CLAIMS:

1. Use of an anti-CD123 immunoconjugate comprising an anti-CD123 antibody or antigen-binding fragment thereof linked to a DNA-alkylating agent in the manufacture of a medicament for the treatment of a hematological malignancy in a human subject, wherein the anti-CD123 immunoconjugate within the medicament is to be administered to the subject at a dose of 0.045 mg/kg, wherein the anti-CD123 antibody or antigen-binding fragment thereof comprises

   a. a heavy chain variable region CDR1 comprising the amino acid sequence of SEQ ID NO: 5; a heavy chain variable region CDR2 comprising the amino acid sequence of SEQ ID NO: 6; and a heavy chain variable region CDR3 comprising the amino acid sequence of SEQ ID NO: 7; and

   b. a light chain variable region CDR1 comprising the amino acid sequence of SEQ ID NO: 8; a light chain variable region CDR2 comprising the amino acid sequence of SEQ ID NO: 9; and a light chain variable region CDR3 comprising the amino acid sequence selected from the group consisting of: SEQ ID NO: 10, and

   wherein the immunoconjugate is for administration to the subject once per 21-day cycle.

2. The use of claim 1, wherein the medicament is to be administered for more than one cycle.

3. The use of claim 1, wherein the medicament is to be administered for at least 2 cycles, at least 3 cycles, at least 4 cycles, at least 5 cycles, at least 6 cycles, at least 7 cycles, at least 8 cycles, at least 9 cycles, or at least 10 cycles.

4. The use of claim 1, wherein the medicament is to be administered for about 2-4 cycles, about 2-6 cycles, about 2-8 cycles, or about 2-10 cycles.

5. The use of any one of claims 1-4, wherein the hematological malignancy is a relapsed hematological malignancy.

6. The use of any one of claims 1-4, wherein the hematological malignancy is acute myeloid leukemia (AML), myelodysplastic syndrome (MDS), B-cell acute lymphoblastic

leukemia (B-ALL), chronic myeloid leukemia in blast crisis/phase (BP-CML), or blastic plasmacytoid dendritic cell neoplasm (BPDCN).

7. The use of any one of claims 1-4, wherein the hematological malignancy is AML.

8. The use of claim 7, wherein the AML is relapsed AML and/or refractory AML.

9. The use of any one of claims 1-4, wherein the hematological malignancy is BPDCN.

10. The use of claim 9, wherein the BPDCN is relapsed BPDCN and/or refractory BPDCN.

11. The use of claim 9, wherein the BPDCN is front line BPDCN.

12. The use of claim 11, wherein the subject is unfit for intensive chemotherapy.

13. The use of claim 11 or 12, wherein the subject is not eligible for SL-401 therapy.

14. The use of any one of claims 1-4, wherein the hematological malignancy is ALL.

15. The use of claim 14, wherein the ALL is relapsed ALL and/or refractory ALL.

16. The use of any one of claims 1-4, wherein the hematological malignancy is chronic myelomonocytic leukemia (CMML).

17. The use of claim 16, wherein the CMML is relapsed CMML and/or refractory CMML.

18. The use of any one of claims 1-4, wherein the hematological malignancy is myelofibrosis (MF).

19. The use of claim 18, wherein the MF is relapsed MF and/or refractory MF.

20. The use of any one of claims 1-4, wherein the hematological malignancy is myelodysplastic syndrome (MDS).

21. The use of claim 20, wherein the MDS is relapsed MDS and/or refractory MDS.

22. The use of any one of claims 1-21, wherein the subject is a pediatric subject.

23. The use of any one of claims 1-22, wherein the hematological malignancy is a CD123-expressing hematological malignancy.

24. The use of any one of claims 1-23, wherein CD123 has been detected in a sample obtained from the hematological malignancy prior to the administration.

25. The use of claim 24, wherein the CD123 was detected using flow cytometry.

26. The use of any one of claims 1-25, wherein at least 80% of cells in the hematological malignancy express CD123.

27. The use of any one of claims 1-26, wherein CD123 has been detected in at least 80% of cells in a sample obtained from the hematological malignancy prior to the administration.

