CLAIMS

What is claimed is:

1. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2; and

administering a poly (ADP-ribose) polymerase (PARP) inhibitor to said cancer patient.

2. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2; and

administering a PARP inhibitor to said patient.

3. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2; and

administering a PARP inhibitor to said patient.

4. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2; and

administering a PARP inhibitor to said patient.

5. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2; and

administering a PARP inhibitor to said patient.

6. A method of treating cancer, said method comprising administering a poly (ADP-ribose) polymerase (PARP) inhibitor to a cancer patient identified to have deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2.

7. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering a PARP inhibitor to said patient, wherein said patient has been identified as having deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2.

8. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering a PARP inhibitor to said patient, wherein said patient has been identified as having deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2.

9. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering a PARP inhibitor to said patient, wherein said patient has been identified as having deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2.

~~10. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering a PARP inhibitor to said patient, wherein said patient has been identified as having deficiency in at least one gene involved in the homologous recombination repair (HRR) pathway, wherein the at least one gene involved in the HRR pathway is not BRCA1 or BRCA2.~~

~~11. The method of any one of claims 4, 5, 9, and 10, wherein the immune response is a humoral or cell mediated immune response.~~

~~12. The method of claim 11, wherein the immune response is a CD4 or CD8 T-cell response.~~

~~13. The method of claim 11, wherein the immune response is a B-cell response.~~

~~14. The method of any one of the preceding claims, wherein the deficiency in the at least one gene involved in the HRR pathway is identified using a pre-specified HRR gene panel.~~

~~15. The method of any one of claims 1-14, wherein the patient has a deficiency in an ATM gene and/or a BAP1 gene.~~

~~16. The method of claim 15, wherein the patient further has a deficiency in a BRCA gene.~~

~~17. The method of any one of claims 1-14, wherein the patient has a deficiency in at least one gene selected from the group consisting of RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, and RAD54L, and combinations thereof.~~

18. The method of any one of claims 1-14, wherein the patient has a deficiency in at least one gene selected from the group consisting of RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, RB1, and combinations thereof.

19. The method of any one of claims 1-14, wherein the at least one gene involved in the HRR pathway is selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, and combinations thereof.

20. The method of any one of claims 1-14, wherein the at least one gene involved in the HRR pathway is selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, RB1, and combinations thereof.

21. The method of any one of claims 1-14, wherein the at least one gene involved in the HRR pathway is selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, and combinations thereof.

22. The method of any one of claims 1-14, wherein the at least one gene involved in the HRR pathway is selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, RB1, and combinations thereof.

23. The method of any one of claims 1-15, wherein the pre-specified HRR gene panel comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or

more, fourteen or more, fifteen or more, sixteen or more, seventeen or more, eighteen or more, nineteen or more, twenty or more, twenty-one or more, twenty-two or more, twenty-three or more, twenty-four or more, twenty-five or more, twenty-six or more, twenty-seven or more, twenty-eight or more, twenty-nine or more, or thirty or more genes selected from the group consisting of RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, and RAD54L.

24. The method of any one of claims 1-15, wherein the pre-specified HRR gene panel comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, fifteen or more, sixteen or more, seventeen or more, eighteen or more, nineteen or more, twenty or more, twenty-one or more, twenty-two or more, twenty-three or more, twenty-four or more, twenty-five or more, twenty-six or more, twenty-seven or more, twenty-eight or more, twenty-nine or more, thirty, thirty-one, thirty-two, or more genes selected from the group consisting of RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, and RB1.

~~25. The method of any one of claims 1-15, wherein the pre-specified HRR gene panel comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, or fifteen or more genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, and XRCC2.~~

~~26. The method of any one of claims 1-15, wherein the pre-specified HRR gene panel comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, fifteen or more, sixteen or more, or seventeen or more genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, RB1.~~

~~27. The method of claim 24 or 25, wherein the pre-specified HRR gene panel comprises TP53.~~

~~28. The method of claim 24, 25 or 27, wherein the pre-specified HRR gene panel comprises RB1.~~

~~29. The method of claim 24 or 25, wherein the pre-specified HRR gene panel comprises each of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, and XRCC2.~~

~~30. The method of claim 24 or 25, wherein the pre-specified HRR gene panel comprises each of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, and RB1.~~

~~31. The method of any one of claims 1-15, wherein the pre-specified HRR gene panel comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, or eleven or more genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, and combinations thereof.~~

~~32. The method of any one of claims 1-15, wherein the pre-specified HRR gene panel comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, or thirteen~~

~~or more genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1 and combinations thereof.~~

~~33. The method of claim 3132, wherein the pre-specified HRR gene panel comprises each of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L~~

~~34. The method of claim 33, wherein the pre-specified HRR gene panel further comprises BAP1, RAD52, and/or XRCC2.~~

~~35. The method of any one of claims 25-34, wherein the pre-specified HRR gene panel further comprises one or more genes selected from the group consisting of RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, XRCC4, RECQL, ERCC8, FANCC, OGG1, WRN, XPA, MSH3, POLE2, LIG4, ERCC6, LIG3, RAD17, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, SMUG1, FANCF, NEIL1, and FANCE.~~

~~36. The method of any one of claims 25-35, wherein the pre-specified HRR gene panel further comprises one or more genes that is BRCA1 and/or BRCA2.~~

~~37. The method of claim 36, wherein the pre-specified HRR gene panel further comprises each of BRCA1 and BRCA2.~~

~~38. The method of claim 37, wherein the pre-specified HRR gene panel comprises each of ATM, ATR, BARD1, BRCA1, BRCA2, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.~~

~~39. The method of claim 36, wherein the pre-specified HRR gene panel further comprises BAP1, RAD52, and XRCC2.~~

~~40. The method of any one of claims 1-39, wherein a deficiency in at least one gene involved in the HRR pathway is a mono-allelic mutation.~~

41. The method of any one of claims 1-39, wherein a deficiency in at least one gene involved in the HRR pathway is a bi-allelic mutation.

