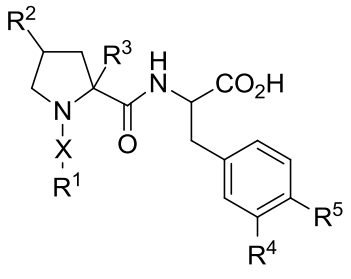
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A use of an effective amount of an antagonist of an α_9 integrin or an active portion thereof and a CXCR4 antagonist or an active portion thereof, preferably an $\alpha_9\beta_1$ integrin or an active portion thereof, more preferably in combination with an antagonist of α_4 integrin, more preferably an $\alpha_4\beta_1$ antagonist, or an active portion thereof, preferably in the absence of granulocyte-colony stimulating factor (G-CSF), in the preparation of a medicament for enhancing dislodgement and preferably release and/or mobilization of haematopoietic stem cells (HSC) and their precursors and progenitors thereof, preferably long term repopulating HSC and their precursors and progenitors and optionally selected from the group including $CD34^+$ cells, $CD38^+$, $CD90^+$, $CD133^+$, $CD34^+CD38^-$ cells, lineage-committed $CD34^-$ cells, or $CD34^+CD38^+$ cells; optionally $CD34^+$ or $CD34^+CD38^-$ cells from a bone marrow (BM) stem cell binding ligand to a BM stem cell niche, and/or enhances release of HSC and their precursors and progenitors thereof from the BM stem cell niche, and/or enhances mobilization of the HSC from the BM stem cell niche *in vivo* or *ex vivo*, preferably in the absence of G-CSF wherein the antagonist of an α_9 integrin is a compound of Formula (I) or a pharmaceutically acceptable salt thereof having the following formula:



(I)

wherein

X is selected from the group consisting of a bond and $–SO_2–$;

R^1 is selected from the group consisting of optionally substituted phenyl and pyridine, wherein the phenyl is optionally substituted with at least one halogen group;

R^2 is selected from the group consisting of H and a substituent group;

R^3 is selected from the group consisting of H and C_1-C_4 alkyl;

R^4 is selected from the group consisting of H and $–OR^6$; preferably R^4 is H;

R^5 is selected from the group consisting of H and $–OR^7$; preferably R^5 is $–OR^7$;

provided that when R^4 is H then R^5 is $–OR^7$ and when R^4 is $–OR^6$ then R^5 is H;

R^6 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^8, $–C(O)R^9$ and $–C(O)NR^{10}R^{11}$;

R^7 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$; preferably R^7 is selected from C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$;

R^8 is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, $–O(C_1$-C_4 alkyl), $–C(O)$-$(C_1$-C_4 alkyl), $–C(O)O$-$(C_1$-C_4 alkyl) and –CN;

R^9 is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl and optionally substituted heteroaryl;

R^{10} and R^{11}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring;

R^{12} is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, $–O(C_1$-C_4 alkyl), $–C(O)$-$(C_1$-C_4 alkyl), $–C(O)O$-$(C_1$-C_4 alkyl) and –CN; preferably R^{12} is selected from the group consisting of C_1-C_4 alkyl, –CN, $–O(C_1$-C_4 alkyl) and optionally substituted heteroaryl; preferably 5-tetrazolyl;

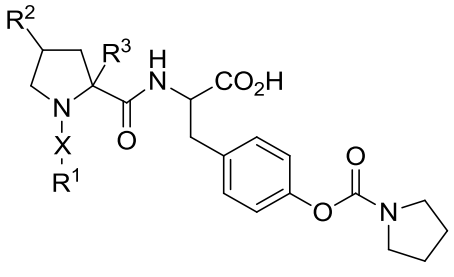
R^{13} is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted aryl and optionally substituted heteroaryl; preferably 2-pyrrolyl;

R^{14} and R^{15} are each independently selected from the group consisting of C_1-C_4 alkyl and optionally substituted aryl; preferably C_1–C_4 alkyl; or

R^{14} and R^{15}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring; preferably an optionally substituted pyrrolidinyl or morpholinyl ring; and

n at each occurrence is an integer in the range of from 1 to 3; preferably n is 1 or 2.

