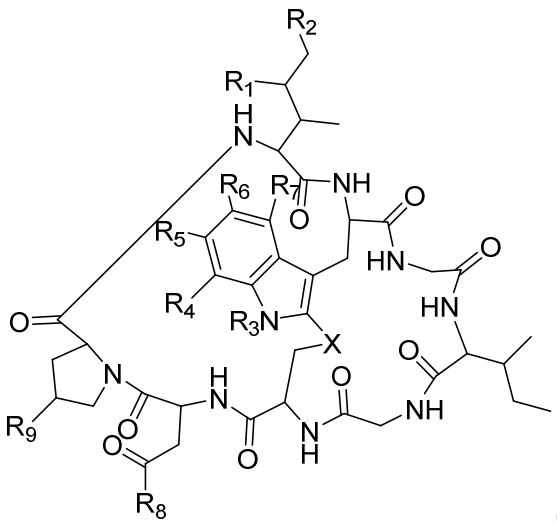
CLAIMS

1. Use of an effective amount of a conjugate comprising an antibody or antigen-binding fragment thereof capable of binding CD45RO, and an amatoxin, in the manufacture of a medicament for depleting a population of CD45RO+ cells in a human patient, wherein the antibody, or the antigen-binding fragment thereof, is internalized by a CD45RO+ cell, and wherein the antibody or antigen-binding fragment thereof conjugated to the amatoxin is represented by the formula Ab-Am, wherein Ab is the antibody or antigen-binding fragment thereof, and Am is the amatoxin represented by formula (**I**)



(**I**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or $-SO_2-$;

R_C is -L-Z;

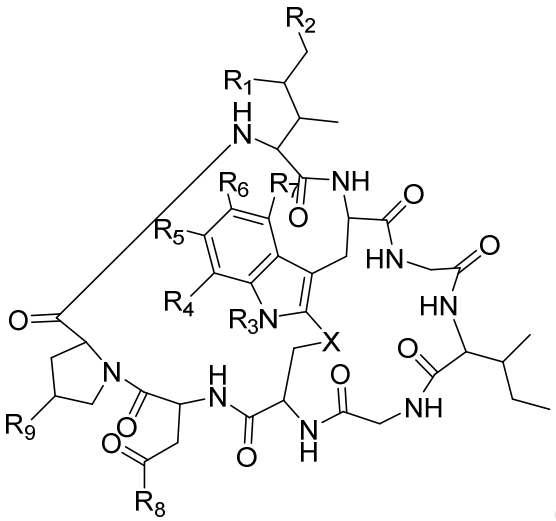
R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent.

2. Use of an effective amount of a conjugate comprising an antibody or antigen-binding fragment thereof capable of binding CD45RO, and an amatoxin, in the manufacture of a medicament for depleting a population of CD45RO+ cells in a human patient in need of a hematopoietic stem cell transplant, wherein the antibody, or the antigen-binding fragment thereof, is internalized by a CD45RO+ cell, and wherein the antibody or antigen-binding fragment thereof conjugated to the amatoxin is represented by the formula Ab-Am, wherein Ab is the antibody or antigen-binding fragment thereof, and Am is the amatoxin represented by formula (**I**)



(**I**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or $-SO_2-$;

R_C is -L-Z;

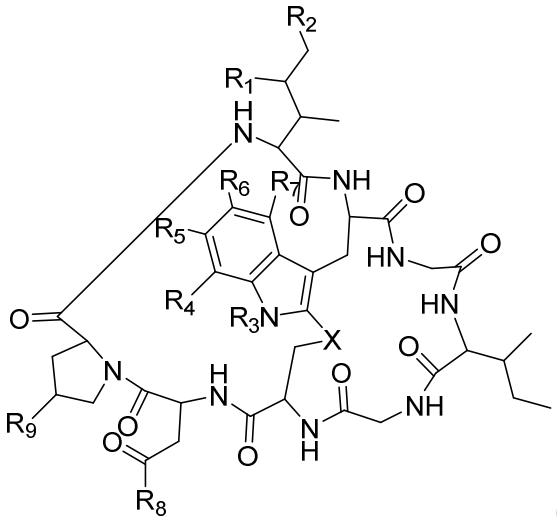
R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent.

