In some embodiments, pharmaceutical formulations are provided. In some such embodiments, a pharmaceutical formulation comprises an immunoconjugate comprising an antibody that binds FcRH5, *e.g.*, as described herein. In some embodiments, the anti-FcRH5 antibody binds an isoform c-specific region of the extracellular domain of FcRH5c. In some embodiments, the anti-FcRH5 antibodies binds Ig-like domain 9 of FcRH5c. In some embodiments, a pharmaceutical formulation further comprises an additional therapeutic agent.

In some embodiments, methods of treating individuals having FcRH5 (*e.g.*, FcRH5c)-positive cancers are provided. In some such embodiments, a method comprises administering a pharmaceutical formulation comprising an immunoconjugate comprising an antibody that binds FcRH5 and/or an FcRH5 bispecific antibody, *e.g.*, as described herein. In some embodiments, the FcRH5 bispecific antibody comprises an FcRH5 binding arm and a CD3 binding arm. In some embodiments, the anti-FcRH5 antibody binds an isoform c-specific region of the extracellular domain of FcRH5c. In some embodiments, the anti-FcRH5 antibodies binds Ig-like domain 9 of FcRH5c. In some embodiments, the FcRH5-positive cancer is a B-cell proliferative disorder. In some embodiments, the FcRH5-positive cancer is plasma cell neoplasm. In some embodiments, the plasma cell neoplasm is multiple myeloma. In some embodiments, a method comprises administering an additional therapeutic agent to the individual.

In one aspect, there is provided the use of an effective amount of the antibody as disclosed herein and/or immunoconjugate as disclosed herein in the manufacture of a medicament for treating an individual having an FcRH5-positive cancer.

In some embodiments, methods of inhibiting proliferation of an FcRH5 (*e.g.*, FcRH5c)-positive cell are provided. In some embodiments, the method comprising exposing the cell to an immunoconjugate comprising an antibody that binds FcRH5 and/or an FcRH5 bispecific antibody under conditions permissive for binding of the antibody to FcRH5 on the surface of the cell. In some embodiments, the FcRH5 bispecific antibody comprises an FcRH5 binding arm and a CD3 binding arm. In some embodiments, the anti-FcRH5 antibody binds an isoform c-specific region of the extracellular domain of FcRH5c. In some embodiments, the anti-FcRH5 antibodies binds Ig-like domain 9 of FcRH5c. In some embodiments, the antibody that binds FcRH5 is an antibody described herein. In some embodiments, the FcRH5-positive cancer is a B-cell proliferative disorder. In some embodiments, the FcRH5-positive cancer is plasma cell neoplasm. In some embodiments, the plasma cell neoplasm is multiple myeloma. In some embodiments, a method comprises administering an additional therapeutic agent to the individual.

In some embodiments, an antibody that binds FcRH5 is conjugated to a .label. In some embodiments, the anti-FcRH5 antibody binds an isoform c-specific region of the extracellular domain of FcRH5c. In some embodiments, the anti-FcRH5 antibodies binds Ig-like domain 9 of FcRH5c. In some embodiments, the antibody that binds FcRH5 is an antibody described herein. In some embodiments, the label is a positron emitter. In some embodiments, the positron emitter is ^{89}Zr.

In some embodiments, a method of detecting human FcRH5 in a biological sample is provided. In some embodiments, a method comprises contacting the biological sample with an anti-FcRH5 antibody under conditions permissive for binding of the anti-FcRH5 antibody to a naturally occurring

human FcRH5, and detecting whether a complex is formed between the anti-FcRH5 antibody and a naturally occurring human FcRH5 in the biological sample. In some embodiments, the anti-FcRH5 antibody binds an isoform c-specific region of the extracellular domain of FcRH5c. In some embodiments, the anti-FcRH5 antibodies binds Ig-like domain 9 of FcRH5c. In some embodiments, the anti-FcRH5 antibody is an antibody described herein.

In some embodiments, a method for detecting an FcRH5-positive cancer is provided. In some such embodiments, a method comprises (i) administering a labeled anti-FcRH5 antibody to a subject having or suspected of having an FcRH5-positive cancer, and (ii) detecting the labeled anti-FcRH5 antibody in the subject, wherein detection of the labeled anti-FcRH5 antibody indicates an FcRH5-positive cancer in the subject. In some embodiments, the anti-FcRH5 antibody binds an isoform c-specific region of the extracellular domain of FcRH5c. In some embodiments, the anti-FcRH5 antibodies binds Ig-like domain 9 of FcRH5c. In some embodiments, an anti-FcRH5 antibody is an antibody described herein.

