Claims

1. An isolated, recombinant or purified antibody that specifically binds to CSF-1R, more preferably human CSF-1R, characterized in that

(i) it comprises :

(a) a first variable region being defined by the following formula

FR1 - CDR1 – FR2 – CDR2 – FR3 – CDR3 – FR4

wherein:

FR1, FR2, FR3 and FR4 are each framework regions;

CDR1, CDR2 and CDR3 are each complementarity determining regions;

wherein:

CDR1 has at least five consecutive amino acids of the sequence starting in position 45 and finishing in position 54 of SEQ ID NO:2;

CDR2 has at least five consecutive amino acids of the sequence starting in position 66 and finishing in position 87 of SEQ ID NO:2; and

CDR3 has at least five consecutive amino acids of the sequence starting in position 117 and finishing in position 126 of SEQ ID NO:2;

and

(b) a second variable region being defined by the following formula

FR1 - CDR1 – FR2 – CDR2 – FR3 – CDR3 – FR4

wherein:

FR1, FR2, FR3 and FR4 are each framework regions;

CDR1, CDR2 and CDR3 are each complementarity determining regions;

wherein:

CDR1 has at least five consecutive amino acids of the sequence starting in position 44 and finishing in position 56 of SEQ ID NO:4;

CDR2 has at least five consecutive amino acids of the sequence starting in position 66 and finishing in position 76 of SEQ ID NO:4; and

CDR3 has at least five consecutive amino acids of the sequence starting in position 109 and finishing in position 117 of SEQ ID NO:4.

and

(ii) it has at least one of the following advantageous properties :

- it binds to one epitope located between position amino acids 20 to 41 of SEQ ID N0:29
- it does not bind to an epitope located between position amino acids 42 to 90, and/or between position amino acids 91 to 104,
- it does not bind to an epitope located between position amino acids 105 to 199,
- it does not bind to an epitope located between position amino acids 200 to 298 of SEQ ID N0:29,
- it binds to construct pTG18016.

2. The antibody of claim 1, having at least one of the following additional advantageous properties

- it does not compete with IL-34 ligand for binding to the CSF-1R receptor,

- it competes partially with CSF-1 ligand for binding to the CSF-1R receptor.

3. The antibody of claim 2, having both of the said advantageous properties.

4. The antibody of claim 1, wherein in the presence of normal human peripheral blood mononuclear cells, it exerts antibody-dependent cellular cytotoxicity (ADCC)

against CSF1-R-expressing human cells, especially CSF1-R-expressing human cancer cells.

5. The antibody of claim 1, wherein it exerts antitumor effects against non-human animals bearing CSF1-R-expressing human cancer cells.

6. The antibody of claim 1, wherein it exerts antitumor effects against animals, including human, bearing CSF1-R-expressing human cancer cells.

7. The antibody of claim 1, wherein it inhibits the CSF-1-dependent proliferation of AML5 cells.

8. The antibody of claim 1, wherein it partially inhibits CSF-1-dependent phosphorylation of CSF-1R.

9. The antibody of claim 1, wherein it comprises :

- an heavy chain selected in the group consisting in SEQ ID N0 :37 and SEQ ID N0 :38, and

- a light chain selected in the group consisting in SEQ ID N0 :39, SEQ ID N0 :40 and SEQ ID N0 :41.

10. The antibody of claim 1, wherein it comprises :

- a first variable region selected in the group consisting of SEQ ID N0 :42 and SEQ ID N0 :43; and

- a second variable region selected in the group consisting of SEQ ID N0 :44, SEQ ID N0 :45 and SEQ ID N0 :46.

11. The antibody of claim 1, wherein it comprises (a) an heavy chain consisting in SEQ ID N0 :37, and (b) a light chain consisting in SEQ ID N0 :39.

12. The antibody of claim 1, wherein it comprises (a) an heavy chain consisting in SEQ ID N0 :38, and (b) a light chain consisting in SEQ ID N0 :40.

