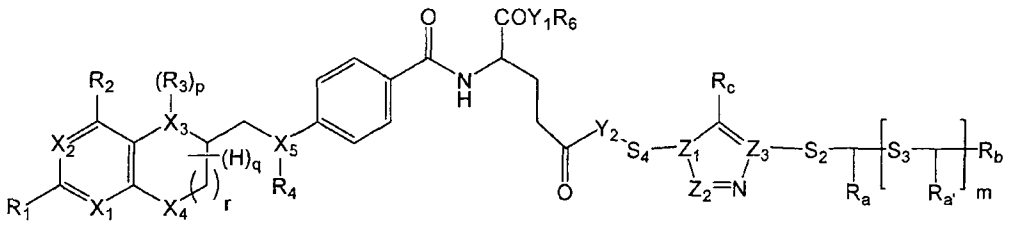
CLAIMS

1. A compound of formula V



V

wherein

X_1, X_2, X_3, X_4 and X_5 are independently of each other C or N;

Y_1 and Y_2 are independently of each other O or N;

Z_1 is N;

Z_2 and Z_3 are C;

R_1 and R_2 are independently of each other H, Hal, -OR', -NHR', C1-C12 alkyl, C1-C12 alkoxy, C1-C12 alkanoyl, C2-C12 alkenyl, C2-C12 alkynyl, (C1-C12 alkoxy)carbonyl, or (C1-C12 alkylamino)carbonyl, wherein R' is H or C1-C6 alkyl;

R_3 and R_4 are independently of each other H, formyl, iminomethyl, nitroso, C1-C12 alkyl, C1-C12 alkoxy, C1-C12 alkanoyl, or halosubstituted C1-C12 alkanoyl;

R_6 is H, C1-C12 alkyl, C1-C12 alkoxy, C1-C12 alkanoyl, C2-C12 alkenyl, C2-C12 alkynyl, (C1-C12 alkoxy)carbonyl, or (C1-C12 alkylamino)carbonyl;

S_2, S_3 and S_4 are independently of each other a single bond or a spacer, said spacer being straight chain or branched C1-C12 alkyl, which is unsubstituted or substituted by at least one -CN, -Hal, -OH, $-NH_2$, -SH, $-SO_3H$ or $-NO_2$, and wherein one or

more of the non-adjacent CH_2 groups may independently be replaced by -O-, -CO-, -CO-O-, -O-CO-, -NR′-, -N=, -NR′-CO-, -CO-NR′-, -NR′-CO-O-, -O-CO-NR′-, -NR′-CO-NR′-, -CH=CH-, -C≡C-, -S-, -SO_3R′-, -PR′- or a five- or six-membered aromatic carbocyclic or heterocyclic ring, which is unsubstituted or substituted with CN, Hal, NO_2, COR′ or COOR′, wherein R′ represents H or C1-C6 alkyl;

R_a is a hydrogen donor group, said hydrogen donor group being -OH, -NH_2 or -SH;

R_b is -COOR′, -CONHR′ or -COSR′, wherein R′ represents H or C1-C6 alkyl;

R_c is H;

m is 0;

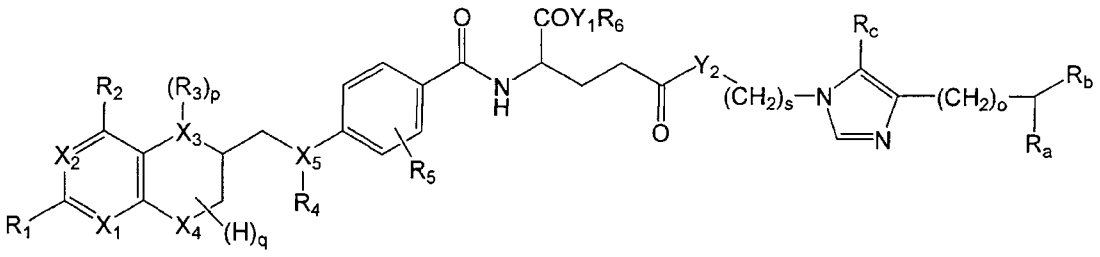
p has a value of 0, 1 or 2;

q has a value of 1 to 7; and

r is 1.

2. A compound according to claim 1 wherein S_2 and S_4 are independently of each other straight-chain or branched C1-C8 alkyl, which is unsubstituted or substituted by at least one CN, Hal, OH, or NO_2 and wherein one or more of non-adjacent CH_2 groups may independently be replaced by -O-, -CO-, -CO-O-, -NR′-, -NR′-CO- or -CO-NR′-, wherein R′ represents H or C1-C6 alkyl.