42. The method of any one of claims 1-39, wherein a deficiency in at least one gene involved in the HRR pathway that is non BRCA1 or BRCA2 is a mono-allelic mutation.

43. The method of claim 40, wherein a mono-allelic mutation is a germline mutation.

44. The method of claim 40, wherein a mono-allelic mutation is a sporadic mutation.

45. The method of any one of claims 1-44, wherein a deficiency in at least one gene involved in the HRR pathway that is non BRCA1 or BRCA2 is a bi-allelic mutation.

46. The method of claim 45, wherein a bi-allelic mutation is a germline mutation.

47. The method of claim 45, wherein a bi-allelic mutation is a sporadic mutation.

48. The method of any one of claims 1-39, wherein a patient has a deficiency in two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, or fifteen or more genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, and XRCC2.

49. The method of any one of claims 1-39, wherein a patient has a deficiency in two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, fifteen or more, sixteen or more, seventeen or more genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, and RB1.

50. The method of any one of claims 1-39, wherein a patient has a deficiency in two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, or eleven or more genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.

~~51. The method of any one of claims 1-39, wherein a patient has a deficiency in two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, or thirteen or more genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~52. The method of any one of claims 48-53, wherein a patient has a deficiency in BAP1 or ATM.~~

~~53. The method of any one of claims 48-53, wherein a patient has a deficiency in one or more or two or more of BAP1, RAD52, and XRCC2.~~

~~54. The method of any one of claims 48-53, wherein the patient further comprises a deficiency in one or more genes selected from the group consisting of RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, XRCC4, RECQL, ERCC8, FANCC, OGG1, WRN, XPA, MSH3, POLE2, LIG4, ERCC6, LIG3, RAD17, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, SMUG1, FANCF, NEIL1, and FANCE.~~

~~55. The method of claim 54, wherein at least one gene having a deficiency has a bi-allelic mutation.~~

~~56. The method of claim 54, wherein each gene having a deficiency has a bi-allelic mutation.~~

~~57. The method of any one of claims 48-55, wherein at least one gene having a deficiency has a mono-allelic mutation.~~

~~58. The method of claim 57, wherein each gene having a deficiency has a mono-allelic mutation.~~

~~59. The method of claim 48, wherein a patient has a deficiency in each of the genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, and XRCC2.~~

~~60. The method of claim 50, wherein a patient has a deficiency in each of the genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.~~

~~61. The method of claim 60, wherein a patient has a deficiency in each of BAP1, RAD52, and XRCC2.~~

~~62. The method of any one of claims 59-61, wherein at least one gene having a deficiency has a bi-allelic mutation.~~

~~63. The method of any one of claims 59-61, wherein each gene having a deficiency has a bi-allelic mutation.~~

~~64. The method of any one of claims 59-62, wherein at least one gene having a deficiency has a mono-allelic mutation.~~

~~65. The method of claim 64, wherein each gene having a deficiency has a mono-allelic mutation.~~

~~66. The method of any one of claims 48-65, wherein the patient has a deficiency in BRCA1 and/or BRCA2.~~

~~67. The method of claim 66, wherein the patient has a deficiency in each of BRCA1 and BRCA2~~

~~68. The method of claim 67, wherein the patient has a deficiency in each of ATM, ATR, BARD1, BRCA1, BRCA2, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.~~

~~69. The method of claim 67, wherein the patient has a deficiency in each of ATM, ATR, BARD1, BRCA1, BRCA2, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, and RB1.~~

~~70. The method of claim 68 or 69, wherein the patient has a deficiency in each of BAP1, RAD52, and XRCC2.~~

~~71. The method of claim 68 or 69, wherein the patient has a deficiency in each of BAP1, RAD52, XRCC2, TP53, and RB1.~~

72. The method of any one of the preceding claims, wherein the deficiency in the at least one gene involved in the HRR pathway is identified by analyzing cancer cells.

73. The method of any one of the preceding claims, wherein the deficiency in the at least one gene involved in the HRR pathway is identified by analyzing non-cancer cells.

74. The method of claim 72 or 73, wherein the cancer cells or non-cancer cells are obtained from one or more body fluids.

75. The method of claim 74, wherein cancer cells or non-cancer cells are obtained from blood.

76. The method of claim 75, wherein cancer cells or non-cancer cells are obtained from whole blood.

77. The method of claim 75, wherein cancer cells or non-cancer cells are obtained from plasma.

78. The method of claim 74, wherein cancer cells or non-cancer cells are obtained from saliva, urine, and/or cerebrospinal fluid.

79. The method of claim 72 or 73, wherein cancer cells or non-cancer cells are obtained from one or more tissue samples.

80. The method of any one of claims 72 and 74-79, wherein the cancer cells are circulating tumor cells.

81. The method of any one of claims 1-80, wherein a deficiency in the at least one gene involved in the HRR pathway is identified by analyzing cell-free DNA.

82. The method of any one of claims 1-81, wherein a deficiency in the at least one gene involved in the HRR pathway is identified by sequencing, optionally next generation sequencing.

83. The method of any one of claims 1-82, wherein a deficiency in the at least one gene involved in the HRR pathway is identified by PCR.

