Claims

1. A vaccine comprising a heterologous polynucleotide encoding a heterologous polypeptide, wherein the heterologous polypeptide is selected from the group consisting of SEQ ID NOs: 541, 543, 550, 554, 555, 556, 623, 624, 552, 557, 558, 559, 625, and 626.

2. The vaccine of claim 1, wherein the vaccine is capable of eliciting a cellular immune response in a subject to be administered the vaccine.

3. The vaccine of claim 2, wherein the cellular immune response is activation of vaccine-specific $CD8^+$ T cells, $CD4^+$ T cells, or $CD8^+$ T cells and $CD4^+$ T cells, wherein activation is assessed by increased production of TNFα, IFNγ, or TNFα and IFNγ by $CD8^+$ T cells, $CD4^+$ T cells, or $CD8^+$ T cells and $CD4^+$ T cells relative to production of TNFα, IFNγ, or TNFα and IFNγ by $CD8^+$ T cells, $CD4^+$ T cells, or $CD8^+$ T cells and $CD4^+$ T cells from an unvaccinated subject.

4. The vaccine of any one of claims 1-3, wherein the heterologous polynucleotide comprises a promoter, an enhancer, a polyadenylation site, a Kozak sequence, a stop codon, a T cell enhancer (TCE), or any combination thereof.

5. The vaccine of claim 4, wherein the promoter comprises a CMV promoter or a vaccinia P7.5 promoter.

6. The vaccine of claim 4 or 5, wherein the TCE is encoded by a polynucleotide of SEQ ID NO: 546, the CMV promoter comprises a polynucleotide of SEQ ID NO: 628, the vaccinia P7.5 promoter comprises a polynucleotide of SEQ ID NO: 630 and the polyadenylation site comprises a bovine growth hormone polyadenylation site of SEQ ID NO: 629.

7. The vaccine of any one of claims 1-6, wherein the heterologous polynucleotide is DNA or RNA.

8. The vaccine of claim 7, wherein RNA is mRNA or self-replicating RNA.

9. The vaccine of any one of claims 1-7, wherein the vaccine is a recombinant virus derived from adenovirus (Ad), poxvirus, adeno-associated virus (AAV) or retrovirus.

10. The vaccine of claim 9, wherein the recombinant virus is derived from hAd5, hAd7, hAd11, hAd26, hAd34, hAd35, hAd48, hAd49, hAd50, GAd20, GAd19, GAd21, GAd25, GAd26, GAd27, GAd28, GAd29, GAd30, GAd31, ChAd3, ChAd4, ChAd5, ChAd6, ChAd7, ChAd8, ChAd9, ChAd10, ChAd11, ChAd16, ChAd17, ChAd19, ChAd20, ChAd22, ChAd24, ChAd26, ChAd30, ChAd31, ChAd37, ChAd38, ChAd44, ChAd55, ChAd63, ChAd73, ChAd82, ChAd83, ChAd146, ChAd147, PanAd1, PanAd2, PanAd3, Copenhagen vaccinia virus (W), New York Attenuated Vaccinia Virus (NYVAC), ALVAC, TROVAC, or modified vaccinia ankara (MVA).

11. The vaccine of claim 10, wherein the recombinant virus is derived from GAd20.

12. The vaccine of claim 10, wherein the recombinant virus is derived from MVA.

13. The vaccine of claim 10, wherein the recombinant virus is derived from hAd26.

14. A vaccine comprising a heterologous polynucleotide encoding a heterologous polypeptide of SEQ ID NOs: 541, 550, 554, 555, 556, 623 or 624, wherein the vaccine is a recombinant virus derived from GAd20 or Ad26.

15. A vaccine comprising a heterologous polynucleotide encoding a heterologous polypeptide of SEQ ID NOs: 543, 552, 557, 558, 559, 625 or 626, wherein the vaccine is a recombinant virus derived from MVA.

16. Use of a therapeutically effective amount of one or more vaccines of any one of claims 1-15 in the manufacture of a medicament for the treatment or prevention of a prostate cancer in a subject.

17. A vaccine as claimed in any one of claims 1-15 for use in inducing an immune response in a subject.

18. The use of claim 16, wherein the prostate cancer is a relapsed prostate cancer, a refractory prostate cancer, a metastatic prostate cancer or a castration resistant prostate cancer, or any combination thereof.

19. The use of claim 16 or claim 18, wherein an additional cancer therapeutic agent is to be administered to the subject.

20. The use of claim 19, wherein the additional cancer therapeutic agent is a CTLA-4 antibody, a CTLA4 ligand, a PD-1 axis inhibitor, a PD-L1 axis inhibitor, a TLR agonist, a CD40 agonist, an OX40 agonist, hydroxyurea, ruxolitinib, fedratinib, a 41BB agonist, a CD28 agonist, a STING antagonist, a RIG-1 antagonist, TCR-T therapy, CAR-T therapy, FLT3 ligand, aluminum sulfate, BTK inhibitor, CD38 antibody, CDK inhibitor, CD33 antibody, CD37 antibody, CD25 antibody, GM-CSF inhibitor, IL-2, IL-15, IL-7, CD3 redirection molecules, pomalimib, IFNγ, IFNα, TNFα, VEGF antibody, CD70 antibody, CD27 antibody, BCMA antibody, GPRC5D antibody, or any combination thereof.