CLAIMS

1.Use of an immune-effector-cell enhancer for the preparation of a medicament for enhancing the therapeutic effect of a vaccine for the treatment of cancer in a human, wherein the medicament is to be administered in combination with an immune-suppressive-cell inhibitor selected from a protein kinase inhibitor, a COX-2 inhibitor, or a PDE5 inhibitor; and wherein the immune-effector-cell enhancer is selected from a CTLA-4 inhibitor, a CD40 agonist, a TLR agonist, a 4-1BB agonist, a OX40 agonist, a GITR agonist, a PD-1 antagonist, or a PD-L1 antagonist.

2.Use of an immune-effector-cell enhancer for the preparation of a medicament for enhancing immunogenicity of a vaccine for the treatment of cancer in a human, wherein the medicament is to be administered in combination with an immune-suppressive-cell inhibitor selected from a protein kinase inhibitor, a COX-2 inhibitor, or a PDE5 inhibitor; and wherein the immune-effector-cell enhancer is selected from a CTLA-4 inhibitor, a CD40 agonist, a TLR agonist, a 4-1BB agonist, a OX40 agonist, a GITR agonist, a PD-1 antagonist, or a PD-L1 antagonist.

3.The use according to claim 1 or claim 2, wherein:

1) the protein kinase inhibitor is selected from the group consisting of imatinib, sorafenib, lapatinib, zactima MP-412, dasatinib, lestaurtinib, lapatinib, sunitinib malate, axitinib, erlotinib, gefitinib, bosutinib, temsirolismus, and nilotinib;

2) the CTLA-4 inhibitor is selected from the group consisting of ipilimumab and Tremelimumab;

3) the CD40 agonist is an anti-CD40 antibody selected from the group consisting of G28-5, mAb89, EA-5 , S2C6, CP870893, and dacetuzumab; and

4) the TLR agonist is a CpG oligonucleotide selected from the group consisting of CpG 24555, CpG 10103, CpG7909, and CpG1018.

4.The use according to claim 3, wherein the immune-suppressive-cell inhibitor is a protein kinase inhibitor and wherein the immune-effector-cell enhancer is a CTLA-4 inhibitor.

5. The use according to claim 4, wherein the protein kinase inhibitor is selected from sorafenib, dasatinib, imatinib, axitinib or sunitinib malate and wherein the CTLA-4 inhibitor is Tremelimumab.

6. Use of an immune-effector-cell enhancer for the preparation of a medicament for treating cancer in a human, wherein the medicament is to be administered in combination with a vaccine and an immune-suppressive-cell inhibitor selected from a COX-2 inhibitor, or a PDE5 inhibitor; and wherein the immune-effector-cell enhancer is selected from a CTLA-4 inhibitor, a CD40 agonist, a TLR agonist, a 4-1BB agonist, a OX40 agonist, a GITR agonist, a PD-1 antagonist, or a PD-L1 antagonist, and wherein the vaccine is capable of eliciting an immune response against a tumor-associated antigen associated with thecancer.

7. The use according to claim 6, wherein the cancer is prostate cancer.

8. The use according to claim 7, wherein the vaccine comprises a nucleic acid molecule encoding an immunogenic PSMA polypeptide selected from the group consisting of:

1) polypeptide consisting of the amino acid sequence of SEQ ID NO:9;
2) polypeptide consisting of the amino acids 4 - 739 of SEQ ID NO:3;
3) polypeptide consisting of the amino acids 4 - 739 of SEQ ID NO:5; and
4) polypeptide consisting of the amino acids 4 - 739 of SEQ ID NO:7.

9. The use according to claim 8, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of:

1) a nucleotide sequence comprising nucleotides 10 — 2217 of SEQ ID NO:4;
2) a nucleotide sequence comprising nucleotides 10 — 2217 of SEQ ID NO:6;
3) a nucleotide sequence comprising nucleotides 10 — 2217 of SEQ ID NO:8; and
4) a nucleotide sequence comprising nucleotides 10 — 2217 of SEQ ID NO:10, or a degenerate variant of any of the nucleotide sequences.

