CLAIMS

1. Use of an ASCT2 antibody or antigen-binding fragment in the manufacture of a medicament for the treatment of cancer, the treatment comprising binding a cancer stem cell (CSC), wherein the medicament is to be administered to contact the CSC, thereby binding to the CSC.

2. Use of an ASCT2 antibody or antigen-binding fragment in the manufacture of a medicament for the treatment of cancer, the treatment comprising inhibiting or killing a CSC, wherein an effective amount of the medicament is to be administrated to contact the CSC, thereby inhibiting or killing the CSC.

3. Use of an ASCT2 antibody or antigen-binding fragment in the manufacture of a medicament for the treatment of cancer comprising a CSC, wherein an effective amount of the medicament is to be administered to a subject in need of treatment.

4. Use of an ASCT2 antibody or antigen-binding fragment in the manufacture of a medicament for the treatment of a therapeutically resistant cancer attributable to the presence of a CSC in a subject who has previously received a therapy, wherein an effective amount of the medicament is to be administered to the subject.

5. Use of an ASCT2 antibody or antigen-binding fragment in the manufacture of a medicament for the treatment of a recurring or relapsed cancer attributable to the presence of a CSC in a subject who has previously received a therapy, wherein an effective amount of the medicament is to be administered to the subject.

6. An *in vitro* method of binding a CSC comprising contacting the CSC with an ASCT2 antibody or antigen-binding fragment thereof.

7. An *in vitro* method of inhibiting or killing a CSC comprising contacting the CSC with an ASCT2 antibody or antigen-binding fragment thereof in an amount effective to inhibit or kill the CSC.

8. A method of diagnosis, prognosis, quantification, identification, and/or detection of the presence of a CSC in a sample comprising cancer cells, wherein the method comprises:

(i) contacting, *ex vivo*, the sample with an agent that binds to an ASCT2 nucleic acid sequence or ASCT2 amino acid sequence;

(ii) detecting the presence or absence of binding between the agent and the ASCT2 nucleic acid sequence or the ASCT2 amino acid sequence; and

(iii) identifying the presence of the CSC in the sample upon detection of binding between the agent and the ASCT2 nucleic acid sequence or ASCT2 amino acid sequence,

wherein the agent that binds to an ASCT2 amino acid sequence comprises an ASCT2 antibody or antigen-binding fragment.

9. Use of an ASCT2 antibody or antigen-binding fragment in the manufacture of a medicament for the treatment of a therapeutically-resistant or recurring or relapsed hematological cancer, wherein an effective amount of the medicament is to be administered to a subject.

10. The use of claim 9, wherein the hematological cancer is selected from the group consisting of acute myeloid leukemia (AML), multiple myeloma (MM), and diffuse large B-cell lymphoma (DLBCL).

11. The use of any one of claims 1 to 5, 9 and 10, or the method of any one of claims 6 to 8, wherein the ASCT2 antibody or antigen-binding fragment specifically binds to an epitope of the neutral amino acid transporter 2 (ASCT2), wherein the antibody or antigen binding fragment comprises three heavy chain complementarity determining regions (HCDRs) of a heavy chain variable region (VH) and three light chain complementarity determining regions (LCDRs) of a light chain variable region (VL), wherein the antibody or antigen-binding fragment thereof comprises an HCDR1 of the amino acid sequence of SEQ ID NO: 10 or SEQ ID NO: 16; an HCDR2 of the amino acid sequence of SEQ ID NO: 11 or SEQ ID NO: 17; an HCDR3 of the amino acid sequence of SEQ ID NO: 12 or SEQ ID NO: 18; an LCDR1 of the amino acid sequence of SEQ ID NO: 13 or SEQ ID NO: 19; an LCDR2 of the amino acid sequence of SEQ ID NO: 14 or SEQ ID NO: 20; and an LCDR3 of the amino acid sequence of SEQ ID NO: 15 or SEQ ID NO: 21.

12. The use or method of claim 11, wherein the ASCT2 antibody or antigen-binding fragment comprises a VH comprising an amino acid sequence selected from SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 5, and SEQ ID NO: 7, and a VL comprising an amino acid sequence selected from SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 6, and SEQ ID NO: 8.

13. The use or method of claim 11 or 12, wherein the ASCT2 antibody or antigen-binding fragment comprises a VH comprising an amino acid sequence of SEQ ID NO: 5 and a VL comprising an amino acid sequence of SEQ ID NO: 6.

14. The use or method of claim 11 or 12, wherein the ASCT2 antibody or antigen-binding fragment comprises a VH comprising an amino acid sequence of SEQ ID NO: 7 and a VL comprising an amino acid sequence of SEQ ID NO: 8.

15. The use of any one of claims 1 to 5, 9 and 10, the method of any one of claims 6 to 8, or the method or use of any one of claims 11 to 14, wherein the ASCT2 antibody or antigen-binding fragment is conjugated to a cytotoxin to form an ADC comprising an ASCT2 antibody or antigen-binding fragment.

16. The use or method of claim 15, wherein the cytotoxin is selected from a tubulysin derivative and a pyrrolobenzodiazepine.

17. The use or method of claim 16, wherein the tubulysin derivative is tubulysin AZ1508.

18. The use or method of claim 16, wherein the pyrrolobenzodiapezine is selected from SG3315 and SG3249.

19. The use or method of claim 18, wherein the ASCT2 antibody or antigen-binding fragment binds to human ASCT2 and cynomolgus monkey ASCT2, but does not specifically bind to human ASCT1.