[Designation of Document] Claims

1. An antibody characterized in that:

a heavy chain sequence contains a variable region having CDRH1, CDRH2, and CDRH3, and the CDRH1 comprises an amino acid sequence represented by SEQ ID NO: 82, the CDRH2 comprises either one of the amino acid sequences represented by SEQ ID NOS: 83 and 89, and the CDRH3 comprises an amino acid sequence represented by SEQ ID NO: 84; and

a light chain sequence contains a variable region having CDRL1, CDRL2, and CDRL3, and the CDRL1 comprises any one of the amino acid sequences represented by SEQ ID NOS: 79, 85, 86, 87, and 88, the CDRL2 comprises an amino acid sequence represented by SEQ ID NO: 80, and the CDRL3 comprises an amino acid sequence represented by SEQ ID NO: 81, or ~~a functional~~an antigen-binding fragment of the antibody.

2. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 1, characterized by containing a heavy chain variable region sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 20 and a light chain variable region sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 16.

3. The antibody or ~~a functional~~an antigen-binding fragment

of the antibody according to claim 1 or 2, characterized in that the antibody is a chimeric antibody.

4. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 3, characterized by containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 20 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 16.

5. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 1, characterized in that the antibody is humanized.

6. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 5, characterized by containing:

(a) a heavy chain variable region sequence selected from the group consisting of the following amino acid sequences:

a1) an amino acid sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 42;

a2) an amino acid sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO:

70;

a3) an amino acid sequence having a homology of at least 95% with an amino acid sequence selected from a1) and a2);

a4) an amino acid sequence having a homology of at least 99% with an amino acid sequence selected from a1) and a2); and

a5) an amino acid sequence including a substitution, deletion, or addition of one to several amino acid residues in either one of the amino acid sequences selected from a1) and a2); and

(b) a light chain variable region sequence selected from the group consisting of the following amino acid sequences:

b1) an amino acid sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 28;

b2) an amino acid sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 52;

b3) an amino acid sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 58;

b4) an amino acid sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 62;

b5) an amino acid sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO:

66;

b6) an amino acid sequence having a homology of at least 95% with any one of the amino acid sequences selected from b1) to b5);

b7) an amino acid sequence having a homology of at least 99% with any one of the amino acid sequences selected from b1) to b5); and

b8) an amino acid sequence including a substitution, deletion, or addition of one to several amino acid residues in any one of the amino acid sequences selected from b1) to b5).

7. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain variable region sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 42 and a light chain variable region sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 28.

8. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain variable region sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain variable region

sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 52.

9. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain variable region sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain variable region sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 58.

10. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain variable region sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain variable region sequence comprising amino acid residues 21 to 134 of the amino acid sequence represented by SEQ ID NO: 62.

11. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain variable region sequence comprising amino acid residues 20 to 141 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain variable region sequence comprising amino acid residues 21 to 134 of the amino

acid sequence represented by SEQ ID NO: 66.

12. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 42 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 28.

13. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 52.

14. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 58.

15. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 62.

16. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 6, characterized by containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 70 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 66.

17. The ~~functional~~antigen-binding fragment of the antibody according to any one of claims 1 to 16, which is selected from the group consisting of Fab, F(ab')2, Fab' and Fv.

18. A pharmaceutical composition characterized by comprising at least one of the antibodies or ~~functional~~antigen-binding fragments of the antibodies according to claims 1 to 17.

19. The pharmaceutical composition according to claim 18, characterized by being a pharmaceutical composition for treating and/or preventing cancer.

20. A pharmaceutical composition for treating and/or preventing cancer, characterized by comprising at least one of the antibodies or ~~functional~~antigen-binding fragments of the antibodies according to claims 1 to 17 and at least one member selected from the group consisting of paclitaxel, carboplatin, CPT-11, and vinblastine.

21. The pharmaceutical composition according to claim 19 or 20, wherein the cancer is selected from the group consisting of lung cancer, prostate cancer, thyroid cancer, stomach cancer, liver cancer, ovarian cancer, colon cancer, breast cancer, pancreatic cancer, uterine cancer, melanoma, glioblastoma, and blood cell cancer.

22. Use of an antibody or ~~a functional~~an antigen-binding fragment thereof according to any one of claims 1 to 17 for the manufacture of a medicament for treating and/or preventing cancer.

23. Use of an antibody or ~~a functional~~an antigen-binding

fragment thereof according to any one of claims 1 to 17 for the manufacture of a medicament for treating and/or preventing cancer, characterized by simultaneously or sequentially administering the medicament and at least one member selected from the group consisting of paclitaxel, carboplatin, CPT-11, vinblastine, and 5-FU.

24. Use of at least one member selected from the group consisting of paclitaxel, carboplatin, CPT-11, vinblastine, and 5-FU for the manufacture of a medicament for treating and/or preventing cancer, characterized by simultaneously or sequentially administering the medicament and at least one of the antibodies or ~~functional~~antigen-binding fragments of the antibodies according to claims 1 to 17.