84. The method of any one of claims 1-83, wherein a deficiency in the at least one gene involved in the HRR pathway is identified by an immunohistochemistry assay.

~~85. The method of any one of claims 1-84, wherein the PARP inhibitor is administered in the absence of determining the BRCA status of the patient.~~

~~86. The method of any one of claims 1-84, wherein the PARP inhibitor is administered prior to determining the BRCA status of the patient.~~

~~87. The method of any one of claims 1-84, wherein the PARP inhibitor is administered independent of the BRCA status of the patient.~~

~~88. The method of any one of claims 1-87, wherein the patient has no germline mutation in BRCA1 and/or BRCA2.~~

~~89. The method of any one of claims 1-87, wherein the patient has at least one germline mutation in BRCA1 and/or BRCA2.~~

~~90. The method of any one of claims 1-89, wherein the patient has no sporadic mutation in BRCA1 and/or BRCA2.~~

~~91. The method of any one of claims 1-89, wherein the patient has at least one sporadic mutation in BRCA1 and/or BRCA2.~~

~~92. The method of any one of claims 1-91, wherein the patient has no tumor BRCA1 and/or BRCA2 mutations.~~

~~93. The method of any one of claims 1-91, wherein the patient has at least one tumor BRCA1 and/or BRCA2 mutation.~~

~~94. The method of any one of claims 1-87, wherein the patient is gBRCA negative, tBRCA negative, or sBRCA negative.~~

~~95. The method of any one of claims 1-87, wherein the patient has no germline, or sporadic, or tumor mutation in BRCA1 and no germline, or sporadic, or tumor mutation in BRCA2.~~

~~96. The method of any one of claims 1-84 and 86-95, wherein the BRCA1 and/or BRCA2 status is determined by including BRCA1 and/or BRCA2 gene in a pre-specified HRR gene panel.~~

~~97. The method of claim 96, wherein the pre-specified HRR gene panel further comprises one or more, two or more, three or more, four or more, five or more, seven or~~

more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, or fifteen or more genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, and XRCC2.

98. The method of claim 96, wherein the pre-specified HRR gene panel further comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more, twelve or more, thirteen or more, fourteen or more, fifteen or more, sixteen or more, seventeen or more genes selected from the group consisting of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, and RB1.

99. The method of claim 96, wherein the pre-specified HRR gene panel further comprises each of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, and XRCC2.

100. The method of claim 96, wherein the pre-specified HRR gene panel further comprises each of ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, and RB1.

101. The method of claim 96, wherein the pre-specified HRR gene panel further comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.

102. The method of claim 96, wherein the pre-specified HRR gene panel further comprises one or more, two or more, three or more, four or more, five or more, seven or more, eight or more, nine or more, ten or more, eleven or more genes selected from the group consisting of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, and RB1.

103. The method of claim 101, wherein the pre-specified HRR gene panel further comprises each of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.

~~104. The method of claim 102, wherein the pre-specified HRR gene panel further comprises each of ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, and RAD54L.~~

~~105. The method of claim 103 or 104, wherein the pre-specified HRR gene panel further comprises each of BAP1, RAD52, and XRCC2.~~

~~106. The method of any one of claims 2-5 and 7-105, wherein the disorder is cancer.~~

~~107. The method of any one of claims 1-106, wherein said patient is suffering from or at risk of a cancer that is adenocarcinoma, adenocarcinoma of the lung, acute myeloid leukemia ("AML"), adrenocortical carcinoma, anal cancer, appendiceal cancer, B-cell derived leukemia, B-cell derived lymphoma, bladder cancer, brain cancer, breast cancer (*e.g.*, triple negative breast cancer (TNBC)), cancer of the fallopian tube(s), cancer of the testes, cerebral cancer, cervical cancer, choriocarcinoma, chronic myelogenous leukemia, colon adenocarcinoma, colon cancer, colorectal cancer, diffuse large B-cell lymphoma ("DLBCL"), endometrial cancer, epithelial cancer, esophageal cancer, Ewing's sarcoma, follicular lymphoma ("FL"), gall bladder cancer, gastric cancer, gastrointestinal cancer, glioma, head and neck cancer, a hematological cancer, hepatocellular cancer, Hodgkin's lymphoma/primary mediastinal B-cell lymphoma, kidney cancer, kidney clear cell cancer, laryngeal cancer, leukemia, liver cancer, lung cancer, lymphoma, melanoma, Merkel cell carcinoma, mesothelioma, monocytic leukemia, multiple myeloma, myeloma, a neuroblastic-derived CNS tumor, non-small cell lung cancer (NSCLC), oral cancer, ovarian cancer, ovarian carcinoma, pancreatic cancer, peritoneal cancer, primary peritoneal cancer, prostate cancer, relapsed or refractory classic Hodgkin's Lymphoma (cHL), renal cell carcinoma, rectal cancer, salivary gland cancer (*e.g.*, a salivary gland tumor), sarcoma, skin cancer, small cell lung cancer, small intestine cancer, squamous cell carcinoma of the anogenital region, squamous cell carcinoma of the esophagus, squamous cell carcinoma of the head and neck (SCHNC), squamous cell carcinoma of the lung, stomach cancer, T-cell derived leukemia, T-cell derived lymphoma, thymic cancer, a thymoma, thyroid cancer, uveal melanoma, urothelial cell carcinoma, uterine cancer, uterine endometrial cancer, uterine sarcoma, vaginal cancer, or vulvar cancer.~~

~~108. The method of any one of claims 1-106, wherein said patient is suffering or at risk of a cancer characterized by a mutation in an ATM gene and/or a BAP1 gene.~~