13. The antibody of claim 1, wherein it comprises (a) an heavy chain consisting in SEQ ID N0 :37, and (b) a light chain consisting in SEQ ID N0 :41.

14. The antibody of claim 1, wherein it comprises (a) first variable region consisting in SEQ ID N0 :42, and (b) a second variable region consisting in SEQ ID N0 :44.

15. The antibody of claim 1, wherein it comprises (a) first variable region consisting in SEQ ID N0 :43, and (b) a second variable region consisting in SEQ ID N0 :45.

16. The antibody of claim 1, wherein it comprises (a) first variable region consisting in SEQ ID N0 :42, and (b) a second variable region consisting in SEQ ID N0 :46.

17. The antibody of claim 1, wherein it has a Ki of less than 1 nM.

Claims

1. An isolated, recombinant or purified antibody that specifically binds to CSF-1R, characterized in that said antibody comprises:

   (i) (a) first variable region consisting in SEQ ID NO:42, and (b) a second variable region consisting in SEQ ID NO:44; or

   (ii) (a) first variable region consisting in SEQ ID NO:43, and (b) a second variable region consisting in SEQ ID NO:45; or

   (iii) (a) first variable region consisting in SEQ ID NO:42, and (b) a second variable region consisting in SEQ ID NO:46.

2. The antibody of claim 1 (i), wherein it comprises (a) a heavy chain consisting in SEQ ID NO:37, and (b) a light chain consisting in SEQ ID NO:39.

3. The antibody of claim 1 (ii), wherein it comprises (a) a heavy chain consisting in SEQ ID NO:38, and (b) a light chain consisting in SEQ ID NO:40.

4. The antibody of claim 1 (iii), wherein it comprises (a) a heavy chain consisting in SEQ ID NO:37, and (b) a light chain consisting in SEQ ID NO:41.

5. The antibody of claim 1 which is a polyclonal antibody, a monoclonal antibody, an Fab, an Fab', an F(ab')2, an Fv, an scFv, an antigen binding fragment or a diabody.

6. The antibody of any one of claims 1 to 5, wherein the CSF-1R is human CSF-1R.

7. A nucleic acid sequence encoding an antibody of any one of claims 1 to 6.

8. A vector containing the nucleic acid sequence of claim 7.

9. The vector of claim 8 which is of plasmid or viral origin.

10. The vector of claim 9 which is of viral origin and which is derived from a poxvirus, an adenovirus, a retrovirus, a herpes virus, an alphavirus, a foamy virus or an adeno-associated virus.

11. The vector of claim 10, wherein said poxvirus is a vaccinia virus or a canarypoxvirus.

12. The vector of claim 11, wherein said vaccinia virus is an MVA.

13. A cell comprising the nucleic acid sequence of claim 7.

14. The cell of claim 13, which is a eukaryotic cell.

15. The cell of claim 14, wherein said eukaryotic cell is a mammalian cell, preferably a CHO or a BHK cell.

16. A process for producing an antibody of any one of claims 1 to 6 comprising culturing a cell of any one of claims 13 to 15 under conditions permitting expression of the antibody and purifying the antibody from the cell or medium surrounding the cell.

17. A pharmaceutical composition comprising the antibody of any one of claims 1 to 6, the nucleic acid sequence of claim 7 or the vector of any one of claims 8 to 12 and a pharmaceutically acceptable carrier.

18. The antibody of any one of claims 1 to 6, the nucleic acid sequence of claim 7, the vector of any one of claims 8 to 12 or the pharmaceutical composition of claim 17 for use as a medicament.

19. The antibody of any one of claims 1 to 6, the nucleic acid of claim 7, the vector of any one of claims 8 to 12 or the pharmaceutical composition of claim 17 for use in the treatment of a disease selected from the group consisting in cancer, a disease associated to an increased osteoclast activity, inflammatory disease and rheumatoid arthritis.