25. The use according to any one of claims 22 to 24, wherein the cancer is selected from the group consisting of lung cancer, prostate cancer, thyroid cancer, stomach cancer, liver cancer, ovarian cancer, colon cancer, breast cancer, pancreatic cancer, renal cancer, uterine cancer, melanoma, fibrosarcoma, glioblastoma, and blood cell cancer.

26. A polynucleotide encoding the antibody according to any one of claims 2, 4, and 6 to 16.

27. The polynucleotide according to claim 26, characterized by containing a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 19 and a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 15.

28. The polynucleotide according to claim 26, characterized by containing a nucleotide sequence comprising nucleotides 58 to 1413 of the nucleotide sequence represented by SEQ ID NO: 19 and a nucleotide sequence comprising nucleotides 61 to 717 of the nucleotide sequence represented by SEQ ID NO: 15.

29. The polynucleotide according to claim 26, characterized by containing:

(a) a polynucleotide selected from the group consisting of the following nucleotide sequences:

a1) a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 41;

a2) a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 69;

a3) a nucleotide sequence of a polynucleotide which hybridizes to a polynucleotide comprising a nucleotide sequence complementary to a nucleotide sequence selected from a1) and a2) under stringent conditions; and

a4) a nucleotide sequence including a substitution,

deletion, or addition of one to several nucleotides in a nucleotide sequence selected from a1) and a2); and

(b) a polynucleotide selected from the group consisting of the following nucleotide sequences:

b1) a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 27;

b2) a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 51;

b3) a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 57;

b4) a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 61;

b5) a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 65;

b6) a nucleotide sequence of a polynucleotide which hybridizes to a polynucleotide comprising a nucleotide sequence complementary to any one of the nucleotide sequences selected from b1) to b5) under stringent conditions; and

b7) a nucleotide sequence including a substitution, deletion, or addition of one to several nucleotides in any one of the nucleotide sequences selected from b1) to b5).

30. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide

sequence represented by SEQ ID NO: 41, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 27.

31. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 51.

32. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 57.

33. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 61.

34. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 423 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 402 of the nucleotide sequence represented by SEQ ID NO: 65.

35. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 1413 of the nucleotide sequence represented by SEQ ID NO: 41, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 717 of the nucleotide sequence represented by SEQ ID NO: 27.

36. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 1413 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 717 of the nucleotide sequence represented by SEQ ID NO: 51.

37. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 1413 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide

comprising a nucleotide sequence comprising nucleotides 61 to 717 of the nucleotide sequence represented by SEQ ID NO: 57.

38. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 1413 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 717 of the nucleotide sequence represented by SEQ ID NO: 61.

39. The polynucleotide according to claim 29, characterized by containing a polynucleotide comprising a nucleotide sequence comprising nucleotides 58 to 1413 of the nucleotide sequence represented by SEQ ID NO: 69, and a polynucleotide comprising a nucleotide sequence comprising nucleotides 61 to 717 of the nucleotide sequence represented by SEQ ID NO: 65.

40. A vector comprising any one of the polynucleotides according to claims 26 to 39.

41. A transformed host cell comprising any one of the polynucleotides according to claims 26 to 39.

42. A transformed host cell comprising the vector according to claim 40.

43. A method of producing the antibody according to any one of claims 2, 4, and 6 to 16, comprising the step of culturing the host cell according to claim 41 or 42 and purifying the antibody from the resulting cultured product.

44. An antibody or ~~a functional~~an antigen-binding fragment of the antibody, characterized by binding to the same epitope as an antibody containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 20 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 16.

~~45. An antibody or a functional fragment of the antibody, characterized by competing with an antibody containing a heavy chain sequence comprising amino acid residues 20 to 471 of the amino acid sequence represented by SEQ ID NO: 20 and a light chain sequence comprising amino acid residues 21 to 239 of the amino acid sequence represented by SEQ ID NO: 16.~~

~~46~~45. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim 44~~ or 45~~, characterized in that a Fab fragment of the antibody prepared by papain digestion, when binding the recombinant protein represented by SEQ ID NO:

23, lies adjacent to the glycine residue at position 26, the isoleucine residue at position 34, the glutamic acid residue at position 36, the aspartic acid residue at position 37, the glycine residue at position 38, the aspartic acid residue at position 56, the leucine residue at position 57, the leucine residue at position 58, the phenylalanine residue at position 59, the leucine residue at position 61, and the arginine residue at position 62 of a recombinant protein represented by SEQ ID NO: 23 at a distance of 4 Å or less.

~~47~~46. The antibody or ~~a functional~~an antigen-binding fragment of the antibody according to claim ~~46~~45, characterized in that the distance between each amino acid residue constituting the recombinant protein represented by SEQ ID NO: 23 and the Fab fragment is determined by a complex structural analysis using X-ray diffraction data.