3. Use of an effective amount of a conjugate comprising an antibody or antigen-binding fragment thereof capable of binding CD45RO, and an amatoxin, in the manufacture of a medicament for use in a method of hematopoietic stem cell transplantation in conjunction with a medicament comprising hematopoietic stem cells, wherein the antibody, or the antigen-binding fragment thereof, is internalized by a CD45RO+ cell, and wherein the medicament comprises an amount of the conjugate sufficient to deplete a population of CD45RO+ cells in the patient, wherein the antibody or antigen-binding fragment thereof conjugated to the amatoxin is represented by the formula Ab-Am, wherein Ab is the antibody or antigen-binding fragment thereof, and Am is the amatoxin represented by formula (**I**)



(**I**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or $-SO_2-$;

R_C is -L-Z;

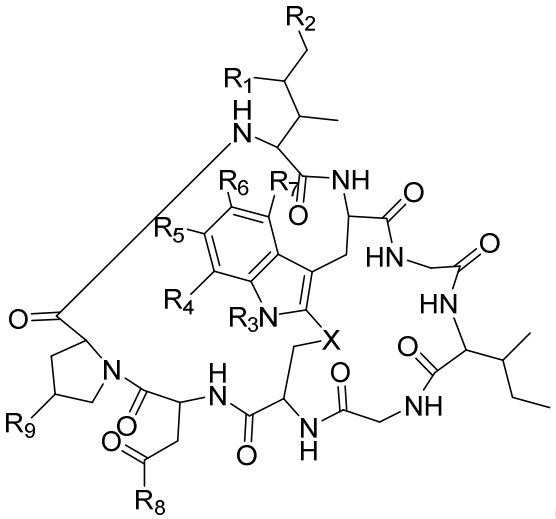
R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent.

4. Use of a conjugate comprising antibody or antigen-binding fragment thereof capable of binding CD45RO, and an amatoxin, in the manufacture of a medicament for depleting a population of CD45RO+ cells in a human patient prior to receipt of a hematopoietic stem cell transplant, wherein the medicament comprises an amount of the conjugate sufficient to deplete a population of CD45RO+ cells in the patient, and wherein the antibody or antigen-binding fragment thereof conjugated to the amatoxin is represented by the formula Ab-Am, wherein Ab is the antibody or antigen-binding fragment thereof, and Am is the amatoxin represented by formula (**I**)



(**I**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or $-SO_2-$;

R_C is -L-Z;

R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

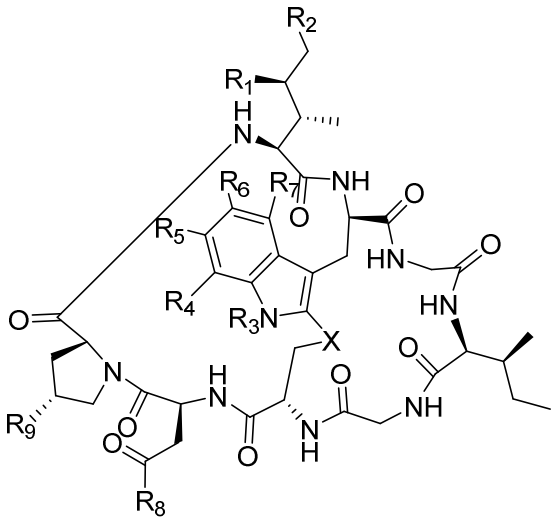
L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent.