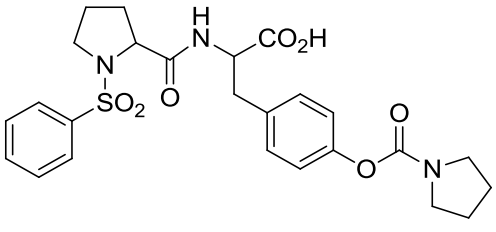
2. A use according to claim 1 wherein the compound of Formula (I) has the following Formula (Ia):



(Ia)

or a pharmaceutically acceptable salt thereof; or

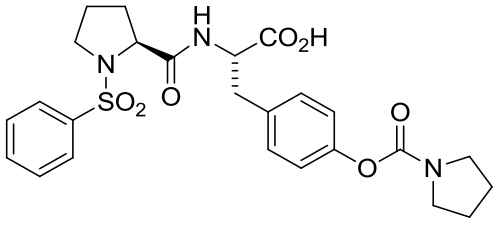
the compound of Formula (I) has the following Formula (Ib):



(Ib)

or a pharmaceutically acceptable salt thereof; or

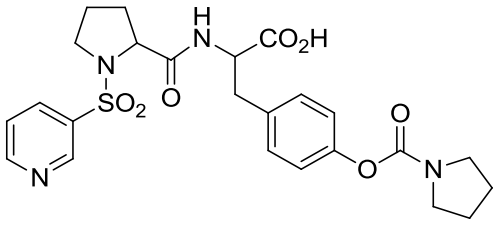
the compound of formula (I) has the following Formula (Ic):



(Ic)

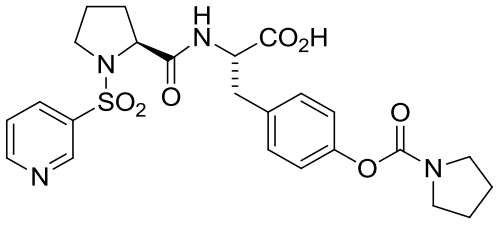
or a pharmaceutically acceptable salt thereof; or

the compound of Formula (I) has the following Formula (Id):


(Id)

or a pharmaceutically acceptable salt thereof; or

the compound of formula (I) has the following Formula (Ie):


(Ie)

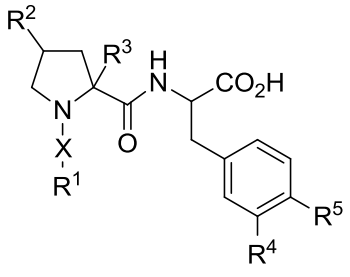
or a pharmaceutically acceptable salt thereof.

3. A use according to claim 1 or 2 wherein the CXCR4 antagonist or an active portion thereof is selected from the group including bicyclam derivatives, tetrahydroquinoline derivatives, cyclic peptides, para-xylyl-enediamine-based derivatives, isothiourea derivatives and POL6326, POL5551, CCTE-9908 and TG-0054 and optionally, the CXCR4 antagonist is AMD3100.

4. A use according to any one of claims 1 to 3 wherein the antagonist of an α_9 integrin or an active portion thereof and the CXCR4 antagonist or an active portion thereof is administered in combination, simultaneously or sequentially.

5. A use according to any one of claims 1 to 4 wherein the HSC and their precursors and progenitors thereof are further mobilized in the presence of a HSC mobilizing agent selected from the group comprising interleukin-17, cyclophosphamide (Cy), Docetaxel and G-CSF.

6. A composition for enhancing dislodgement of HSC and their precursors and progenitors thereof, preferably long term repopulating HSC and their precursors and progenitors and optionally selected from the group including $CD34^+$ cells, $CD38^+$, $CD90^+$, $CD133^+$, $CD34^+CD38^-$ cells, lineage-committed $CD34^-$ cells, or $CD34^+CD38^+$ cells; optionally $CD34^+$ or $CD34^+CD38^-$ cells from a BM stem cell binding ligand to a BM stem cell niche and/or enhances release of HSC and their precursors and progenitors thereof from the BM stem cell niche, and/or enhances mobilization of the HSC from the BM stem cell niche, preferably in the absence of G-CSF, said composition comprising an antagonist of α_9 integrin and a CXCR4 antagonist or an active portion thereof, preferably $\alpha_9\beta_1$ integrin or an active portion thereof, more preferably in combination with an antagonist of α_4 integrin, preferably $\alpha_4\beta_1$ integrin or an active portion thereof, wherein the α_9 integrin antagonist is a compound of Formula (I) or a pharmaceutically acceptable salt thereof having the formula:



