CLAIMS

1. A recombinant oncolytic adenovirus having a genome comprising one or more heterologous nucleic acid sequences encoding a tumor antigen, whereby the adenovirus expresses the tumor antigen(s) on its surface.

2. The recombinant oncolytic adenovirus of claim 1 comprising between 1 and 5 heterologous nucleic acid sequences each encoding a tumor antigen selected from the group consisting of: MAGE-1, MAGE-2, MAGE-3, CEA, Tyrosinase, midkin, BAGE, CASP-8, β-catenin, CA-125, CDK-1, ESO-1, gp75, gp100, MART-1, MUC-1, MUM-1, p53, PAP, PSA, PSMA, ras, trp-1, HER-2, TRP-1, TRP-2, IL13Ralpha, IL13Ralpha2, AIM-2, AIM-3, NY-ESO-1, C9orf112, SART1, SART2, SART3, BRAP, RTN4, GLEA2, TNKS2, KIAA0376, ING4, HSPH1, C13orf24, RBPSUH, C6orf153, NKTR, NSEP1, U2AF1L, CYNL2, TPR, SOX2, GOLGA, BMI1, COX-2, EGFRvIII, EZH2, LICAM, Livin, Livinβ, MRP-3, Nestin, OLIG2, ART1, ART4, B-cyclin, Gli1, Cav-1, cathepsin B, CD74, E-cadherin, EphA2/Eck, Fra-1/Fosl 1, GAGE-1, Ganglioside/GD2, GnT-V, β1, 6-N, Ki67, Ku70/80, PROX1, PSCA, SOX10, SOX11, Survivin, UPAR and WT-1 or an immunogenic peptide thereof, whereby the adenovirus expresses between 1 and 5 tumor antigens on its surface.

3. The recombinant oncolytic adenovirus of claim 1 or 2 comprising a heterologous nucleic acid encoding CEA or an immunogenic peptide thereof, whereby the adenovirus expresses a chimeric surface protein comprising CEA or an immunogenic peptide thereof.

4. The recombinant oncolytic adenovirus of claim 3 wherein the immunogenic peptide of CEA is SEQ ID NO: 1.

5. The recombinant oncolytic adenovirus of claim 3 or 4 wherein the heterologous nucleic acid is inserted in hyper-variable region 5 of the hexon gene of the adenovirus.

6. The recombinant oncolytic adenovirus of claim 1 or 2 comprising a heterologous nucleic acid encoding EGFRvIII or an immunogenic peptide thereof, whereby the adenovirus expresses a chimeric surface protein comprising EGFRvIII or an immunogenic peptide thereof.

7. The recombinant oncolytic adenovirus of claim 6 wherein the immunogenic peptide of EGFRvIII is selected from the group consisting of SEQ ID NOs: 2-6.

8. The recombinant oncolytic adenovirus of claim 6 or 7 wherein the heterologous nucleic acid is inserted into the H1 loop region of the adenovirus fiber gene.

9. The recombinant oncolytic adenovirus of any preceding claim having a genome comprising 2-5 heterologous nucleic acid sequences each encoding a tumor antigen, whereby the adenovirus expresses the tumor antigens on its surface.

10. The recombinant oncolytic adenovirus of any preceding claim comprising heterologous nucleic acid encoding MAGE or an immunogenic peptide thereof.

11. The recombinant oncolytic adenovirus of claim 10 wherein the adenovirus comprises a deletion in part or all of the E3 gene region.

12. The recombinant oncolytic adenovirus of claim 11, wherein said heterologous nucleic acid is inserted in the E3 deleted gene region of the adenovirus, whereby the adenovirus expresses MAGE or an immunogenic peptide thereof on its surface.

13. The recombinant oncolytic adenovirus of any preceding claim, comprising heterologous nucleic acid encoding NY-ESO-1 or an immunogenic peptide thereof,

whereby the adenovirus expresses a chimeric surface protein comprising NY-ESO-1 or an immunogenic peptide thereof.

14. The recombinant oncolytic adenovirus of claim 13 wherein the immunogenic peptide of NY-ESO-1 is SEQ ID NO: 7.

15. The recombinant oncolytic adenovirus of claim 13 or 14, wherein said heterologous nucleic acid is inserted in the hyper-variable region 5 of the hexon gene of the adenovirus.

16. The recombinant oncolytic adenovirus of claim 1 having a deletion in part or all of the E3 gene region and having a genome comprising:

a. heterologous nucleic acid encoding CEA or an immunogenic peptide thereof inserted into hyper-variable region 5 of the hexon gene of the adenovirus;

b. heterologous nucleic acid encoding EGFRvIII or an immunogenic peptide thereof inserted into the H1 loop region of the fiber gene of the adenovirus;

c. heterologous nucleic acid encoding MAGE or an immunogenic peptide thereof inserted in the E3 deleted gene region of the adenovirus; and

d. heterologous nucleic acid encoding NY-ESO-1 or an immunogenic peptide thereof inserted in the hyper-variable region 5 of the hexon gene of the adenovirus.

17. The recombinant oncolytic adenovirus of any preceding claim wherein the adenovirus is a human adenovirus type 5 or a hybrid comprising a human adenovirus type 5 component.

18. The recombinant oncolytic adenovirus of claim 17 wherein the adenovirus is Delta-24 or Delta-24-RGD.

19. The recombinant oncolytic adenovirus of any of claims 1-16 wherein the adenovirus is selected from ICOVIR-5, ICOVIR-7, ONYX-015, ColoAd1, H101 and AD5/3-D24-GMCSF.

20. Use of a recombinant oncolytic adenovirus according to any one of claims 1-19 in the manufacture of medicament for treating cancer in a patient in need thereof.

21. The use of claim 20, wherein the patient has a cancer selected from primary or metastatic brain cancer, melanoma, adenocarcinoma, thyoma, lymphoma, sarcoma, lung cancer, liver cancer, colon cancer, non-Hodgkins lymphoma, Hodgkins lymphoma, leukemia, uterine cancer, breast cancer, prostate cancer, ovarian cancer, cervical cancer, bladder cancer, kidney cancer, and pancreatic cancer.

22. The use of claim 21, wherein the patient has a low-level or high-level glioma.

23. The use of any one of claims 20-22, wherein the medicament is formulated to be administered intratumorally, intravascularly, or in a neuronal or mesenchymal stem cell carrier.

24. The use of any one of claims 20-23, wherein the medicament is formulated to be administered once or multiple times at a dose of 10^8-10^{13} plaque forming units (pfu).

25. The use of any one of claims 20-24 wherein the patient is a human.