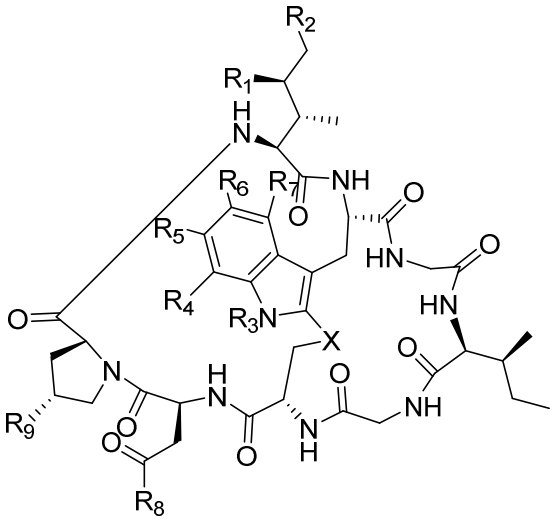
5. The use of any one of claims 1-4, wherein the amatoxin is selected from the group consisting of α-amanitin, β-amanitin, γ-amanitin, ε-amanitin, amanin, amaninamide, amanullin, amanullinic acid, and proamanullin.

6. The use of any one of claims 1-5, wherein Am is an amatoxin represented by formula (**IA**)



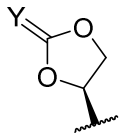
(**IA**).

7. The use of any one of claims 1-5, wherein Am is an amatoxin represented by formula (**IB**)



(**IB**).

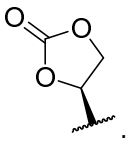
8. The use of claim 6 or 7, wherein R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form:



wherein Y is selected from O, S, NR_E, and $CR_ER_{E'}$, and

R_E and $R_{E'}$ are each independently C_1-C_6 alkylene-R_C, C_1-C_6 heteroalkylene-R_C, C_2-C_6 alkenylene-R_C, C_2-C_6 heteroalkenylene-R_C, C_2-C_6 alkynylene-R_C, C_2-C_6 heteroalkynylene-R_C, cycloalkylene-R_C, heterocycloalkylene-R_C, arylene-R_C, or heteroarylene-R_C.

9. The use of claim 8, wherein R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form:

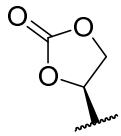


.

10. The use of claim 6 or 7, wherein R_1 is H, OH, or OR_A;

R_2 is H, OH, or OR_B;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form:



R_3, R_4, R_6, and R_7 are each H;

R_5 is OR_C;

R_8 is OH or NH_2; and

R_9 is H or OH.

11. The use of claim 6 or 7, wherein R_1 and R_2 are each independently H or OH; R_3 is R_C;

R_4, R_6, and R_7 are each H;

R_5 is H, OH, or OC_1-C_6 alkyl;

R_8 is OH or NH_2; and

R_9 is H or OH.

12. The use of claim 6 or 7, wherein R_1 and R_2 are each independently H or OH; R_3, R_6, and R_7 are each H;

R_4 and R_5 are each independently H, OH, OR_C, or R_C;

R_8 is OH or NH_2; and

R_9 is H or OH.

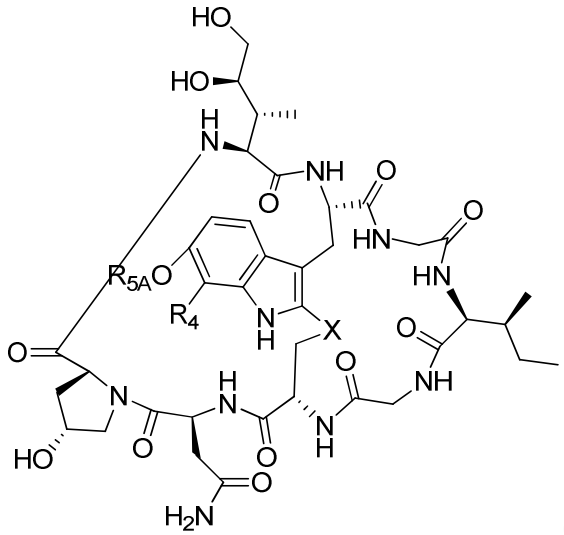
13. The use of claim 6 or 7, wherein R_1 and R_2 are each independently H or OH; R_3, R_6, and R_7 are each H;

R_4 and R_5 are each independently H or OH;

R_8 is OR_C or NHR_C; and

R_9 is H or OH.

