.

7. An antibody-drug conjugate comprising the antibody of any one of claims 1 to 6 conjugated to a cytotoxic agent.

8. A polynucleotide comprising a nucleotide sequence encoding the antibody of any one of claims 1 to 6.

9. An expression vector comprising the polynucleotide of claim 8.

10. A host cell comprising the expression vector of claim 9.

11. A method of producing the antibody or antigen-binding fragment thereof, of any of claims 1 to 6, said method comprising a step of culturing the host cell of claim 10 under conditions that promotes the production of the antibody.

12. A pharmaceutical composition comprising the antibody of any one of claims 1 to 6 or the antibody-drug conjugate of claim 7, and a pharmaceutically acceptable diluent, carrier or excipient.

13. Use of the pharmaceutical composition of claim 12 in the manufacture of a medicament for treating, preventing or alleviating one or more symptoms of a cancer.

14. The use of claim 13, wherein the cancer is a leukemia, preferably acute myeloid leukemia (AML), a bladder cancer, a skin cancer, a colon cancer, a breast cancer, a liver cancer, a kidney cancer, a lung cancer, a stomach cancer, a pancreas cancer, an esophagus cancer or a fibrosarcoma.

15. Use of the pharmaceutical composition of claim 12 in the manufacture of a medicament for inhibiting the growth of a tumor with inflammation in a subject.

16. Use of the pharmaceutical composition of claim 12 in the manufacture of a medicament for inhibiting the growth of a cell having cell surface expression

of C10orf54.

17. The use of claim 16, wherein the cell is a regulatory T cell.

18. The use of any one of claims 16 or 17, wherein the cell is a cancerous or pre-cancerous cell.

19. Use of the pharmaceutical composition of claim 12 in the manufacture of a medicament for modulating an immune response in a subject.

20. The use of claim 19, wherein the modulating comprises:
    (a) increasing T cell activation;
    (b) increasing T cell proliferation; or
    (c) increasing cytokine production.

21. Use of an antibody of any one of claims 1 to 6 or an antibody-drug conjugate of claim 7 in the manufacture of a medicament for treating cancer.

22. Use of the antibody of any one of claims 1 to 6 or the antibody-drug conjugate of claim 7 in the manufacture of a medicament for killing a tumor cell.

23. A method for detecting C10orf54 in a sample comprising contacting the sample with the antibody of any one claims 1 to 6.

24. A kit comprising the antibody of any one of claims 1 to 6.

25. The kit of claim 24, wherein said antibody is conjugated to a detectable substrate.