3. A compound according to claim 1 having compound of formula VII



VII

wherein

X_1, X_2, X_3, X_4 and X_5 are independently of each other N or C;

Y_1 and Y_2 are independently of each other O or N;

R_1 and R_2 are independently of each other H, Hal, -OR', -NHR', C1-C12 alkyl, C1-C12 alkoxy, C1-C12 alkanoyl, C2-C12 alkenyl, C2-C12 alkynyl, (C1-C12 alkoxy)carbonyl, or (C1-C12 alkylamino)carbonyl, wherein R' is H or C1-C6 alkyl;

R_3 and R_4 are independently of each other H, formyl, iminomethyl, nitroso, C1-C12 alkyl, C1-C12 alkoxy, C1-C12 alkanoyl or halosubstituted C1-C12 alkanoyl;

R_5 is H;

R_6 is H, C1-C12 alkyl, C1-C12 alkoxy, C1-C12 alkanoyl, C2-C12 alkenyl, C2-C12 alkynyl, (C1-C12 alkoxy)carbonyl, or (C1-C12 alkylamino)carbonyl;

R_a is a hydrogen donor group, said hydrogen donor group being -OH, $-NH_2$ or -SH;

R_b is -COOR', -CONHR' or -COSR', wherein R' represents H or C1-C6 alkyl;

R_c is H;

p has a value of 0, 1 or 2;

q has a value of 1 to 7;

s is 1 to 8; and

o is 1 to 6.

4. A compound according to any one of claims 1 to 3, wherein R_a is $-NH_2$, R_b is -OH and R_c is H.

5. A compound according to any one of claims 1 to 4, wherein R_6 is H or straight chain or branched C_1-C_{12} alkyl.

6. A complex comprising a compound according to any one of claims 1 to 5 and a radionuclide.

7. A complex according to claim 6 wherein the radionuclide is ^{99m}Tc, $^{186/188}Re$, $^{111}In^{+3}$, $^{67/68}Ga^{+3}$, $^{90}Y^{+3}$, $^{109}Pd^{+2}$, $^{105}Rh^{-3}$, ^{177}Lu, $^{64/67}Cu$ ^{166}Ho, or ^{213}Bi.

8. A method of production of a complex according to claim 6 or claim 7 comprising the steps of reacting said compound with the radionuclide optionally in the presence of a reducing agent to form said complex.

9. A pharmaceutical composition comprising at least one complex according to claim 6 or claim 7 and a pharmaceutically acceptable carrier therefor.

10. Complex according to claim 6 or claim 7 for use as a

diagnostic agent or as a radiotherapeutic agent.

11. Complex according to claim 6 or claim 7 for use in a method for diagnostic imaging of a cell or population of cells expressing a folate-receptor, wherein said complex is for administration in a diagnostic imaging amount to obtain a diagnostic image of said cell or population of cells.

12. Complex according to claim 6 or claim 7 for use in radiotherapy of tissues of a subject in need thereof, wherein said complex is for administration in therapeutically effective amounts to the subject, and the tissues are for receiving irradiation after localization of said complex in the tissues to achieve the desired therapeutic effect.

13. Method for in vitro detection of a cell expressing a folate receptor in a tissue sample which comprises contacting said tissue sample with a complex according to claim 6 or claim 7 in effective amounts and for sufficient time and conditions to allow binding to occur and detecting the binding by imaging techniques.

14. A single or multi-vial kit for use in diagnostic imaging or radiotherapy, the kit comprising in one or separate vials a compound according to any one of claims 1 to 5, a source of a pharmaceutically acceptable reducing agent, an instruction for said use and optional additives.

15. The pharmaceutical composition according to claim 9, wherein the composition comprises a diagnostic imaging amount of said at least one complex.

16. The kit according to claim 14, wherein said additives comprise a stannous salt.

17. The pharmaceutical composition according to claim 9 for use as a diagnostic agent or as a radiotherapeutic agent.

18. The pharmaceutical composition according to claim 9 for use in a method for diagnostic imaging of a cell or population of cells expressing a folate-receptor, wherein said composition is for administration in a diagnostic imaging amount to obtain a diagnostic image of said cell or population of cells.

19. The pharmaceutical composition according to claim 9 for use in radiotherapy of tissues of a subject in need thereof, wherein said composition is for administration in therapeutically effective amounts to the subject, and the tissues are for receiving irradiation after localization of said composition in the tissues to achieve the desired therapeutic effect.

20. Method for in vitro detection of a cell expressing a folate receptor in a tissue sample which comprises contacting said tissue sample with the composition according to claim 9 in effective amounts and for sufficient time and conditions to allow binding to occur and detecting the binding by imaging techniques.