14. The use of any one of claims 1-5, wherein the antibody or antigen-binding fragment thereof conjugated to the amatoxin is represented by the formula Ab-Am, wherein Ab is the antibody or antigen-binding fragment thereof, and Am is the amatoxin represented by formula (**II**)



(**II**)

wherein X is S, SO, or SO_2;

R_{5A} is L-Z; and

R_4 is H;

wherein

L is a peptide containing linker;

and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof.

15. The use of any one of claims 1-14, wherein the antibody or antigen-binding fragment thereof is selected from the group consisting of a monoclonal antibody or antigen-binding fragment thereof, a polyclonal antibody or antigen-binding fragment thereof, a humanized antibody or antigen-binding fragment thereof, a bispecific antibody or antigen-binding fragment thereof, a dual-variable immunoglobulin domain, a single-chain Fv molecule (scFv), a diabody, a triabody, a nanobody, an antibody-like protein scaffold, a Fv fragment, a Fab fragment, a $F(ab')_2$ molecule, and a tandem di-scFv.

16. The use of any one of claims 1-15, wherein the antibody has an isotype selected from the group consisting of IgG, IgA, IgM, IgD, and IgE.

17. The use of any one of claims 1-16, wherein the antibody has an IgG1 isotype.

18. The use of any one of claims 1-16, wherein the antibody or antigen-binding fragment thereof is capable of promoting necrosis of a cancer cell, autoimmune cell, or hematopoietic stem cell.

19. The use of any one of claims 2-18, wherein the antibody or antigen-binding fragment thereof is capable of recruiting one or more complement proteins to the hematopoietic stem cell upon administration to the patient.

20. The use of any one of claims 2-19, wherein the transplant comprising hematopoietic stem cells is administered to the patient after the concentration of the antibody or antigen-binding fragment thereof has substantially cleared from the blood of the patient.

21. The use of any one of claims 2-20, wherein the hematopoietic stem cells or progeny thereof maintain hematopoietic stem cell functional potential after two or more days following transplantation of the hematopoietic stem cells into the patient.

22. The use of any one of claims 2-21, wherein the hematopoietic stem cells or progeny thereof are capable of localizing to hematopoietic tissue and/or reestablishing hematopoiesis following transplantation of the hematopoietic stem cells into the patient.

23. The use of any one of claims 2-22, wherein upon transplantation into the patient, the hematopoietic stem cells give rise to recovery of a population of cells selected from the group consisting of megakaryocytes, thrombocytes, platelets, erythrocytes, mast cells, myeoblasts, basophils, neutrophils, eosinophils, microglia, granulocytes, monocytes, osteoclasts, antigen-presenting cells, macrophages, dendritic cells, natural killer cells, T-lymphocytes, and B-lymphocytes.

24. The use of any one of claims 1-23, wherein the patient is suffering from a stem cell disorder.

25. The use of any one of claims 1-24, wherein the patient is suffering from a hemoglobinopathy disorder.

26. The use of claim 25, wherein the hemoglobinopathy disorder is selected from the group consisting of sickle cell anemia, thalassemia, Fanconi anemia, aplastic anemia, and Wiskott-Aldrich syndrome.

