What is claimed is:

1. Use of talazoparib, or a pharmaceutically acceptable salt thereof, and an anti-androgen, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the treatment of metastatic castration-sensitive prostate cancer, wherein a subject for the treatment of metastatic castration-sensitive prostate cancer has been identified as having at least one DNA damage repair gene mutation.

2. Use of a combination therapy which comprises talazoparib, or a pharmaceutically acceptable salt thereof, and an anti-androgen, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the treatment of metastatic castration-sensitive prostate cancer in a subject in need thereof, comprising a) detecting at least one DNA damage repair gene mutation from a biopsy of the metastatic cancer or a peripheral blood sample from the subject; and b) administering the combination therapy to the subject.

3. The use of of claim 1 or claim 2, wherein the at least one DNA damage repair gene mutation is selected from the group consisting of ATM, ATR, BRCA1, BRCA2, CDK12, CHEK2, FANCA, MLH1, MRE11A, NBN, PALB2, and RAD51C.

4. The use of any one of claims 1-3, wherein the subject is treatment naive.

5. The use of any one of claims 1-4, wherein the talazoparib, or pharmaceutically acceptable salt thereof, is talazoparib tosylate.

6. The use of any one of claims 1-5, wherein the anti-androgen, or a pharmaceutically acceptable salt thereof, is an androgen receptor inhibitor, or a pharmaceutically acceptable salt thereof.

7. The use of claim 6, wherein the anti-androgen is selected from the group consisting of:

abiraterone acetate,
enzalutamide,
N-desmethyl enzalutamide,
darolutamide, and
apalutamide;

or a pharmaceutically acceptable salt thereof.

8. The use of claim 6, wherein the anti-androgen is enzalutamide, or a pharmaceutically acceptable salt thereof.

9. The use of claim 8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 0.35 mg or about 0.5 mg once daily and the enzalutamide, or a pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 160 mg.

10. The use of claim 8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 0.35 mg once daily and the enzalutamide, or a pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 160 mg.

11. The use of claim 8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 0.5 mg once daily and the enzalutamide, or a pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 160 mg.

12. The use of any one of claims 1-8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 0.35 mg once daily.

13. The use of any one of claims 1-8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, is administered at a daily dosage of about 0.5 mg once daily.

14. The use of claim 8, wherein the enzalutamide, or a pharmaceutically acceptable salt thereof is administered at a daily dosage of about 160 mg.

15. The use of any one of claims 1-8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, and the anti-androgen, or pharmaceutically acceptable salt thereof, are each in an amount that is together effective in treating metastatic castration-sensitive prostate cancer.

16. The use of any one of claims 1-8, wherein the talazoparib, or pharmaceutically acceptable salt thereof, and the anti-androgen, or a pharmaceutically acceptable salt thereof, are administered concurrently.

17. The use of any one of claims 1-8, wherein the method comprises administering a further anti-cancer agent.

18. The use of claim 17, wherein the further anti-cancer agent is selected from the group consisting of an anti-tumor agent, an anti-angiogenesis agent, a signal transduction inhibitor, an antiproliferative agent, and androgen deprivation therapy.

19. The use of claim 18, wherein the androgen deprivation therapy is selected from the group consisting of a luteinizing hormone-releasing hormone agonist, a luteinizing hormone-releasing hormone antagonist, a gonadotropin releasing hormone agonist, a gonadotropin releasing hormone antagonist, and bilateral orchiectomy.

20. The use of any of the proceeding claims, wherein the subject is a human.