~~109. The method of any one of claims 1-106, wherein said patient is suffering or at risk of bladder cancer, breast cancer, cancer of the fallopian tube(s), cholagiocarcinoma, colon adenocarcinoma, endometrial cancer, esophageal cancer, Ewing's sarcoma, gastric cancer, kidney clear cell cancer, lung cancer, mesothelioma, ovarian cancer, pancreatic cancer, peritoneal cancer, prostate cancer, uterine endometrial cancer, or uveal melanoma.~~

~~110. The method of any one of claims 1-106, wherein said patient is suffering or at risk of pancreatic cancer, melanoma, cervical cancer, gastric cancer, uterine cancer, or lung cancer.~~

~~111. The method of claim 110, wherein the pancreatic cancer, melanoma, cervical cancer, gastric cancer, uterine cancer, or lung cancer is characterized by a bi-allelic mutation.~~

~~112. The method of any one of claims 1-106, wherein said patient is suffering or at risk of pancreatic cancer.~~

~~113. The method of claim 112, wherein the pancreatic cancer is characterized by a BRCA1/2 mutation.~~

~~114. The method of claim 113, wherein the BRCA1/2 mutation is a bi-allelic mutation.~~

~~115. The method of any one of claims 1-106, wherein said patient is suffering or at risk of lung cancer.~~

~~116. The method of claim 115, wherein the lung cancer is characterized by a mutation in a BAP1 gene.~~

~~117. The method of claim 116, wherein BAP1 gene mutation is bi-allelic.~~

~~118. The method of any one of claims 1-106, wherein said patient is suffering or at risk of liver cancer.~~

~~119. The method of claim 118, wherein the liver cancer is characterized by a mutation in a BAP1 gene.~~

~~120. The method of claim 119, wherein BAP1 gene mutation is bi-allelic.~~

~~121. The method of any one of claims 1-106, wherein said patient is suffering or at risk of melanoma.~~

~~122. The method of claim 108, wherein said patient is suffering or is at risk of breast cancer or triple negative breast cancer (TNBC).~~

~~123. The method of claim 108, wherein said patient is suffering or is at risk of lung cancer or non-small cell lung cancer (NSCLC).~~

~~124. The method of any one of claims 1-106, wherein the patient is suffering or at risk of a gynecological cancer.~~

~~125. The method of claim 124, wherein said patient is suffering or at risk of ovarian cancer, cervical cancer, fallopian tube cancer, or primary peritoneal cancer.~~

~~126. The method of any one of claims 1-125, wherein the cancer or disorder is recurrent cancer.~~

~~127. The method of any of the preceding claims, wherein the patient has previously been treated with one or more different cancer treatment modalities.~~

~~128. The method of claim 127, wherein the patient has previously been treated with one or more of radiotherapy, chemotherapy or immunotherapy.~~

~~129. The method of claim 127 or 128, wherein the patient has been treated with one, two, three, four, or five lines of prior therapy.~~

~~130. The method of claim 129, wherein the patient has been treated with one or two lines of prior therapy.~~

~~131. The method of claim 129, wherein the patient has been treated with one line of prior therapy.~~

~~132. The method of claim 129, wherein the patient has been treated with two lines of prior therapy.~~

~~133. The method of any one of claims 127-132, wherein the prior therapy is cytotoxic therapy.~~

~~134. The method of any one of claims 1-133, wherein the patient has undergone at least one cycle of a platinum-based chemotherapy.~~

~~135. The method of claim 134, wherein the cancer patient has undergone at least two cycles of a platinum-based chemotherapy.~~

~~136. The method of claim 134 or 135, wherein the cancer is platinum-sensitive.~~

~~137. The method of any one of claims 134-136, wherein the patient has a complete response or a partial response to the most recent cycle of platinum-based chemotherapy.~~

~~138. The method of any one of claims 134-137, wherein the patient has a complete response of a partial response to the penultimate cycle of platinum-based chemotherapy.~~

~~139. The method of any one of claims 134-138, wherein the administration of a PARP inhibitor is commenced within 8 weeks of the end of the last cycle of platinum-based chemotherapy.~~

~~140. The method of any one of claims 1-139, wherein the PARP inhibitor is administered daily for at least one 28-day cycle.~~

~~141. The method of claim 140, wherein the PARP inhibitor is administered daily for at least two, at least three, at least four, at least five, at least six, at least seven, at least eight, at least nine, at least ten, at least eleven, or at least twelve 28-day cycles.~~

~~142. The method of any one of claims 1-141, wherein the PARP inhibitor is administered daily for at least one 21-day cycle.~~

~~143. The method of claim 142, wherein the PARP inhibitor is administered daily for at least two, at least three, at least four, at least five, at least six, at least seven, at least eight, at least nine, at least ten, at least eleven, or at least twelve 21-day cycles.~~

~~144. The method of any one of claims 1-143, wherein the PARP inhibitor is administered daily for a period sufficient to achieve i) prolonged progression free survival as compared to control, or ii) a reduced hazard ratio for disease progression or death as compared to control.~~

~~145. The method of claim any one of claims 1-144, wherein the PARP inhibitor is a small molecule, a nucleic acid, a polypeptide (*e.g.*, an antibody), a carbohydrate, a lipid, a metal, or a toxin.~~

~~146. The method of any one of claims 1-145, further comprising administering one or more additional therapeutic agents in combination with administering a PARP inhibitor.~~

~~147. The method of claim 146, comprising administering a chemotherapeutic agent in combination with administering a PARP inhibitor.~~

~~148. The method of claim 147, wherein the chemotherapeutic agent is a platinum agent.~~