27. The use of claim 25, wherein the hemoglobinopathy disorder is Fanconi anemia.

28. The use of claim 25, wherein the hemoglobinopathy disorder is aplastic anemia.

29. The use of claim 25, wherein the hemoglobinopathy disorder is sickle cell anemia.

30. The use of claim 25, wherein the hemoglobinopathy disorder is thalassemia.

31. The use of any one of claims 1-30, wherein the patient is suffering from a myelodysplastic disorder.

32. The use of any one of claims 1-31, wherein the patient is suffering from an immunodeficiency disorder.

33. The use of claim 32, wherein the immunodeficiency disorder is a congenital immunodeficiency.

34. The use of claim 32, wherein the immunodeficiency disorder is an acquired immunodeficiency.

35. The use of claim 34, wherein the acquired immunodeficiency is human immunodeficiency virus or acquired immune deficiency syndrome.

36. The use of any one of claims 1-35, wherein the patient is suffering from a metabolic disorder.

37. The use of claim 36, wherein the metabolic disorder is selected from the group consisting of glycogen storage diseases, mucopolysaccharidoses, Gaucher's Disease, Hurlers Disease, sphingolipidoses, and metachromatic leukodystrophy.

38. The use of any one of claims 1-37, wherein the patient is suffering from cancer.

39. The use of claim 38, wherein the cancer is selected from the group consisting of leukemia, lymphoma, multiple myeloma, and neuroblastoma.

40. The use of claim 38, wherein the cancer is a hematological cancer.

41. The use of claim 38, wherein the cancer is acute myeloid leukemia.

42. The use of claim 38, wherein the cancer is acute lymphoid leukemia.

43. The use of claim 38, wherein the cancer is chronic myeloid leukemia.

44. The use of claim 38, wherein the cancer is chronic lymphoid leukemia.

45. The use of claim 38, wherein the cancer is diffuse large B-cell lymphoma.

46. The use of claim 38, wherein the cancer is non-Hodgkin’s lymphoma.

47. The use of any one of claims 1-46, wherein the patient is suffering from a disorder selected from the group consisting of adenosine deaminase deficiency and severe combined immunodeficiency, hyper immunoglobulin M syndrome, Chediak-Higashi disease, hereditary lymphohistiocytosis, osteopetrosis, osteogenesis imperfecta, storage diseases, thalassemia major, systemic sclerosis, systemic lupus erythematosus, multiple sclerosis, and juvenile rheumatoid arthritis.

48. The use of any one of claims 1-47, wherein the patient is suffering from an autoimmune disorder.

49. The use of claim 48, wherein the autoimmune disorder is selected from the group consisting of multiple sclerosis, human systemic lupus, rheumatoid arthritis, inflammatory bowel disease, treating psoriasis, Type 1 diabetes mellitus, acute disseminated encephalomyelitis, Addison's disease, alopecia universalis, ankylosing spondylitisis, antiphospholipid antibody syndrome, aplastic anemia, autoimmune hemolytic anemia, autoimmune hepatitis, autoimmune inner ear disease, autoimmune lymphoproliferative syndrome, autoimmune oophoritis, Balo disease, Behcet's disease, bullous pemphigoid, cardiomyopathy, Chagas' disease, chronic fatigue immune dysfunction syndrome, chronic inflammatory demyelinating polyneuropathy, Crohn's disease, cicatrical pemphigoid, coeliac sprue-dermatitis herpetiformis, cold agglutinin disease, CREST syndrome, Degos disease, discoid lupus, dysautonomia, endometriosis, essential mixed cryoglobulinemia, fibromyalgia-fibromyositis, Goodpasture' s syndrome, Grave's disease, Guillain-Barre syndrome, Hashimoto' s thyroiditis, Hidradenitis suppurativa, idiopathic and/or acute thrombocytopenic purpura, idiopathic pulmonary fibrosis, IgA neuropathy, interstitial cystitis, juvenile arthritis, Kawasaki's disease, lichen planus, Lyme disease, Meniere disease, mixed connective tissue disease, myasthenia gravis, neuromyotonia, opsoclonus myoclonus syndrome, optic neuritis, Ord's thyroiditis, pemphigus vulgaris, pernicious anemia, polychondritis, polymyositis and dermatomyositis, primary biliary cirrhosis, polyarteritis nodosa, polyglandular syndromes, polymyalgia rheumatica, primary agammaglobulinemia, Raynaud phenomenon, Reiter' s syndrome, rheumatic fever, sarcoidosis, scleroderma, Sjögren's syndrome, stiff person syndrome, Takayasu's arteritis, temporal arteritis, ulcerative colitis, uveitis, vasculitis, vitiligo, vulvodynia, and Wegener's granulomatosis.

