Claims

1. An isolated antibody or antibody fragment of the IgG1 subtype, which specifically binds to M-CSF and wherein said isolated antibody or antibody fragment is able to inhibit the binding of M-CSF to the M-CSF receptor with an IC50 of 10 pM or less in a receptor binding inhibition assay comprising M-CSF at a final concentration of 12.5 pM wherein said antibody or antibody fragment comprises

(a) the HCDR1 region of SEQ ID NO.: 8, the HCDR2 region of SEQ ID NO.: 9, the HCDR3 region of SEQ ID NO.: 10, the LCDR1 region of SEQ ID NO.: 11, the LCDR2 region of SEQ ID NO.: 12 and the LCDR3 region of SEQ ID NO.: 13,

(b) the HCDR1 region of SEQ ID NO.: 18, the HCDR2 region of SEQ ID NO.: 19, the HCDR3 region of SEQ ID NO.: 20, the LCDR1 region of SEQ ID NO.: 21, the LCDR2 region of SEQ ID NO.: 22 and the LCDR3 region of SEQ ID NO.: 23,

(c) the HCDR1 region of SEQ ID NO.: 28, the HCDR2 region of SEQ ID NO.: 29, the HCDR3 region of SEQ ID NO.: 30, the LCDR1 region of SEQ ID NO.: 31, the LCDR2 region of SEQ ID NO.: 32 and the LCDR3 region of SEQ ID NO.: 33,

(d) the HCDR1 region of SEQ ID NO.: 38, the HCDR2 region of SEQ ID NO.: 39, the HCDR3 region of SEQ ID NO.: 40, the LCDR1 region of SEQ ID NO.: 41, the LCDR2 region of SEQ ID NO.: 42 and the LCDR3 region of SEQ ID NO.: 43,

(e) the HCDR1 region of SEQ ID NO.: 48, the HCDR2 region of SEQ ID NO.: 49, the HCDR3 region of SEQ ID NO.: 50, the LCDR1 region of SEQ ID NO.: 51, the LCDR2 region of SEQ ID NO.: 52 and the LCDR3 region of SEQ ID NO.: 53,

(f) the HCDR1 region of SEQ ID NO.: 58, the HCDR2 region of SEQ ID NO.: 59, the HCDR3 region of SEQ ID NO.: 60, the LCDR1 region of SEQ ID NO.: 61, the LCDR2 region of SEQ ID NO.: 62 and the LCDR3 region of SEQ ID NO.: 63,

(g) the HCDR1 region of SEQ ID NO.: 88, the HCDR2 region of SEQ ID NO.: 89, the HCDR3 region of SEQ ID NO.: 90, the LCDR1 region of SEQ ID NO.: 91, the LCDR2 region of SEQ ID NO.: 92 and the LCDR3 region of SEQ ID NO.: 93,

(h) the HCDR1 region of SEQ ID NO.: 98, the HCDR2 region of SEQ ID NO.: 99, the HCDR3 region of SEQ ID NO.: 100, the LCDR1 region of SEQ ID NO.: 101, the LCDR2 region of SEQ ID NO.: 102 and the LCDR3 region of SEQ ID NO.: 103, or

(i) the HCDR1 region of SEQ ID NO.: 108, the HCDR2 region of SEQ ID NO.: 109, the HCDR3 region of SEQ ID NO.: 110, the LCDR1 region of SEQ ID NO.: 111, the LCDR2 region of SEQ ID NO.: 112 and the LCDR3 region of SEQ ID NO.: 113.

2. An isolated antibody or antibody fragment according to claim 1, wherein said antibody or antibody fragment comprises

(a) the variable heavy region of SEQ ID NO.: 14 and the variable light region of SEQ ID NO.: 15,

(b) the variable heavy region of SEQ ID NO.: 24 and the variable light region of SEQ ID NO.: 25,

(c) the variable heavy region of SEQ ID NO.: 34 and the variable light region of SEQ ID NO.: 35,

(d) the variable heavy region of SEQ ID NO.: 44 and the variable light region of SEQ ID NO.: 45,

(e) the variable heavy region of SEQ ID NO.: 54 and the variable light region of SEQ ID NO.: 55,

(f) the variable heavy region of SEQ ID NO.: 64 and the variable light region of SEQ ID NO.: 65,

(g) the variable heavy region of SEQ ID NO.: 94 and the variable light region of SEQ ID NO.: 95,

(h) the variable heavy region of SEQ ID NO.: 104 and the variable light region of SEQ ID NO.: 105, or

(i) the variable heavy region of SEQ ID NO.: 114 and the variable light region of SEQ ID NO.: 115.

3. An isolated antibody according to any one of the preceding claims, wherein said antibody is of a IgG1 subtype which has an effector function which is diminished compared to the wild type IgG1 subtype.

4. The isolated antibody of claim 3, wherein the aspartic acid residue at position 265 of said antibody (numbering according to the EU index) is exchanged for an alanine residue.

5. The isolated antibody or antibody fragment of any of the preceding claims, wherein said antibody or antibody fragment is a monoclonal antibody or a polyclonal antibody.

6. The antibody or antibody fragment of any of the preceding claims, wherein said antibody is a human, humanized or chimeric antibody.

7. The antibody or antibody fragment of any of the preceding claims, wherein said antibody is cross-reactive to cynomolgus M-CSF, mouse M-CSF and/or rat M-CSF.

8. The isolated antibody or antibody fragment of any of the preceding claims for use in medicine.

9. A pharmaceutical composition comprising an isolated antibody or antibody fragment of any one of claims 1-7, and a pharmaceutically acceptable carrier.

10. A nucleic acid encoding an antibody or antibody fragment of any one of claims 1-7.

11. A vector comprising a nucleic acid of claim 10 or encoding any of the antibodies of claims 1-7.

12. An isolated host cell comprising a vector according to claim 11, a nucleic acid according to claim 10 or a nucleic acid encoding an antibody or antibody fragment according to any one of claims 1-7.