(I)

wherein

X is selected from the group consisting of a bond and $–SO_2–$;

R^1 is selected from the group consisting of optionally substituted phenyl and pyridine, wherein the phenyl is optionally substituted with at least one halogen group;

R^2 is selected from the group consisting of H and a substituent group;

R^3 is selected from the group consisting of H and C_1-C_4 alkyl;

R^4 is selected from the group consisting of H and $–OR^6$; preferably R^4 is H;

R^5 is selected from the group consisting of H and $–OR^7$; preferably R^5 is $–OR^7$;

provided that when R^4 is H then R^5 is $–OR^7$ and when R^4 is $–OR^6$ then R^5 is H;

R^6 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^8, $–C(O)R^9$ and $–C(O)NR^{10}R^{11}$;

R^7 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$; preferably R^7 is selected from C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$;

R^8 is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, $–O(C_1$-C_4 alkyl), $–C(O)$-$(C_1$-C_4 alkyl), $–C(O)O$-$(C_1$-C_4 alkyl) and –CN;

R^9 is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl and optionally substituted heteroaryl;

R^{10} and R^{11}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring;

R^{12} is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, $–O(C_1$-C_4 alkyl), $–C(O)$-$(C_1$-C_4 alkyl), $–C(O)O$-$(C_1$-C_4 alkyl) and –CN; preferably R^{12} is selected from the group consisting of C_1-C_4 alkyl, –CN, $–O(C_1$-C_4 alkyl) and optionally substituted heteroaryl; preferably 5-tetrazolyl;

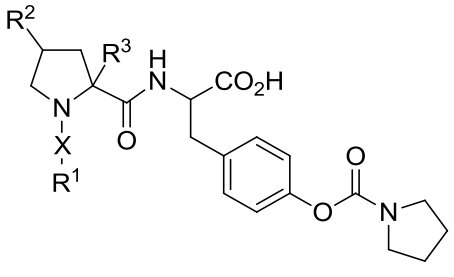
R^{13} is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted aryl and optionally substituted heteroaryl; preferably 2-pyrrolyl;

R^{14} and R^{15} are each independently selected from the group consisting of C_1-C_4 alkyl and optionally substituted aryl, preferably C_1–C_4 alkyl; or

R^{14} and R^{15}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring; preferably an optionally substituted pyrrolidinyl or morpholinyl ring; and

n at each occurrence is an integer in the range of from 1 to 3; preferably n is 1 or 2.

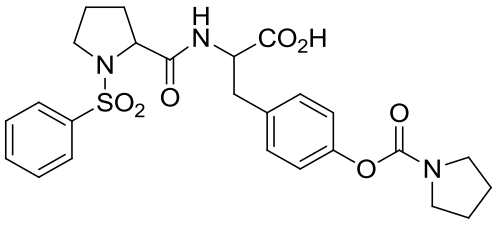
7. A composition according to claim 6 wherein the compound of Formula (I) has the following Formula (Ia):



(Ia)

or a pharmaceutically acceptable salt thereof; or

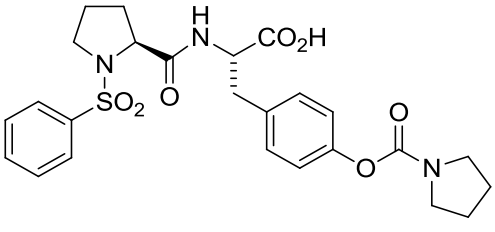
the compound of Formula (I) has the following Formula (Ib):



(Ib)

or a pharmaceutically acceptable salt thereof; or

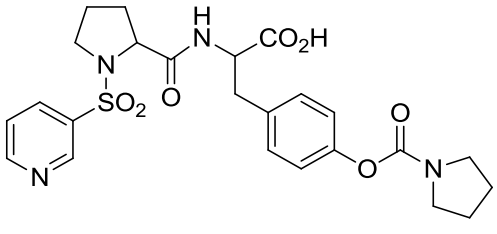
the compound of formula (I) has the following Formula (Ic):



