Claims

1. A bispecific chimeric antigen receptor (CAR), comprising an amino acid sequence set forth in SEQ ID NO: 16, wherein the bispecific CAR comprises an anti-CD20 antigen-binding region and an anti-CD19 antigen-binding region.

2. An immune cell comprising a bispecific chimeric antigen receptor (CAR), wherein the bispecific CAR comprises an amino acid sequence set forth in SEQ ID NO: 16, and wherein the bispecific CAR comprises an anti-CD20 antigen-binding region and an anti-CD19 antigen-binding region.

3. The immune cell of claim 2, wherein the immune cell is a T cell or a natural killer (NK) cell.

4. A pharmaceutical composition comprising an immune cell which comprises a bispecific chimeric antigen receptor (CAR), wherein the bispecific CAR comprises an amino acid sequence set forth in SEQ ID NO: 16, and wherein the bispecific CAR comprises an anti-CD20 antigen-binding region and an anti-CD19 antigen-binding region.

5. The bispecific chimeric antigen receptor (CAR) of claim 1, the immune cell of claim 2 or 3, or the pharmaceutical composition of claim 4 for use in therapy.

6. Use of a T cell or a NK cell comprising a bispecific chimeric antigen receptor (CAR), wherein the bispecific CAR comprises an amino acid sequence set forth in SEQ ID NO: 16, and wherein the bispecific CAR comprises an anti-CD20 antigen-binding region and an anti-CD19 antigen-binding region in the manufacture of a medicament for the treatment of a B-cell malignancy.

7. The use of claim 6, wherein the anti-CD20 antigen-binding region comprises a light chain variable region (V_L1) and a heavy chain variable region (V_H1) having amino

acid sequences set forth in SEQ ID NO: 4 and SEQ ID NO: 3, respectively, wherein V_L1 is located at the N-terminus of V_H1, and the anti-CD19 antigen-binding region comprises a light chain variable region (V_L2) and a heavy chain variable region (V_H2) having amino acid sequences set forth in SEQ ID NO: 5 and SEQ ID NO: 6, respectively, wherein V_H2 is located at the N-terminus of V_L2.

8. The use of claim 7, wherein the B-cell malignancy is non-Hodgkin's lymphoma.

9. The use of claim 7, wherein the B-cell malignancy is chronic lymphocytic leukemia (CLL), B-cell acute lymphoblastic leukemia (B-ALL), diffuse large B cell lymphoma (DLBCL), or combinations thereof.

10. The use of claim 7, wherein the T cell or NK cell is allogeneic or autologous.

11. The use of claim 7, wherein the B-cell malignancy is B-cell leukemia or B-cell lymphoma.

12. The use of claim 6 wherein the medicament is to be administered to a subject in need thereof by infusion, injection, transfusion, implantation, or transplantation.

13. The use of claim 12, wherein the T cell or NK cell is to be administered intravenously, subcutaneously, intramuscularly, intraperitoneally, or through spinal administration.

14. The use of claim 13, wherein the T cell or NK cell is to be administered intravenously.

15. The use of claim 12, wherein the T cell or NK cell is allogeneic or autologous.

16. The use of claim 12, wherein the subject is a human.