28. The use of any one of claims 1-27, wherein the subject has an absolute neutrophil count of greater than 500 neutrophils/μL.

29. The use of any one of claims 1-28, wherein the subject has received at least one prior line of therapy.

30. The use of any one of claims 1-29, wherein the subject has received at least two prior lines of therapy.

31. The use of any one of claims 1-30, wherein the subject has received at least three prior lines of therapy, at least four prior lines of therapy, or at least five prior lines of therapy.

32. The use of any one of claims 1-31, wherein the subject has been pretreated with a corticosteroid prior to administration of the medicament.

33. The use of claim 32, wherein the corticosteroid is prednisone, prednisolone, methylprednisolone, beclamethasone, betamethasone, fludrocortisone, hydrocortisone, and triamcinolonedexamethasone, or a combination thereof.

34. The use of any one of claims 1-33, wherein the medicament is to be administered intravenously.

35. The use of any one of claims 1-34, wherein the anti-CD123 antibody or antigen-binding fragment in the immunoconjugate of the medicament comprises a VH comprising the amino acid sequence set forth in SEQ ID NO:1 and a VL comprising the amino acid sequence set forth in SEQ ID NO: 2.

36. The use of any one of claims 1-35, wherein the anti-CD123 antibody or antigen-binding fragment in the immunoconjugate of the medicament comprises a heavy chain constant region and a light chain constant region.

37. The use of claim 36, wherein the heavy chain constant region comprises a human immunoglobulin IgG_1 heavy chain constant region and wherein the light chain constant region comprises a human immunoglobulin IgGκ light chain constant region.

38. The use of any one of claims 1-35, wherein the anti-CD123 antibody or antigen-binding fragment in the immunoconjugate of the medicament comprises a heavy chain comprising the amino acid sequence set forth in SEQ ID NO:3 and a light chain comprising the amino acid sequence set forth in SEQ ID NO:4.

39. The use of any one of claims 1-38, wherein the anti-CD123 antibody or antigen-binding fragment in the immunoconjugate of the medicament is a full-length antibody.

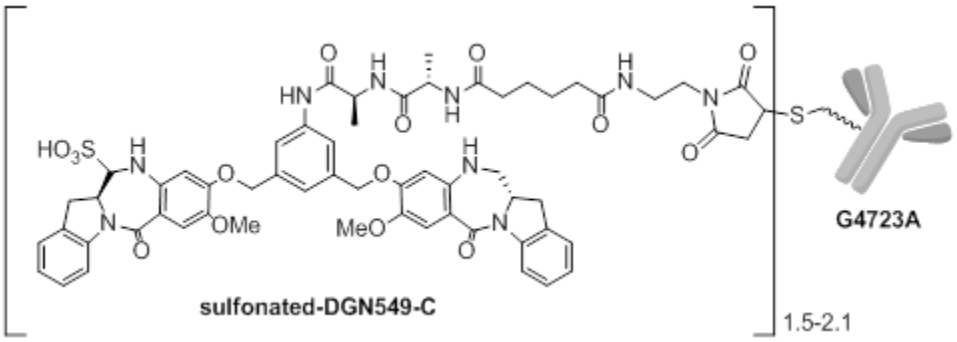
40. The use of any one of 1-36, wherein the anti-CD123 antibody or antigen-binding fragment in the immunoconjugate of the medicament is an antigen binding fragment.

41. The use of any one of claims 1-40, wherein the DNA alkylating agent is an indolino-benzodiazepine (IGN) DNA-alkylator.

42. The use of claim 41, wherein the IGN DNA-alkylator is DGN549-C.

43. The use of any one of claims 1-42, wherein the immunoconjugate comprises a peptide linker.

44. The use of any one of claims 1-43, wherein the medicament comprises immunoconjugates with the following structure:



, wherein G4723A comprises a heavy chain comprising the amino acid sequence set forth in SEQ ID NO:3 and a light chain comprising the amino acid sequence set forth in SEQ ID NO:4.