(Ic)

or a pharmaceutically acceptable salt thereof; or

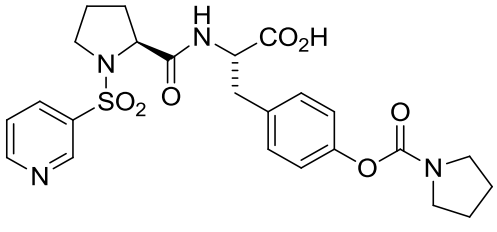
the compound of Formula (I) has the following Formula (Id):



(Id)

or a pharmaceutically acceptable salt thereof; or

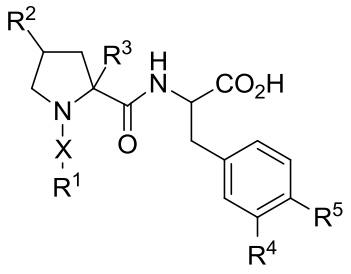
the compound of formula (I) has the following Formula (Ie):



(Ie)

or a pharmaceutically acceptable salt thereof.

8. A use of an effective amount of an antagonist of an α_9 integrin or an active portion thereof and a CXCR4 antagonist or an active portion thereof, preferably an $\alpha_9\beta_1$ integrin or an active portion thereof, more preferably in combination with an antagonist of α4 integrin, more preferably $\alpha4\beta_1$ integrin or an active portion thereof, , preferably in the absence of G-CSF for harvesting HSC from peripheral blood of a subject wherein said effective amount enhances dislodgement of HSC and their precursors and progenitors thereof from a BM stem cell binding ligand in a BM stem cell niche prior to harvesting the HSC wherein the α_9 antagonist is a compound of Formula (I) or a pharmaceutically acceptable salt thereof having the formula:



(I)

wherein

X is selected from the group consisting of a bond and $–SO_2–$;

R^1 is selected from the group consisting of optionally substituted phenyl and pyridine, wherein the phenyl is optionally substituted with at least one halogen;

R^2 is selected from the group consisting of H and a substituent group;

R^3 is selected from the group consisting of H and C_1-C_4 alkyl;

R^4 is selected from the group consisting of H and $–OR^6$; preferably R^4 is H;

R^5 is selected from the group consisting of H and $–OR^7$; preferably R^5 is $–OR^7$;

provided that when R^4 is H then R^5 is $–OR^7$ and when R^4 is $–OR^6$ then R^5 is H;

R^6 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^8, $–C(O)R^9$ and $–C(O)NR^{10}R^{11}$;

R^7 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$; preferably R^7 is selected from C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$;

R^8 is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, $–O(C_1$-C_4 alkyl), $–C(O)$-$(C_1$-C_4 alkyl), $–C(O)O$-$(C_1$-C_4 alkyl) and –CN;

R^9 is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl and optionally substituted heteroaryl;

R^{10} and R^{11}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring;

R^{12} is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, $–O(C_1$-C_4 alkyl), $–C(O)$-$(C_1$-C_4 alkyl), $–C(O)O$-$(C_1$-C_4 alkyl) and –CN; preferably R^{12} is selected from the group consisting of C_1-C_4 alkyl, –CN, $–O(C_1$-C_4 alkyl) and optionally substituted heteroaryl; preferably 5-tetrazolyl;

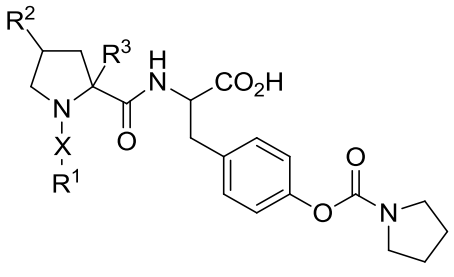
R^{13} is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted aryl and optionally substituted heteroaryl; preferably 2-pyrrolyl;

R^{14} and R^{15} are each independently selected from the group consisting of C_1-C_4 alkyl and optionally substituted aryl; preferably C_1–C_4 alkyl; or

R^{14} and R^{15}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring; preferably an optionally substituted pyrrolidinyl or morpholinyl ring; and

n at each occurrence is an integer in the range of from 1 to 3; preferably n is 1 or 2.