~~149. The method of claim 148, wherein the chemotherapeutic agent is cisplatin, carboplatin, oxaliplatin, nedaplatin, triplatin tetranitrate, phenanthriplatin, picoplatin, or satraplatin.~~

~~150. The method of claim 146, comprising administering an immune checkpoint inhibitor in combination with a PARP inhibitor.~~

~~151. The method of claim 150, comprising administering one, two, or three immune checkpoint inhibitors.~~

~~152. The method of claim 150 or 151, wherein an immune checkpoint inhibitor is an agent that inhibits programmed death-1 protein (PD-1) signaling, T-cell immunoglobulin domain and mucin domain 3 (TIM-3), cytotoxic T-lymphocyte-associated protein 4 (CTLA-4), lymphocyte activation gene-3 (LAG-3), or T cell immunoglobulin and ITIM domain (TIGIT).~~

~~153. The method of claim 150 or 151, wherein an immune checkpoint inhibitor is a T-cell immunoglobulin domain and mucin domain 3 (TIM-3) inhibitor.~~

~~154. The method of claim 150 or 151, wherein an immune checkpoint inhibitor is a cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) inhibitor.~~

~~155. The method of claim 150 or 151, wherein an immune checkpoint inhibitor is a lymphocyte activation gene-3 (LAG-3) inhibitor.~~

~~156. The method of claim 150 or 151, wherein an immune checkpoint inhibitor is a T cell immunoglobulin and ITIM domain (TIGIT) inhibitor.~~

~~157. The method of claim 150 or 151, wherein an immune checkpoint inhibitor is a programmed death-1 protein (PD-1) signaling inhibitor.~~

~~158. The method of claim 157, further comprising administering an immune checkpoint inhibitor that is a T-cell immunoglobulin domain and mucin domain 3 (TIM-3) inhibitor.~~

~~159. The method of claim 157 or 158, further comprising administering an immune checkpoint inhibitor that is a lymphocyte activation gene-3 (LAG-3) inhibitor.~~

~~160. The method of any one of claims 157-159, wherein the PD-1 signaling inhibitor is an antibody.~~

~~161. The method of claim 160, wherein the antibody is selected from the group consisting of BGB-A317, BI 754091, IBI308, INCSHR-1210, JNJ-63723283, JS-001, MEDI-0680, MGA-012, nivolumab, PDR001, pembrolizumab, PF-06801591, REGN-2810, TSR-042, atezolizumab, avelumab, CX-072, durvalumab, FAZ053, LY3300054, or PD-L1 millamolecule, or derivatives thereof.~~

~~162. The method of any one of claims 157-159, wherein the PD-1 signaling inhibitor is an anti-PD-L1/L2 agent.~~

~~163. The method of claim 162, wherein the anti-PD-L1/L2 agent is an antibody.~~

~~164. The method of claim 163, wherein the anti-PD-L1 antibody agent is atezolizumab, avelumab, CX-072, durvalumab, FAZ053, LY3300054, PD-L1 millamolecule, or derivatives thereof.~~

~~165. The method of any one of claims 157-164, wherein the PD-1 signaling inhibitor is administered intravenously.~~

~~166. The method of any one of claims 157-165, wherein the PD-1 signaling inhibitor and the PARP inhibitor are administered in 21-day treatment cycles or in 28-day treatment cycles.~~

~~167. The method of claim 166, wherein the PD-1 signaling inhibitor and the PARP inhibitor are each administered for~~

~~at least one, at least two, at least three, at least four, at least five, at least six, at least seven, at least eight, at least nine, at least ten, at least eleven, or at least twelve 21-day treatment cycles; or~~

~~at least one, at least two, at least three, at least four, at least five, at least six, at least seven, at least eight, at least nine, at least ten, at least eleven, or at least twelve 28-day treatment cycles.~~

~~168. The method of claim 166 or 167, wherein the PD-1 signaling inhibitor and the PARP inhibitor are each administered in 21-day treatment cycles.~~

~~169. The method of claim 166 or 167, wherein the PD-1 signaling inhibitor and the PARP inhibitor are each administered in 28-day treatment cycles.~~

~~170. The method of any one of claims 166-169, wherein the PARP inhibitor is administered once daily in a treatment cycle.~~

~~171. The method of claim 166-170, wherein the PD-1 signaling inhibitor is administered on the first day of the first treatment cycle.~~

~~172. The method of claim 171, wherein the PD-1 signaling inhibitor is administered on the first day of each new treatment cycle or within about three days of the first day of a new treatment cycle.~~

~~173. The method of any one of claims 166-172, wherein the PD-1 signaling inhibitor is administered once during each cycle.~~

~~174. The method of any one of claims 157-173, wherein the cancer is non-small cell lung cancer (NSCLC).~~

~~175. The method of claim 174, wherein the cancer is characterized by high expression of PD-L1.~~

~~176. The method of claim 174, wherein the cancer is characterized by low expression of PD-L1.~~

~~177. The method of any one of claims 1-176, wherein the PARP inhibitor is administered as an oral dose.~~

~~178. The method of claim 177, wherein the oral dose is administered in one or more unit dosage forms.~~

~~179. The method of claim 178, wherein the one or more unit dosage forms are capsules and/or tablets.~~

~~180. The method of any one of claims 1-179, wherein the PARP inhibitor is an agent that inhibits PARP-1 and/or PARP-2.~~