45. An anti-CD123 immunoconjugate comprising an anti-CD123 antibody or antigen-binding fragment thereof linked to a DNA-alkylating agent for use as a medicament for the treatment of a hematological malignancy in a human subject, wherein the anti-CD123 immunoconjugate within the medicament is to be administered to the human subject at a dose of 0.045 mg/kg, and the anti-CD123 antibody or antigen-binding fragment thereof comprises

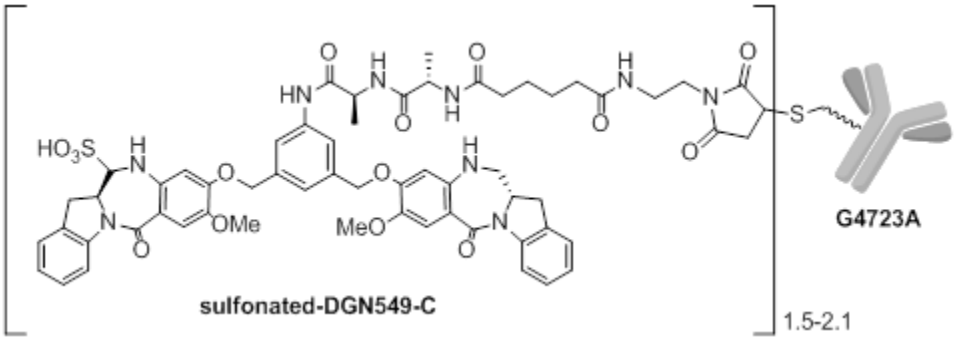
a. a heavy chain variable region CDR1 comprising the amino acid sequence of SEQ ID NO: 5; a heavy chain variable region CDR2 comprising the amino acid sequence of SEQ ID NO: 6; and a heavy chain variable region CDR3 comprising the amino acid sequence of SEQ ID NO: 7; and

b. a light chain variable region CDR1 comprising the amino acid sequence of SEQ ID NO: 8; a light chain variable region CDR2 comprising the amino acid sequence of

SEQ ID NO: 9; and a light chain variable region CDR3 comprising the amino acid sequence selected from the group consisting of: SEQ ID NO: 10, and wherein the immunoconjugate is for administration to the subject once per 21-day cycle.

46. The use of claim 45, wherein the anti-CD123 antibody or antigen-binding fragment in the immunoconjugate of the medicament comprises a VH comprising the amino acid sequence set forth in SEQ ID NO:1 and a VL comprising the amino acid sequence set forth in SEQ ID NO: 2.

47. The use of claim 45 or 46, wherein the medicament comprises immunoconjugates with the following structure:



, wherein G4723A comprises a heavy chain comprising the amino acid sequence set forth in SEQ ID NO:3 and a light chain comprising the amino acid sequence set forth in SEQ ID NO:4.

48. The use of any one of claims 45-47, wherein the DNA-alkylating agent is DGN549-C.

49. The use of any one of claims 45-48, wherein the medicament is to be administered intravenously.

50. The use of any one of claims 45-49, wherein the medicament is to be administered for more than one cycle.

51. The use of any one of claims 45-49, wherein the medicament is to be administered for at least 2 cycles, at least 3 cycles, at least 4 cycles, at least 5 cycles, at least 6 cycles, at least 7 cycles, at least 8 cycles, at least 9 cycles, or at least 10 cycles.

52. The use of any one of claims 45-51, wherein the hematological malignancy is AML.

53. The use of claim 52, wherein the AML is relapsed AML and/or refractory AML.

54. The use of any one of claims 45-51, wherein the hematological malignancy is BPDCN.

55. The use of claim 54, wherein the BPDCN is relapsed BPDCN and/or refractory BPDCN.

56. The use of claim 54, wherein the BPDCN is front line BPDCN.