CLAIMS

~~1. An isolated antibody or antigen-binding fragment thereof specifically~~ binding to domain S1 of C4.4a.

2. The antibody or antigen-binding fragment thereof according to claim 1 wherein the antibody or antigen-binding fragment thereof is cross-reactive to rodent C4.4a.

3. The antibody or antigen-binding fragment thereof according to claims 1or 2 wherein the antibody or antigen-binding fragment thereof is internalized following binding to C4.4a expressing cells.

4. The antibody or antigen-binding fragment according to any one of claims 1 to 3, wherein the antibody or antigen-binding fragment competes in binding to C4.4a with antibody M31-B01 or M20-D02 S-A.

5. The antibody or antigen-binding fragment according to claim 4, wherein the amino acid sequence of the antibody or antigen-binding fragment is at least 50%, 55%, 60% 70%, 80%, 90, or 95% identical to at least one CDR sequence depicted in table 7, or at least 50%, 60%, 70%, 80%, 90%, 92% or 95% identical to at least one VH or VL sequence depicted in table 7.

6. The antibody or antigen-binding fragment according to any one of claims 4 to 5, wherein the amino acid sequence of the antibody or antigen-binding fragment is at least 50%, 55%, 60% 70%, 80%, 90, or ~~95% identical to at least one CDR sequence of M31-B01or M20-D02 S-~~

A, or at least 50%, 60%, 70%, 80%, 90%, 92% or 95% identical to the VH or VL sequence of M31-B01 or M20-D02 S-A.

7. The antibody or antigen-binding fragment according to any one of claims 4 to 6, wherein the antibody or antigen-binding fragment thereof comprises at least one of the heavy chain CDR sequences that conforms to the consensus sequences SEQ ID NO: 297 or SEQ ID NO: 302 (CDR H1), SEQ ID NO: 298 or SEQ ID NO: 303 (CDR H2), or SEQ ID NO: 299 or SEQ ID NO: 304 (CDR H3), and/or at least one of the light chain CDR sequences that conform to the consensus sequences of SEQ ID NO: 300 or SEQ ID NO: 305 (CDR L1), SEQ ID NO: 22 or SEQ ID NO: 306 (CDR L2), or SEQ ID NO: 301 or SEQ ID NO: 307 (CDR L3).

8. The antibody or antigen-binding fragment according to any one of claims 4 to 7,

a) wherein the antibody or antigen-binding fragment thereof comprises the heavy chain CDR sequences conforming to SEQ ID NO: 297 (CDR H1), SEQ ID NO: 298 (CDR H2) and SEQ ID NO: 299 (CDR H3), and the light chain CDR sequences conforming to SEQ ID NO: 300 (CDR L1), SEQ ID NO: 22 (CDR L2) and SEQ ID NO: 301 (CDR L3), or

b) wherein the antibody or antigen-binding fragment thereof comprises the heavy chain CDR sequences conforming to SEQ ID NO: 302 (CDR H1), SEQ ID NO: 303 (CDR H2) and SEQ ID NO: 304 (CDR H3), and the light chain CDR

~~sequences conforming to SEQ ID NO: 305 (CDR L1), SEQ~~ ID NO: 306 (CDR L2) and SEQ ID NO: 307 (CDR L3).

9. The antibody or antigen-binding fragment according to claims 4 to 8, wherein the antibody or antigen-binding fragment comprises at least one CDR sequence or at least one variable heavy chain or light chain sequence as depicted in table 7.

10. The antibody or antigen binding fragment according to any one of the preceding claims, wherein the antibody or antigen-binding fragment comprises the heavy and light chain CDR sequences or the variable heavy and light chain sequences of an antibody of table 7.

11. The antibody or antigen binding fragment according to any one of the preceding claims comprising

the variable heavy chain CDR sequences as presented by SEQ ID NO: 75-77 and the variable light chain CDR sequences presented by SEQ ID NO: 78-80, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 5, 9 and 13 and the variable light chain CDR sequences presented by SEQ ID NO: 17, 21 and 25, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 6, 10 and 14 and the variable light chain CDR sequences presented by SEQ ID NO: 18, 22 and 26, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 7, 11 and 15 and the variable light chain CDR sequences presented by SEQ ID NO: 19, 23 and 27, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: ~~8, 12 and 16 and the variable light chain CDR sequences presented by~~

~~SEQ ID NO: 20, 24 and 28. , or~~

the variable heavy chain CDR sequences as presented by SEQ ID NO: 45-47 and the variable light chain CDR sequences presented by SEQ ID NO: 48-50, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 55-57 and the variable light chain CDR sequences presented by SEQ ID NO: 58-60, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 65-67 and the variable light chain CDR sequences presented by SEQ ID NO: 68-70, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 85-87 and the variable light chain CDR sequences presented by SEQ ID NO: 88-90, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 95-97 and the variable light chain CDR sequences presented by SEQ ID NO: 98-100, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 105-107 and the variable light chain CDR sequences presented by SEQ ID NO: 108-110, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 115-117 and the variable light chain CDR sequences presented by SEQ ID NO: 118-120, or

the variable heavy chain CDR sequences as presented by SEQ ID NO: 125-127 and the variable light chain CDR sequences presented by SEQ ID NO: 128-130, or

~~the variable heavy chain CDR sequences as presented by SEQ ID NO:~~

~~135-137 and the variable light chain CDR sequences presented by SEQ~~ ID NO: 138-140.