10. The use according to claim 8, wherein the vaccine further comprises a nucleic acid

molecule encoding an immunogenic PSA polypeptide and wherein the immunogenic PSA polypeptide is selected from the group consisting of:

1) a polypeptide comprising the amino acid sequence of SEQ ID NO:17 or amino acids 4-240 of SEQ ID NO:17;

2) a polypeptide consisting of the amino acid sequence of SEQ ID NO:17 or amino acids 4-240 of SEQ ID NO:17;

3) a polypeptide comprising the amino acid sequence of SEQ ID NO:19 or amino acids 4-281 of SEQ ID NO:19; and

4) a polypeptide consisting of the amino acid sequence of SEQ ID NO:19 or amino acids 4-281 of SEQ ID NO:19.

11. The use according to claim 10, wherein the vaccine further comprises a nucleic acid molecule encoding the human PSCA polypeptide.

12. The use according to claim 11, wherein the immunogenic PSCA polypeptide is the full length human PSCA.

13. The use according to claim 7, wherein the vaccine comprises a multi- antigen construct encoding at least two immunogenic PAA polypeptides selected from the group consisting of immunogenic PSMA polypeptide, an immunogenic PSA polypeptide, and an immunogenic PSCA polypeptide.

14. The use according to claim 7, wherein the vaccine comprises a multi-antigen construct encoding at least three immunogenic PAA polypeptides selected from the group consisting of an immunogenic PSMA polypeptide, an immunogenic PSA polypeptide, and an immunogenic PSCA polypeptide.

15. The use according to claim 13 or claim 14, wherein the immunogenic PSMA polypeptide is selected from the group consisting of:

1) a polypeptide consisting of the amino acid sequence of SEQ ID NO:9;

2) a polypeptide consisting of the amino acids 4 - 739 of SEQ ID NO:3;

3) a polypeptide consisting of the amino acids 4 - 739 of SEQ ID NO:5; and

4) a polypeptide consisting of the amino acids 4 - 739 of SEQ ID NO:7,

wherein the immunogenic PSA polypeptide is selected from the group consisting of:

1) a polypeptide comprising the amino acid sequence of SEQ ID NO:17 or amino acids 4-240 of SEQ ID NO:17;

2) a polypeptide consisting of the amino acid sequence of SEQ ID NO:17 or amino acids 4-240 of SEQ ID NO:17;

3) a polypeptide comprising the amino acid sequence of SEQ ID NO:19 or amino acids 4-281 of SEQ ID NO:19; and

4) a polypeptide consisting of the amino acid sequence of SEQ ID NO:19 or amino acids 4-281 of SEQ ID NO:19; and

wherein the immunogenic PSCA polypeptide is the full length human PSCA.

16. The use according to claim 15, wherein the immune-suppressive-cell inhibitor is selected from protein kinase inhibitor, COX-2 inhibitor, or PDE5 inhibitor; and wherein the immune-effector-cell enhancer is selected from CTLA-4 inhibitor, CD40 agonist, TLR agonist, 4-1BB agonist, OX40 agonist, GITR agonist, PD-1 antagonist, or PD-L1 antagonist.

17. The use according to claim 6, wherein:

1) the protein kinase inhibitor is selected from the group consisting of imatinib, sorafenib, lapatinib, zactima MP-412, dasatinib, lestaurtinib, lapatinib, sunitinib malate, axitinib, erlotinib, gefitinib, bosutinib, temsirolismus, and nilotinib;

2) the CTLA-4 inhibitor is selected from the group consisting of Ipilimumab and Tremelimumab;

3) the CD40 agonist is an anti-CD40 antibody selected from the group consisting of G28-5, mAb89, EA-5 , S2C6, CP870893, and dacetuzumab; and

4) the TLR agonist is a CpG oligonucleotide selected from the group consisting of CpG 24555, CpG10103, CpG7909, and CpG1018.

18. The use according to claim 17, wherein the immune-suppressive-cell inhibitor is a protein kinase inhibitor and wherein the immune-effector-cell enhancer is a CTLA-4 inhibitor.

19. The use according to claim 18, wherein the protein kinase inhibitor is selected from sorafenib, dasatinib, imatinib, axitinib, bosutinib or sunitinib malate and wherein the CTLA-4 inhibitor is Tremelimumab.

20. The use according to claim 19, wherein the protein kinase inhibitor is sunitinib malate to be administered orally at about 1 - 25 mg/dose and Tremelimumab is to be administered intra-dermally or subcutaneously at about 10 - 150 mg/dose.

21. The use according to claim 19, wherein the protein kinase inhibitor is axitinib to be administered orally at about 1, 2, 3, 4, or 5 mg/dose twice per day and Tremelimumab is to be administered intradermally or subcutaneously at about 10 - 150 mg/dose.