~~181. The method of any one of claims 1-180, wherein the PARP inhibitor is selected from the group consisting of: ABT-767, AZD 2461, BGB-290, BGP 15, CEP 8983, CEP 9722, DR 2313, E7016, E7449, fluzoparib, IMP 4297, INO1001, JPI 289, JPI 547, monoclonal antibody B3-LysPE40 conjugate, MP 124, niraparib, NU 1025, NU 1064, NU 1076, NU1085, olaparib, ONO2231, PD 128763, R 503, R554, rucaparib, SBP 101, SC 101914, Simmiparib, talazoparib, veliparib, WW 46, 2-(4-(trifluoromethyl)phenyl)-7,8-dihydro-5H-thiopyrano[4,3-d]pyrimidin-4-ol, and salts or derivatives thereof.~~

~~182. The method of claim 181, wherein the PARP inhibitor is niraparib, olaparib, rucaparib, talazoparib, or veliparib.~~

~~183. The method of claim 182, wherein the PARP inhibitor is niraparib.~~

~~184. The method of claim 183, wherein the PARP inhibitor is niraparib free base, niraparib tosylate, or niraparib tosylate monohydrate, or any combination thereof.~~

~~185. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L; and~~

~~administering niraparib to said cancer patient.~~

~~186. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L; TP53, or RB1 and~~

~~administering niraparib to said cancer patient.~~

~~187. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and~~

~~administering niraparib to said cancer patient.~~

188. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and

administering niraparib to said cancer patient.

189. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and

administering niraparib to said cancer patient.

190. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and

administering niraparib to said cancer patient.

191. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L, and

administering niraparib to said cancer patient.

~~192. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1, and~~

~~administering niraparib to said cancer patient.~~

~~193. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L;~~

~~administering niraparib to said cancer patient.~~

~~194. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1; and~~

~~administering niraparib to said cancer patient.~~

~~195. A method of treating cancer, said method comprising:~~

~~identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and~~

~~administering niraparib to said cancer patient.~~

196. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and

administering niraparib to said cancer patient.

197. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and

administering niraparib to said cancer patient.

198. A method of treating cancer, said method comprising:

identifying a cancer patient having deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and

administering niraparib to said cancer patient.

199. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC; and

administering niraparib to said patient.

200. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC, TP53, or RB1; and

administering niraparib to said patient.

201. The method of claim 199 or 200, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.

202. The method of claim 199 or 200, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, or TP53, or RB1.

203. The method of claim 199 or 200, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.

204. The method of claim 199 or 200, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.

205. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L; and

administering niraparib to said patient.

206. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1; and

administering niraparib to said patient.

207. The method of claim 205 or 206, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.

208. The method of claim 205 or 206, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.

209. The method of claim 205 or 206, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.

210. The method of claim 205 or 206, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.

211. The method of claim 205 or 206, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1,

~~MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~212. The method of claim 205 or 206, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~213. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and~~

~~administering niraparib to said patient.~~

~~214. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and~~

~~administering niraparib to said patient.~~

~~215. The method of claim 213 or 214, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~216. The method of claim 213 or 214, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~217. The method of claim 213 or 214, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~218. The method of claim 213 or 214, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~219. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L; and~~

~~administering niraparib to said patient.~~

~~220. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C,~~

~~LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1; and~~

~~administering niraparib to said patient.~~

~~221. The method of claim 219 or 220, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~222. The method of claim 219 or 220, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~223. The method of claim 219 or 220,, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~224. The method of claim 219 or 220,, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~225. The method of claim 219 or 220,, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~226. The method of claim 219 or 220,, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1,~~

~~MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1~~

~~227. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and~~

~~administering niraparib to said patient.~~

~~228. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and~~

~~administering niraparib to said patient.~~

~~229. The method of claim 227 or 228, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~230. The method of claim 227 or 228, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~231. The method of claim 227 or 228, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~232. The method of claim 227 or 228, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~233. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L; and

administering niraparib to said patient.

234. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1; and

administering niraparib to said patient.

235. The method of claim 233 or 234, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.

~~236. The method of claim 233 or 234, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~237. The method of claim 233 or 234, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~238. The method of claim 233 or 234, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~239. The method of claim 233 or 234, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~240. The method of claim 233 or 234, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~241. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2; and~~

~~administering niraparib to said patient.~~

242. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1; and

administering niraparib to said patient.

243. The method of claim 241 or 242, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.

244. The method of claim 241 or 242, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.

245. The method of claim 241 or 242, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.

246. The method of claim 241 or 242, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.

247. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:

identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5,

~~PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L; and~~

~~administering niraparib to said patient.~~

~~248. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising:~~

~~identifying said patient, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1; and~~

~~administering niraparib to said patient.~~

~~249. The method of claim 247 or 248, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~250. The method of claim 247 or 248, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~251. The method of claim 247 or 248, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~252. The method of claim 247 or 248, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~253. The method of claim 247 or 248, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~254. A method of treating cancer, said method comprising administering niraparib to a cancer patient identified to have deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~255. A method of treating cancer, said method comprising administering niraparib to a cancer patient identified to have deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~256. The method of claim 254 or 255, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~257. The method of claim 254 or 255, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~258. The method of claim 254 or 255, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~259. The method of claim 254 or 255, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~260. A method of treating cancer, said method comprising administering niraparib to a cancer patient identified to have deficiency in at least one gene that is BRCA1, BRCA2,~~

~~RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L.~~

~~261. A method of treating cancer, said method comprising administering niraparib to a cancer patient identified to have deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1.~~

~~262. The method of claim 260 or 261, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~263. The method of claim 260 or 261, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~264. The method of claim 260 or 261, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~265. The method of claim 260 or 261, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~266. The method of claim 260 or 261, said method comprising administering niraparib to a cancer patient identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~267. The method of claim 260 or 261, said method comprising administering niraparib to a cancer patient identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~268. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~269. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~270. The method of claim 268 or 269, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~271. The method of claim 268 or 269, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~272. The method of claim 268 or 269, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~273. The method of claim 268 or 269, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~274. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L.~~