12. The antibody or antigen binding fragment according to any one of the preceding claims comprising
a variable heavy chain sequence as presented by SEQ ID NO: 81 and a variable light chain sequence as presented by SEQ ID NO: 82,
or a variable heavy chain sequence as presented by SEQ ID NO: 33 and a variable light chain sequence as presented by SEQ ID NO: 29,
or a variable heavy chain sequence as presented by SEQ ID NO: 34 and a variable light chain sequence as presented by SEQ ID NO: 30,
or a variable heavy chain sequence as presented by SEQ ID NO: 35 and a variable light chain sequence as presented by SEQ ID NO: 31,
or a variable heavy chain sequence as presented by SEQ ID NO: 36 and a variable light chain sequence as presented by SEQ ID NO: 32,
or a variable heavy chain sequence as presented by SEQ ID NO: 51 and a variable light chain sequence as presented by SEQ ID NO: 52,
or a variable heavy chain sequence as presented by SEQ ID NO: 61 and a variable light chain sequence as presented by SEQ ID NO: 62,
or a variable heavy chain sequence as presented by SEQ ID NO: 71 and a variable light chain sequence as presented by SEQ ID NO: 72,
or a variable heavy chain sequence as presented by SEQ ID NO: 91 and a variable light chain sequence as presented by SEQ ID NO: 92,
or a variable heavy chain sequence as presented by SEQ ID NO: 101 and a variable light chain sequence as presented by SEQ ID NO: 102,
~~or a variable heavy chain sequence as presented by SEQ ID NO: 111~~

~~and a variable light chain sequence as presented by SEQ ID NO: 112,~~

or a variable heavy chain sequence as presented by SEQ ID NO: 121 and a variable light chain sequence as presented by SEQ ID NO: 122, or a variable heavy chain sequence as presented by SEQ ID NO: 131 and a variable light chain sequence as presented by SEQ ID NO: 132, or a variable heavy chain sequence as presented by SEQ ID NO: 141 and a variable light chain sequence as presented by SEQ ID NO: 142.

13. The antibody according to any one of the preceding claims, which is an IgG antibody.

14. The antigen-binding fragment according to any one of the preceding claims, which is an scFv, Fab, Fab' fragment or a $F(ab')_2$ fragment.

15. The antibody or antigen-binding fragment according to any one of the preceding claims, which is a monoclonal antibody or antigen-binding fragment.

16. The antibody or antigen-binding fragment according to any one of the preceding claims, which is human, humanized or chimeric antibody or antigen-binding fragment.

17. An antibody-drug conjugate, comprising an antibody or antigen binding fragment thereof according to claims 1 to 16.

18. An isolated nucleic acid sequence that encodes the antibody or antigen-binding fragment according to claims 1 to 16.

19. A vector comprising a nucleic acid sequence according to claim 18.

20. An isolated cell expressing an antibody or antigen-binding fragment according to any one of the claims 1 – 16 and /or comprising a nucleic acid according to claim 18 or a vector according to claim 19.

~~21. An isolated cell according to claim 20, wherein said cell is a prokaryotic or an eukaryotic cell.~~

22. A method of producing an antibody or antigen-binding fragment according to any one of the claims 1 – 16 comprising culturing of a cell according to claim 21 and purification of the antibody or antigen-binding fragment.

23. An antibody or antigen-binding fragment according to claims 1 – 16 or an antibody-drug conjugate according to claim 17 as a medicament.

24. An antibody or antigen antigen-binding fragment according to claims 1 – 16 as a diagnostic agent.

25. An antibody or antigen-binding fragment according to claims 1 – 16 or an antibody-drug conjugate according to claim 17 as a medicament for the treatment of cancer.

26. A pharmaceutical composition comprising an antibody or antigen-binding fragment according to claims 1 – 16 or an antibody-drug conjugate according to claim 17.

~~27. A combination of a pharmaceutical composition according to claim 26 and one or more therapeutically active compounds.~~

28. A method for treating a disorder or condition associated with the undesired presence of C4.4a, comprising administering to a subject in need thereof an effective amount of the pharmaceutical composition ~~according to claim 26 or a combination according to claim 27~~.