50. The use of claim 48, wherein the autoimmune disorder is scleroderma.

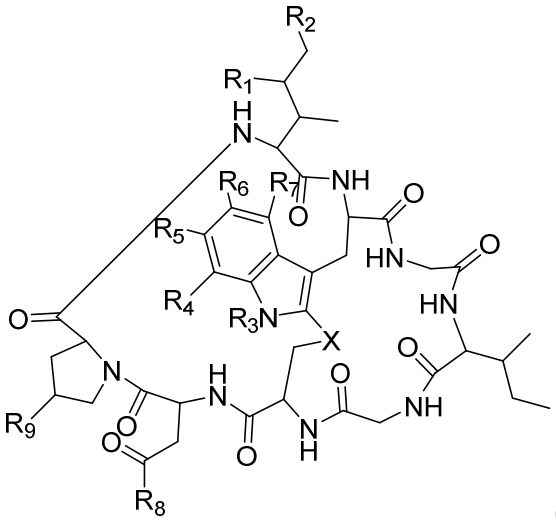
51. The use of claim 48, wherein the autoimmune disorder is multiple sclerosis.

52. The use of claim 48, wherein the autoimmune disorder is ulcerative colitis.

53. The use of claim 48, wherein the autoimmune disorder is Chrohn's disease.

54. The use of claim 48, wherein the autoimmune disorder is Type 1 diabetes.

55. Use of an effective amount of a conjugate represented by the formula Ab-Am in the manufacture of a medicament for depleting a population of CD45+ cells in a subject, , wherein Ab is an antibody or antigen-binding fragment thereof that binds CD45 and Am is an amatoxin, and wherein the antibody, or the antigen-binding fragment thereof, is internalized by a CD45+ cell, wherein the antibody or antigen-binding fragment thereof conjugated to the amatoxin is represented by the formula Ab-Am, wherein Ab is the antibody or antigen-binding fragment thereof, and Am is the amatoxin represented by formula (**I**)



(**I**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or $-SO_2-$;

R_C is -L-Z;

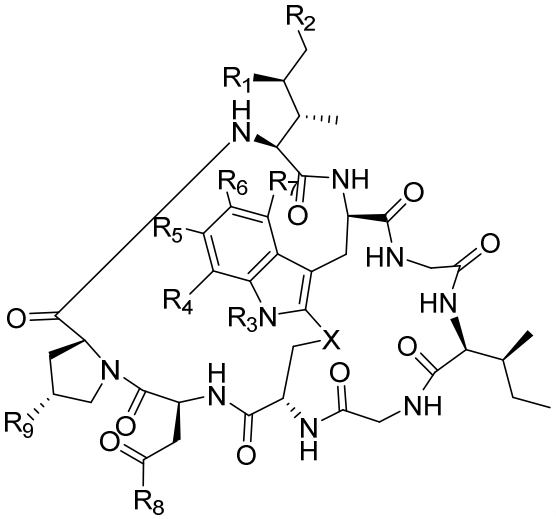
R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent.