~~275. A method of increasing T cell activation or T cell effector function in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN,~~

~~SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1.~~

~~276. The method of claim 274 or 275, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~277. The method of claim 274 or 275, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~278. The method of claim 274 or 275, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~279. The method of claim 274 or 275, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~280. The method of claim 274 or 275, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~281. The method of claim 274 or 275, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~282. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~283. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~284. The method of claim 282 or 283, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~285. The method of claim 282 or 283, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~286. The method of claim 282 or 283, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~287. The method of claim 282 or 283, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~288. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE,~~

~~XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L.~~

~~289. A method of reducing tumors or inhibiting the growth of tumor cells in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1.~~

~~290. The method of claim 288 or 289, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~291. The method of claim 288 or 289, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~292. The method of claim 288 or 289, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~293. The method of claim 288 or 289, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~294. The method of claim 288 or 289, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1,~~

~~BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~295. The method of claim 288 or 289, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~296. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~297. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~298. The method of claim 296 or 297, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~299. The method of claim 296 or 297, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~300. The method of claim 296 or 297, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~301. The method of claim 296 or 297, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~302. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L.~~

~~303. A method of inducing an immune response in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1.~~

~~304. The method of claim 302 or 303, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~305. The method of claim 302 or 303, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~306. The method of claim 302 or 303, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~307. The method of claim 302 or 303, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~308. The method of claim 302 or 303, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~309. The method of claim 302 or 303, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~310. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~311. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP1, or RB1.~~

312. The method of claim 310 or 311, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.

313. The method of claim 310 or 311, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.

314. The method of claim 310 or 311, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.

315. The method of claim 310 or 311, wherein said patient has a deficiency in at least one gene that is ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.

316. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5, MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, or RAD54L.

317. A method of enhancing an immune response or increasing the activity of an immune cell in a patient having a disorder that is responsive to poly (ADP-ribose) polymerase (PARP) inhibition, said method comprising administering niraparib to said patient, wherein said patient has been identified as having deficiency in at least one gene that is BRCA1, BRCA2, RFC2, XRCC6, POLD2, PCNA, RPA1, RPA2, ERCC3, UNG, ERCC5,

~~MLH1, LIG1, MSH6, POLD4, RFC5, DDB2 /// LHX3, POLD1, FANCG, POLB, XRCC1, MPG, ERCC1, TDG, FANCA, RFC4, RFC3, APEX2, RAD1, EXO1, FEN1, MLH3, MGMT, RAD51, XRCC4, RECQL, ERCC8, FANCC, OGG1, MRE11A, RAD52, WRN, XPA, BLM, MSH3, POLE2, RAD51C, LIG4, ERCC6, LIG3, RAD17, XRCC2, MUTYH, RFC1, RAD50, DDB1, XRCC5, PARP1, POLE3, XPC, MSH2, RPA3, MBD4, NTHL1, PMS2 /// PMS2CL, UNG2, APEX1, ERCC4, RECQL5, MSH5, POLD3, ERCC2, RECQL4, PMS1, ZFP276, POLE, XRCC3, NBN, SMUG1, FANCF, NEIL1, FANCE, ATM, ATR, BAP1, BARD1, BRIP1, PALB2, RAD51B, RAD51D, RAD54L, TP53, or RB1.~~

~~318. The method of claim 316 or 317, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, or RAD54L.~~

~~319. The method of claim 316 or 317, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD54L, TP53, or RB1.~~

~~320. The method of claim 316 or 317, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~321. The method of claim 316 or 317, wherein said patient has a deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, XRCC2, TP53, or RB1.~~

~~322. The method of claim 316 or 317, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2.~~

~~323. The method of claim 316 or 317, wherein said patient has been identified to have deficiency in at least one gene that is BRCA1, BRCA2, ATM, ATR, BAP1, BARD1, BLM, BRIP1, MRE11A, NBN, PALB2, RAD51, RAD51B, RAD51C, RAD51D, RAD52, RAD54L, or XRCC2, TP53, or RB1.~~

~~324. The method of any one of claims 185-323 wherein the patient does not have a deficiency in BRCA1 and BRCA2.~~

~~325. The method of any one of claims 185-323, wherein the patient has a recurring cancer that is ovarian cancer, fallopian tube cancer, or primary peritoneal cancer.~~

~~326. The method of claim 325, wherein the patient has undergone at least one cycle of platinum-based chemotherapy or at least two cycles of platinum-based chemotherapy, and wherein the patient has a complete or partial response to said platinum-based chemotherapy.~~

~~327. The method of any one of claims 185-323, wherein the patient has a cancer that is pancreatic cancer.~~

~~328. The method of any one of claims 185-323, wherein the patient has a cancer that is lung cancer.~~

~~329. The method of any one of claims 185-323, wherein the patient has a cancer that is non-small cell lung cancer.~~

~~330. The method of claim 327, further comprising administering a PD-1 inhibitor.~~

~~331. The method of any one of claims 185-330, wherein niraparib is administered daily at an oral dose of an amount equivalent to at least 100 mg of niraparib free base.~~

~~332. The method of claim 331, wherein niraparib is administered daily at an oral dose of an amount equivalent to about 100 mg of niraparib free base.~~

~~333. The method of claim 331, wherein niraparib is administered daily at an oral dose of an amount equivalent to about 200 mg of niraparib free base.~~