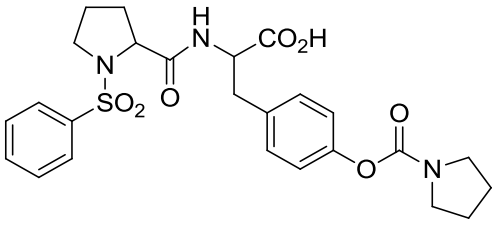
9. A use according to claim 8 wherein the compound of Formula (I) has the following Formula (Ia):



(Ia)

or a pharmaceutically acceptable salt thereof; or

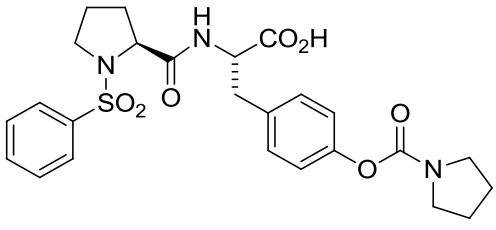
the compound of Formula (I) has the following Formula (Ib):



(Ib)

or a pharmaceutically acceptable salt thereof; or

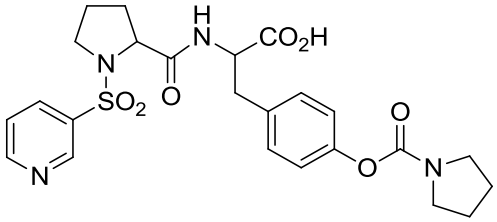
the compound of formula (I) has the following Formula (Ic):



(Ic)

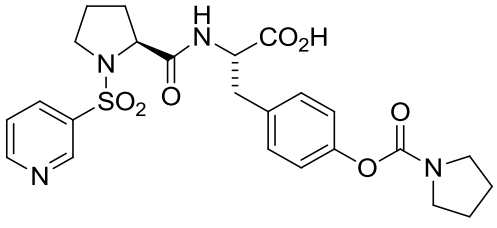
or a pharmaceutically acceptable salt thereof; or

the compound of Formula (I) has the following Formula (Id):


(Id)

or a pharmaceutically acceptable salt thereof; or

the compound of formula (I) has the following Formula (Ie):


(Ie)

or a pharmaceutically acceptable salt thereof.

10. A use according to claim 8 or 9 wherein the CXCR4 antagonist or an active portion thereof is selected from the group including bicyclam derivatives, tetrahydroquinoline derivatives, cyclic peptides, para-xylyl-enediamine-based derivatives, isothiourea derivatives and POL6326, POL5551, CCTE-9908 and TG-0054 and optionally, the CXCR4 antagonist is AMD3100.

11. A use according to any one of claims 1 to 4 or 8 to 10 wherein the HSC and their precursors and progenitors thereof are further mobilized in the presence of interleukin-17, cyclophosphamide (Cy), Docetaxel or G-CSF.

12. A use according to any one of claims 8 to 11 wherein the HSC are long term repopulating HSC/HPC and optionally selected from the group including CD34+ cells, $CD38^+$, $CD90^+$, $CD133^+$, $CD34^+CD38^-$ cells, lineage-committed $CD34^-$ cells, or $CD34^+CD38^+$ cells; optionally $CD34^+$ or $CD34^+CD38^-$ cells.

13. A use of an effective amount of an antagonist of an α_9 integrin or an active portion thereof and a CXCR4 antagonist or an active portion thereof, preferably an $\alpha_9\beta_1$ integrin or an active portion thereof, more preferably in combination with an antagonist of α4 integrin, preferably $\alpha4\beta_1$ integrin or an active portion thereof, preferably in the absence of G-CSF, in the preparation of a medicament for enhancing dislodgement and preferably release and/or mobilization of haematopoietic stem cells (HSC) and their precursors and progenitors thereof from a bone marrow (BM) stem cell binding ligand to a BM stem cell niche, and/or enhances release of HSC and their precursors and progenitors thereof from the BM stem cell niche, and/or enhances mobilization of the HSC from the BM stem cell niche *in vivo* or *ex vivo*, for harvesting HSC from peripheral blood of a subject in the treatment of a haematological disorder selected from the group including haematological neoplastic disorders, autoimmune diseases, cancers, and non-malignant disorders.