In on aspect, there is provided the use of a labeled anti-FcRH5 antibody in the manufacture of a medicament for detecting an FcRH5-positive cancer in a subject having or suspected of having a FcRH5-positive cancer, wherein the labeled anti-FcRH5 antibody comprises the anti-FcRH5 antibody as disclosed herein, wherein detection of the labeled anti-FcRH5 antibody indicates a FcRH5-positive cancer in the subject.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1(A) depicts the three major isoforms of FcRH5, FcRH5a (IRTA2a; UniProt Identifier Q96RD9-3), FcRH5b (IRTA2b; UniProt Identifier Q96RD9-4), and FcRH5c (IRTA2c; UniProt Identifier Q96RD9-1). The Ig-like domains are numbered and correspond to the amino acid sequence of UniProt Identifier Q69RD9-1 (SEQ ID NO:1): Ig-like domain 1 (aa ("amino acid") 23-100), Ig-like domain 2 (aa 105-185), Ig-like domain 3 (aa 188-271), Ig-like domain 4 (287-373), Ig-like domain 5 (aa 380-466), Ig-like domain 6 (aa 490-555), Ig-like domain 7 (aa 568-652), Ig-like domain 8 (aa 658-731), and Ig-like domain 9 (aa 754-835). FIG. 1(B) depicts part of FcRH5 (SEQ ID NO:136) and the structure and homology of FcRH5 amino acids 735 to 977 of FcRH5c (SEQ ID NO:2).

FIG. 2 shows binding of FcRH5 antibodies to SVT2 cells transfected with (A) human FcRH5 and (B) cyno FcRH5, in different concentrations.

FIG. 3 shows binding of FcRH5 antibodies to (A) EJM cells or (B) OPM2 cells transfected with human FcRH5, and binding of subclone supernatants (C) 5A10.1, (D) 5F1.1, (E) 3G7.1, and (F) 6D2.2 to MOLP2 cells which express FcRH5 endogenously.

FIG. 4 shows (A) binding of FcRH5 subclone supernatants to 293 cells transfected with WT or (B) mutant FcRH5 with deletion of 4 membrane proximal extracellular domains.

FIG. 5 shows binding of (A) the FcRH5 antibodies to FcRH5a by ELISA, and (B) binding of subclone supernatants to human B cells.

FIG. 6 shows binding of FcRH5 subclone supernatants to SVT2 cells transfected with (A) FcRH1, (B) FcRH2, (C) FcRH3, or (D) FcRH4.

FIG. 7 shows the binding of FcRH5 antibody subclone supernatants to NK cells.

FIG. 8 shows (A) killing activity of FcRH5 bisFabs, FcRH5-TDB (clone 10A8) and (B) HER2-TDB and (C) killing activity of FcRH5-bisFabs and (D) FcRH5-TDBs on FcRH5 transfected 293 cells.

59) A pharmaceutical formulation comprising the antibody of any one of claims 1-36 and/or the immunoconjugate of any one of claims 41- 58 and a pharmaceutically acceptable carrier.

60) The pharmaceutical formulation of claim 59, further comprising an additional therapeutic agent.

61) ~~A method~~ Use of an effective amount of the antibody of any one of claims 1-36 and/or immunoconjugate of any one of claims 41 to 59 in the manufacture of a medicament for treating an individual having an FcRH5-positive cancer~~, the method comprising administering to the individual an effective amount of the antibody of any one of claims 1-36 and/or immunoconjugate of any one of claims 41 to 59~~.

62) The ~~method~~ use of claim 61, wherein the FcRH5-positive cancer is a B-cell proliferative disorder.

63) The ~~method~~ use of any one of claims 61-62, wherein the medicament further comprisinges ~~administering~~ an additional therapeutic agent ~~to the individual~~.

64) A method of inhibiting proliferation of an FcRH5-positive cell, the method comprising exposing the cell to the antibody of any one of claims 1-36 and/or immunoconjugate of any one of claims 41-59 under conditions permissive for binding of the antibody and/or immunoconjugate to FcRH5 on the surface of the cell, thereby inhibiting proliferation of the cell.

65) The method of claim 64, wherein the cell is a B-cell.

66) The antibody of any one of claims 1-36 conjugated to a label.

67) The antibody of claim 66, wherein the label is a positron emitter.

68) The antibody of claim 67, wherein the positron emitter is ^{89}Zr.

69) A method of detecting human FcRH5 in a biological sample comprising contacting the biological sample with the anti-FcRH5 antibody of any one of claims 1-36 or 66-68 under conditions permissive for binding of the anti-FcRH5 antibody to a naturally occurring human FcRH5, and detecting whether a complex is formed between the anti-FcRH5 antibody and a naturally occurring human FcRH5 in the biological sample.

70) The method of claim 69, wherein the anti-FcRH5 antibody is an antibody as in claim 9 or claim 15.

71) The method of any one of claims 69-70, wherein the biological sample is a blood sample.

72) ~~A method~~ Use of a labeled anti-FcRH5 antibody in the manufacture of a medicament for detecting an FcRH5-positive cancer ~~comprising (i) administering a labeled anti-FcRH5 antibody to~~ in a subject having or suspected of having a FcRH5-positive cancer, wherein the labeled anti-FcRH5 antibody comprises the anti-FcRH5 antibody of any one of claims 1 to 36~~, and (ii) detecting the labeled anti-FcRH5 antibody in the subject~~, wherein detection of the labeled anti-FcRH5 antibody indicates a FcRH5-positive cancer in the subject.

73) The ~~method~~ use of 72, wherein the labeled anti-FcRH5 antibody comprises an anti-FcRH5 antibody conjugated to a positron emitter.

74) The ~~method~~ use of any one of claims 72-73, wherein the positron emitter is ^{89}Zr.