56. The use of claim 55, wherein Am is represented by formula (**IA**)



(**IA**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or -SO_2-;

R_C is -L-Z;

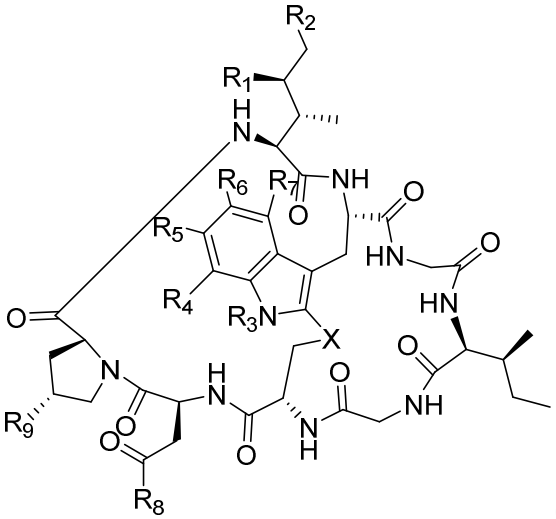
R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction between L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent.

57. The use of claim 55, wherein Am is represented by formula (**IB**)



(**IB**)

wherein R_1 is H, OH, OR_A, or OR_C;

R_2 is H, OH, OR_B, or OR_C;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form a 5-membered heterocycloalkyl group;

R_3 is H, R_C, or R_D;

R_4 is H, OH, OR_C, or OR_D;

R_5, R_6, and R_7 are each independently H, OH, OR_C, OR_D, R_C, or R_D;

R_8 is OH, NH_2, OR_C, OR_D, NHR_C, or NR_CR_D;

R_9 is H, OH, OR_C, or OR_D;

X is -S-, -S(O)-, or -SO_2-;

R_C is -L-Z;

R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl;

L is a peptide containing linker; and

Z is a chemical moiety formed from a coupling reaction L and a reactive substituent present within the antibody or antigen-binding fragment thereof,

wherein Am comprises exactly one R_C substituent

58. The use of claim 55, wherein the wherein the antibody or antigen-binding fragment thereof is conjugated to the amatoxin by way of a cysteine residue in the Fc domain of the antibody or antigen-binding fragment thereof.

59. The use of claim 58, wherein the cysteine residue is introduced by way of a mutation in the Fc domain of the antibody or antigen-binding fragment thereof.

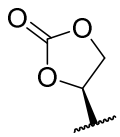
60. The use of claim 59, wherein the cysteine residue is selected from the group consisting of Cys118, Cys239, and Cys265.

61. The use of claim 59, wherein the cysteine residue is naturally occurring in the Fc domain of the antibody or antigen-binding fragment thereof.

62. The use of claim 61, wherein the Fc domain is an IgG Fc domain and the cysteine residue is selected from the group consisting of Cys261, Csy321, Cys367, and Cys425.

63. The use of claim 56 or 57, wherein R_1 is H, OH, or OR_A;
R_2 is H, OH, or OR_B;

R_A and R_B, when present, together with the oxygen atoms to which they are bound, combine to form:



R_3, R_4, R_6, and R_7 are each H;

R_5 is OR_C;

R_8 is OH or NH_2; and

R_9 is H or OH.

64. The use of claim 56 or 57, wherein R_1 and R_2 are each independently H or OH; R_3 is R_C;

R_4, R_6, and R_7 are each H;

R_5 is H, OH, or OC_1-C_6 alkyl;

R_8 is OH or NH_2; and

R_9 is H or OH.

65. The use of claim 56 or 57, wherein R_1 and R_2 are each independently H or OH; R_3, R_6, and R_7 are each H;

R_4 is OR_C, or R_C;

R_5 is H, OH, or OC_1-C_6 alkyl;

R_8 is OH or NH_2; and

R_9 is H or OH.

66. The use of claim 56 or 57, wherein R_1 and R_2 are each independently H or OH; R_3, R_6, and R_7 are each H;

R_4 and R_5 are each independently H or OH;

R_8 is OR_C or NHR_C; and

R_9 is H or OH.

67. The use of claim 55, wherein the antibody or antigen-binding fragment thereof binds CD45 with a K_d of from about 0.1 pM to about 1 µM.

68. The use of claim 55, wherein the antibody or antigen-binding fragment thereof binds CD45 with a k_{on} of from about 9×10^{-2} M^{-1} s^{-1} to about 1×10^{2} M^{-1} s^{-1}.