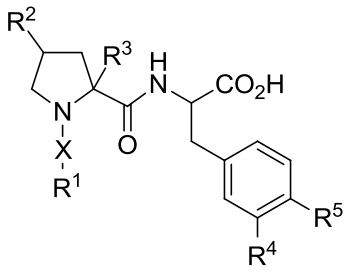
14. A use according to claim 13 wherein the haematological disorder is a haematological neoplastic disorder selected from poorly differentiated acute leukemias, myeloid disorders, lymphoid malignancies, and malignant lymphomas; autoimmune diseases are selected from multiple sclerosis (MS), myasthenia gravis, autoimmune neuropathy, scleroderma, aplastic anemia, and systemic lupus erythematosus; and non-malignant disorders are selected from aplastic anemia, a hemoglobinopathy, including sickle cell anemia, or an immune deficiency disorder.

15. A use according to claim 14 wherein the acute leukemias are selected from erythroblastic leukemia and acute megakaryoblastic leukemia; myeloid disorders are selected from acute promyeloid leukemia (APML), chronic myelogenous leukemia (CML); lymphoid malignancies are acute lymphoblastic leukemia (ALL); and malignant lymphomas are selected from Hodgkin's Disease and Medium/High grade (aggressive) Non-Hodgkin's lymphoma and variants thereof, peripheral T cell

lymphomas, adult T cell leukemia/lymphoma (ATL), cutaneous T-cell lymphoma (CTCL), large granular lymphocytic leukemia (LGF), Hodgkin's disease and Reed-Sternberg disease.

16. A use according to claim 15 wherein the acute lymphoblastic leukemia is selected from B-lineage ALL and T-lineage ALL, chronic lymphocytic leukemia (CLL), prolymphocytic leukemia (PLL), hairy cell leukemia (HLL) and Waldenstrom's macroglobulinemia (WM).

17. A use according to any one of claims 13 to 16 wherein the α_9 antagonist is a compound of Formula (I) or a pharmaceutically acceptable salt thereof having the formula:



(I)

wherein

X is selected from the group consisting of a bond and $–SO_2–$;

R^1 is selected from the group consisting of optionally substituted phenyl and pyridine, wherein the phenyl is optionally substituted with at least one halogen;

R^2 is selected from the group consisting of H and a substituent group;

R^3 is selected from the group consisting of H and C_1-C_4 alkyl;

R^4 is selected from the group consisting of H and $–OR^6$; preferably R^4 is H;

R^5 is selected from the group consisting of H and $–OR^7$; preferably R^5 is $–OR^7$;

provided that when R^4 is H then R^5 is $–OR^7$ and when R^4 is $–OR^6$ then R^5 is H;

R^6 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^8, $–C(O)R^9$ and $–C(O)NR^{10}R^{11}$;

R^7 is selected from the group consisting of H, C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$; preferably R^7 is selected from C_1-C_4 alkyl, $–(CH_2)_n$-R^{12}, $–C(O)R^{13}$ and $–C(O)NR^{14}R^{15}$;

R^8 is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, –O(C_1-C_4 alkyl), –C(O)-(C_1-C_4 alkyl), –C(O)O-(C_1-C_4 alkyl) and –CN;

R^9 is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, optionally substituted aryl and optionally substituted heteroaryl;

R^{10} and R^{11}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring;

R^{12} is selected from the group consisting of optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, –O(C_1-C_4 alkyl), –C(O)-(C_1-C_4 alkyl), –C(O)O-(C_1-C_4 alkyl) and –CN; preferably R^{12} is selected from the group consisting of C_1-C_4 alkyl, –CN, –O(C_1-C_4 alkyl) and optionally substituted heteroaryl; preferably 5-tetrazolyl;