~~334. The method of claim 333, wherein the initial oral dose of niraparib administered to the patient is of an amount equivalent to about 200 mg of niraparib free base.~~

~~335. The method of claim 331, wherein niraparib is administered daily at an oral dose of an amount equivalent to about 300 mg of niraparib free base.~~

~~336. The method of claim 335, comprising~~

~~administering to a patient an oral dose of niraparib of an amount equivalent to about 300 mg of niraparib free base for a period of time; and~~

~~administering niraparib to the patient at a reduced oral dose of an amount equivalent to about 200 mg of niraparib free base.~~

~~337. The method of any one of claims 185-336, wherein the oral dose is administered in one or more unit dosage forms.~~

~~338. The method of claim 337, wherein the one or more unit dosage forms are capsules.~~

~~339. The method of claim 337, wherein the one or more unit dosage forms are tablets.~~

~~340. The method of any of claims 337-339, wherein the one or more unit dosage forms comprise niraparib in an amount equivalent to about 100 mg of niraparib free base.~~

~~341. The method of any one of claims 185-340, wherein the administered niraparib comprises niraparib tosylate monohydrate.~~

~~342. The method of any one of claims 185-341, further comprising administering one or more additional therapeutic agents in combination with administering niraparib.~~

~~343. The method of claim 342, comprising administering a chemotherapeutic agent in combination with administering niraparib.~~

~~344. The method of claim 343, comprising administering an immune checkpoint inhibitor in combination with niraparib.~~

~~345. The method of claim 344, comprising administering one, two, or three immune checkpoint inhibitors.~~

~~346. The method of claim 344 or 345, wherein an immune checkpoint inhibitor is an agent that inhibits programmed death-1 protein (PD-1) signaling, T-cell immunoglobulin domain and mucin domain 3 (TIM-3), cytotoxic T-lymphocyte-associated protein 4 (CTLA-4), lymphocyte activation gene-3 (LAG-3), or T cell immunoglobulin and ITIM domain (TIGIT).~~

~~347. The method of any one of claims 344-346, wherein an immune checkpoint inhibitor is a T-cell immunoglobulin domain and mucin domain 3 (TIM-3) inhibitor.~~

348. The method of any one of claims 344-346, wherein an immune checkpoint inhibitor is a cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) inhibitor.

349. The method of any one of claims 344-346, wherein an immune checkpoint inhibitor is a lymphocyte activation gene-3 (LAG-3) inhibitor.

350. The method of any one of claims 344-346, wherein an immune checkpoint inhibitor is a T-cell immunoglobulin and ITIM domain (TIGIT) inhibitor.

351. The method of any one of claims 344-346, wherein an immune checkpoint inhibitor is a programmed death-1 protein (PD-1) signaling inhibitor.

352. The method of claim 351, further comprising administering an immune checkpoint inhibitor that is a T-cell immunoglobulin domain and mucin domain-3 (TIM-3) inhibitor.

353. The method of claim 351 or 352, further comprising administering an immune checkpoint inhibitor that is a lymphocyte activation gene-3 (LAG-3) inhibitor.

354. The method of any one of claims 351-353, wherein the PD-1 signaling inhibitor is an antibody.

355. The method of claim 354, wherein the antibody is selected from the group consisting of BGB-A317, BI 754091, IBI308, INCSHR-1210, JNJ-63723283, JS-001, MEDI-0680, MGA-012, nivolumab, PDR001, pembrolizumab, PF-06801591, REGN-2810, TSR-042, atezolizumab, avelumab, CX-072, durvalumab, FAZ053, LY3300054, or PD-L1 millamolecule, or derivatives thereof.

356. The method of any one of claims 351-353, wherein the PD-1 signaling inhibitor is an anti-PD-L1/L2 agent.

357. The method of claim 356, wherein the anti-PD-L1/L2 agent is an antibody.

358. The method of claim 357, wherein the anti-PD-L1 antibody agent is atezolizumab, avelumab, CX-072, durvalumab, FAZ053, LY3300054, PD-L1 millamolecule, or derivatives thereof.

359. The method of any one of claims 351-358, wherein the PD-1 signaling inhibitor is administered intravenously.

~~360. The method of any one of claims 351-359, wherein the PD-1 signaling inhibitor and niraparib are administered in 21-day treatment cycles or in 28-day treatment cycles.~~

~~361. The method of claim 360, wherein the PD-1 signaling inhibitor and niraparib are each administered for~~

~~at least one, at least two, at least three, at least four, at least five, at least six, at least seven, at least eight, at least nine, at least ten, at least eleven, or at least twelve 21-day treatment cycles; or~~

~~at least one, at least two, at least three, at least four, at least five, at least six, at least seven, at least eight, at least nine, at least ten, at least eleven, or at least twelve 28-day treatment cycles.~~

~~362. The method of claim 360 or 361, wherein the PD-1 signaling inhibitor and niraparib are each administered in 21-day treatment cycles.~~

~~363. The method of claim 360 or 361, wherein the PD-1 signaling inhibitor and niraparib are each administered in 28-day treatment cycles.~~

~~364. The method of any one of claims 360-363, wherein niraparib is administered once daily in a treatment cycle.~~

~~365. The method of claim 360-364, wherein the PD-1 signaling inhibitor is administered on the first day of the first treatment cycle.~~

~~366. The method of claim 365, wherein the PD-1 signaling inhibitor is administered on the first day of each new treatment cycle or within about three days of the first day of a new treatment cycle.~~

~~367. The method of any one of claims 360-366, wherein the PD-1 signaling inhibitor is administered once during each cycle.~~

1. An invention not claimed in any divisional application.