69. The use of claim 55, wherein the antibody or antigen-binding fragment thereof competitively inhibits the binding of CD45 to a second antibody or antigen binding fragment thereof,

wherein the second antibody or antigen-binding fragment thereof comprises the following complementarity determining regions (CDRs):

a. a CDR-H1 having the amino acid sequence SYAMS (SEQ ID NO: 16);
b. a CDR-H2 having the amino acid sequence AISGSGGSTFYADSVRG (SEQ ID NO: 17);
c. a CDR-H3 having the amino acid sequence EVMGPIFFDY (SEQ ID NO: 18);
d. a CDR-L1 having the amino acid sequence RASQSIISSALA (SEQ ID NO: 19);
e. a CDR-L2 having the amino acid sequence GASSRAT (SEQ ID NO: 20); and
f. a CDR-L3 having the amino acid sequence QQYGSTPLT (SEQ ID NO: 21).

70. The use of claim 55, wherein the antibody or antigen-binding fragment thereof is selected from the group consisting of a monoclonal antibody or antigen-binding fragment thereof, a polyclonal antibody or antigen-binding fragment thereof, a humanized antibody or antigen-binding fragment thereof, a bispecific antibody or antigen-binding fragment thereof, a dual-variable immunoglobulin domain, a single-chain Fv molecule (scFv), a diabody, a triabody, a nanobody, an antibody-like protein scaffold, a Fv fragment, a Fab fragment, a $F(ab')_2$ molecule, and a tandem di-scFV.

71. The use of claim 1-5, 56 or 57, wherein L is an enzyme cleavable peptide-containing linker.

72. The use of claim 71, wherein L comprises an arylene, and Z is formed from the coupling reaction between a maleimide moiety and a thiol moiety of a cysteine present within the antibody or antigen-binding fragment thereof.

73. The use of claim 72, wherein L further comprises a heteroalkylene and a heterocycloalkylene, wherein the heteroalkylene and heterocycloalkylene is each substituted with from 1 to 5 substituents independently selected for each occasion from the group consisting of alkyl and acyl.

74. The use of claim 1-5, 56 or 57, wherein R_D is C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl; wherein each C_1-C_6 alkyl, C_1-C_6 heteroalkyl, C_2-C_6 alkenyl, C_2-C_6 heteroalkenyl, C_2-C_6 alkynyl, C_2-C_6 heteroalkynyl, cycloalkyl, heterocycloalkyl, aryl, or heteroaryl is substituted with from 1 to 5 substituents independently selected for each occasion from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, alkyl aryl, alkyl heteroaryl, alkyl cycloalkyl, alkyl heterocycloalkyl, amino, ammonium, acyl, acyloxy, acylamino, aminocarbonyl, alkoxycarbonyl, ureido, carbamate, aryl, heteroaryl, sulfinyl, sulfonyl, alkoxy, sulfanyl, halogen, carboxy, trihalomethyl, cyano, hydroxy, mercapto, and nitro.

75. The use of claim 8, wherein each C_1-C_6 alkylene-R_C, C_1-C_6 heteroalkylene-R_C, C_2-C_6 alkenylene-R_C, C_2-C_6 heteroalkenylene-R_C, C_2-C_6 alkynylene-R_C, C_2-C_6 heteroalkynylene-R_C, cycloalkylene-R_C, heterocycloalkylene-R_C, arylene-R_C, or heteroarylene-R_C is substituted with from 1 to 5 substituents independently selected for each occasion from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, alkyl aryl, alkyl heteroaryl, alkyl cycloalkyl, alkyl heterocycloalkyl, amino, ammonium, acyl, acyloxy, acylamino, aminocarbonyl, alkoxycarbonyl, ureido, carbamate, aryl, heteroaryl, sulfinyl, sulfonyl, alkoxy, sulfanyl, halogen, carboxy, trihalomethyl, cyano, hydroxy, mercapto, and nitro.