WHAT IS CLAIMED:

1. Use of a first agent comprising a first targeting component coupled to a cancer therapeutic component, and a second agent comprising a second targeting component alone, for use in the preparation of a medicament for the treatment of cancer, wherein the second agent increases the uptake, internalization, and/or retention of the first targeting component coupled to a cancer therapeutic and

the first and second agents to treat cancer are to be administered to a subject having cancer.

2. The use of claim 1, wherein the cancer therapeutic component has a maximum tolerated dose, and either (1) the maximum tolerated dose of the cancer therapeutic component is to be administered or (2) less than the maximum tolerated dose of the cancer therapeutic component is to be administered.

3. A combination therapeutic for treating cancer comprising:

a first agent comprising a first targeting component coupled to a cancer therapeutic and

a second agent comprising a second targeting component alone, wherein the second agent increases the uptake, internalization, and/or retention of the first targeting component coupled to a cancer therapeutic.

4. The use of claim 1 or the combination therapeutic according to claim 3, wherein the first and second targeting components target the same molecular target.

5. The use of claim 1 or the combination therapeutic according to claim 3, wherein the first and second targeting components target different molecular targets on the same cell.

6. A method of imaging cancer in a subject, said method comprising:

providing a first agent comprising a first targeting component coupled to an imaging component;

providing a second agent comprising a second targeting component alone, wherein the second agent increases the uptake, internalization, and/or retention of the first targeting component coupled to an imaging component and

the first and second agents to image cancer are to be administered to a subject having cancer.

7. Use of a first agent comprising a first targeting component coupled to an imaging component in the manufacture of a medicament for the imaging of a cancer; and

a second agent comprising a second targeting component alone, wherein the second agent increases the uptake, internalization, and/or retention of the first targeting component coupled to an imaging component, wherein

the first and second agents are to be administered to a subject having cancer to image cancer.

8. A combination imaging system for imaging cancer comprising:

a first agent comprising a first targeting component coupled to an imaging component and

a second agent comprising a second targeting component alone, wherein the second agent increases the uptake, internalization, and/or retention of the first targeting component coupled to an imaging component.

9. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the first targeting component is selected from the group consisting of a protein, a peptide, and small molecule, and the second targeting component is an antibody or antigen binding portion thereof.

10. The use of claim 1 or combination therapeutic of claim 3, wherein the cancer therapeutic component is selected from the group consisting of a radionuclide and a chemotherapeutic agent.

11. The use of claim 1 or combination therapeutic of claim 3, wherein the cancer therapeutic component is

a) a radionuclide selected from the group consisting of ^{86}Re, ^{90}Y, ^{67}Cu, ^{169}Er, ^{121}Sn, ^{127}Te, ^{142}Pr, ^{143}Pr, ^{198}Au, ^{199}Au, ^{161}Tb, ^{109}Pd, ^{188}Rd, ^{166}Dy,^{166}Ho, ^{149}Pm, ^{151}Pm, ^{153}Sm, ^{159}Gd, ^{172}Tm, ^{169}Yb, ^{175}Yb, ^{177}Lu, ^{105}Rh, ^{111}Ag, ^{131}I, ^{177m}Sn, ^{225}Ac, ^{227}Th, ^{211}At, and combinations thereof; or

b) a chemotherapeutic agent selected from the group consisting of busulfan, cisplatin, carboplatin, chlorambucil, cyclophosphamide, ifosfamide, dacarbazine (DTIC), mechlorethamine (nitrogen mustard), melphalan, carmustine (BCNU), lomustine (CCNU), 5-fluorouracil (5-FU), capecitabine, methotrexate, gemcitabine, cytarabine (ara-C), fludarabine, dactinomycin, daunorubicin, doxorubicin (Adriamycin), idarubicin,

mitoxantrone, paclitaxel, docetaxel, cabazitaxel, etoposide (VP-16), vinblastine, vincristine, vinorelbine, prednisone, dexamethasone, tamoxifen, fulvestrant, anastrozole, letrozole, megestrol acetate, bicalutamide, flutamide, leuprolide, goserelin, L-asparaginase, tretinoin, maytansines, auristatins, pyrrolobenzodiazepines, duocarmycins, and combinations thereof.

12. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the cancer is prostate cancer, neuroendocrine cancer, breast cancer, or non-Hodgkins lymphoma.

13. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8 , wherein the first and second targeting components target the prostate specific membrane antigen (PSMA) receptor.

14. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the first targeting component is a PSMA receptor binding peptide or PSMA receptor inhibitor and the second targeting component is a PSMA receptor antibody or antigen binding portion thereof.

15. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the first targeting component is a peptide selected from the group consisting of PSMA-617, PSMA I&T, PSMA I&S, PSMA 1007, PSMA-11, DCFPyL, MIP-1404, MIP-1972, MIP-1095, rh(radiohybrid)PSMA, and other PSMA ligands/inhibitors, while the second targeting component is an antibody selected from the group consisting of J591, J415, E99, J533, D2B, 2G7, and 107-1A4.

16. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the first and second targeting components target the somatostatin receptor.

17. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the first and second targeting components target the HER receptor family.

18. The use of claim 1, combination therapeutic of claim 3, method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the first and second targeting components target CD20.

19. The method of imaging of claim 6, use of claim 7, or combination imaging system of claim 8, wherein the imaging component is selected from the group consisting of radiolabels, fluorescent labels, nuclear magnetic resonance active labels, chemiluminescent labels, enzymatic markers, radiation emitters, and combinations thereof.