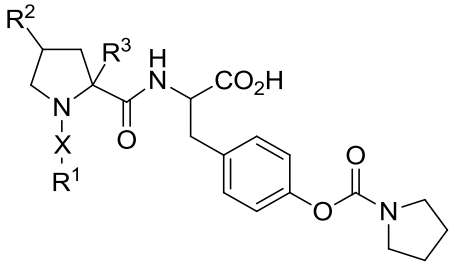
R^{13} is selected from the group consisting of optionally substituted cycloalkyl, optionally substituted aryl and optionally substituted heteroaryl; preferably 2-pyrrolyl;

R^{14} and R^{15} are each independently selected from the group consisting of C_1-C_4 alkyl and optionally substituted aryl; preferably C_1–C_4 alkyl; or

R^{14} and R^{15}, together with the nitrogen to which they are attached, form an optionally substituted heterocycloalkyl ring; preferably an optionally substituted pyrrolidinyl or morpholinyl ring; and

n at each occurrence is an integer in the range of from 1 to 3; preferably n is 1 or 2.

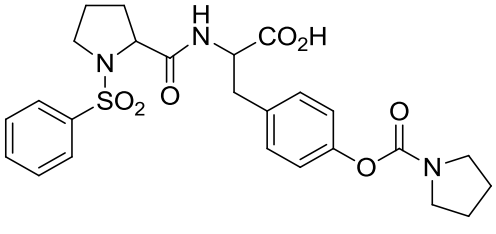
18. A use according to claim 17 wherein the compound of Formula (I) has the following Formula (Ia):



(Ia)

or a pharmaceutically acceptable salt thereof; or

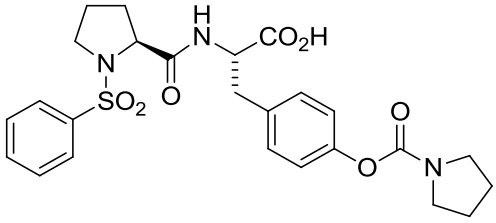
the compound of Formula (I) has the following Formula (Ib):



(Ib)

or a pharmaceutically acceptable salt thereof; or

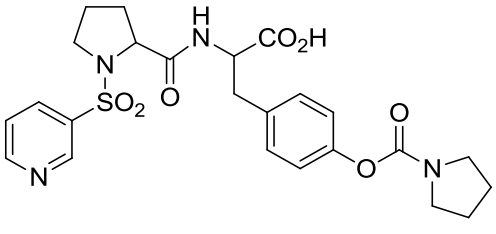
the compound of formula (I) has the following Formula (Ic):



(Ic)

or a pharmaceutically acceptable salt thereof; or

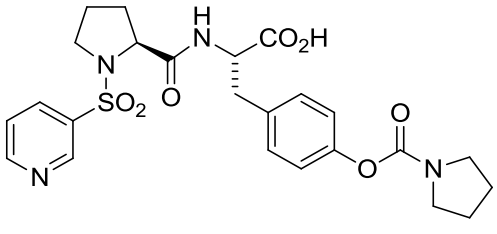
the compound of Formula (I) has the following Formula (Id):



(Id)

or a pharmaceutically acceptable salt thereof; or

the compound of formula (I) has the following Formula (Ie):



(Ie)

or a pharmaceutically acceptable salt thereof.

19. A use according to any one of claims 13 to 18 wherein the CXCR4 antagonist or an active portion thereof is selected from the group including bicyclam derivatives, tetrahydroquinoline derivatives, cyclic peptides, para-xylyl-enediamine-based derivatives, isothiourea derivatives and POL6326, POL5551, CCTE-9908 and TG-0054 and optionally, the CXCR4 antagonist is AMD3100.

20. A use according to any one of claims 13 to 19 wherein the HSC/HPC are further mobilized in the presence of a HSC mobilizing agent selected from the group comprising interleukin-17, cyclophosphamide (Cy), Docetaxel and granulocyte-colony stimulating factor (G-CSF)

21. A use according to any one of claims 13 to 20 wherein the harvested cells are long term repopulating HSC/HPC and optionally selected from the group including $CD34^+$ cells, CD38+, CD90+, CD133+, $CD34^+CD38^-$ cells, lineage-committed $CD34^-$ cells, or $CD34^+CD38^+$ cells; optionally $CD34^+$ or $CD34^+CD38^-$ cells, for transplantation to a patient for the treatment of the haematological disorder.