Claims

1. An oncolytic adenoviral vector comprising

1) an adenovirus serotype 5 (Ad5) nucleic acid backbone comprising a ~~capsid modification~~modified nucleic acid sequence encoding a modified fiber of the virus, wherein the modification of the fiber is Ad5/3 chimerism, insertion of an integrin binding (RGD) region and/or heparin sulphate binding polylysine modification into the fiber,

2) a nucleic acid sequence encoding a tumor specific human telomerase reverse transcriptase (hTERT) promotor upstream of the E1 region; and

3) a nucleic acid sequence encoding human CD40L in the place of the deleted adenoviral genes *gp19k/6.7K* in the E3 region.

2. An oncolytic adenoviral vector according to claim 1 further comprising one or more regions selected from a group consisting of E2, E4, and late regions.

~~3. An oncolytic adenoviral vector according to any one of the previous claims, wherein a wild type region is located upstream of the E1 region.~~

~~4~~3. An oncolytic adenoviral vector according to any one of the previous claims, wherein the E1 region comprises a viral packaging signal.

~~5~~4. An oncolytic adenoviral vector according to any one of the previous claims, wherein a nucleic acid sequence encoding CD40L is under the control of the viral E3 promoter.

~~6~~5. An oncolytic adenoviral vector according to any one of the previous claims, wherein a nucleic acid sequence encoding CD40L is one nucleotide distinct from the wild type human sequence.

~~7~~6. An oncolytic adenoviral vector according to any one of the previous claims, wherein the E4 region is of a wild type.

~~8. An oncolytic adenoviral vector according to any one of the previous claims, wherein the capsid modification is Ad5/3 chimerism, insertion of an integrin binding (RGD) region and/or heparin sulphate binding polylysine modification into the fiber.~~

~~9~~7. An oncolytic adenoviral vector according to ~~claim 8~~any one of the previous claims, wherein the capsid modification is a RGD-4C modification.

~~10~~8. A cell comprising the adenoviral vector according to any one of claims 1-~~9~~7.

~~11~~9. A pharmaceutical composition comprising the adenoviral vector according to any one of claims 1-~~9~~7.

~~12~~10. An oncolytic adenoviral vector or pharmaceutical composition according to any one of the previous claims, which acts as an *in situ* cancer vaccine.

~~13~~11. Use of an adenoviral vector according to any one of claims 1-~~9~~7 in the manufacture of a medicament for treating cancer in a subject.

~~14~~12. The use according to claim ~~13~~11, wherein the cancer is selected from a group consisting of nasopharyngeal cancer, synovial cancer, hepatocellular cancer, renal cancer, cancer of connective tissues, melanoma, lung cancer, bowel cancer, colon cancer, rectal cancer, colorectal cancer, brain cancer, throat cancer, oral cancer, liver cancer, bone cancer, pancreatic cancer, choriocarcinoma, gastrinoma, pheochromocytoma, prolactinoma, T-cell leukemia/lymphoma, neuroma, von Hippel-Lindau disease, Zollinger-Ellison syndrome, adrenal cancer, anal cancer, bile duct cancer, bladder cancer, ureter cancer, oligodendroglioma, neuroblastoma, meningioma, spinal cord tumor, osteochondroma, chondrosarcoma, Ewing's sarcoma, cancer of unknown primary site, carcinoid, carcinoid of gastrointestinal tract, fibrosarcoma, breast cancer, Paget's disease, cervical cancer, esophagus cancer, gall bladder cancer, head cancer, eye cancer, neck cancer, kidney cancer, Wilms' tumor, Kaposi's sarcoma, prostate cancer, testicular cancer, Hodgkin's disease, non-Hodgkin's

lymphoma, skin cancer, mesothelioma, multiple myeloma, ovarian cancer, endocrine pancreatic cancer, glucagonoma, pancreatic cancer, parathyroid cancer, penis cancer, pituitary cancer, soft tissue sarcoma, retinoblastoma, small intestine cancer, stomach cancer, thymus cancer, thyroid cancer, trophoblastic cancer, hydatidiform mole, uterine cancer, endometrial cancer, vagina cancer, vulva cancer, acoustic neuroma, mycosis fungoides, insulinoma, carcinoid syndrome, somatostatinoma, gum cancer, heart cancer, lip cancer, meninges cancer, mouth cancer, nerve cancer, palate cancer, parotid gland cancer, peritoneum cancer, pharynx cancer, pleural cancer, salivary gland cancer, tongue cancer, and tonsil cancer.

~~15~~13. The use according to claims ~~13~~11-~~14~~12, wherein the subject is a human or an animal.

~~16~~14. The use according to any one of claims ~~13~~11-~~15~~13, wherein the vector is to be administered through an intratumoral, intramuscular, intraarterial, intravenous, intrapleural, intravesicular, intracavitary or peritoneal injection, or an oral administration.

~~17~~15. The use according to any one of claims ~~13~~11-~~16~~14, wherein oncolytic adenoviral vectors or pharmaceutical compositions are to be administered several times during the treatment period.

~~18~~16. The use according to any one of claims ~~13~~11-~~17~~15, wherein the oncolytic adenoviral vector having a different fiber knob of the capsid compared to the vector of the earlier treatment, is to be administered to a subject.

~~19~~17. The use according to any one of claims ~~13~~11-~~18~~16, wherein the vector is to be administered with concurrent radiotherapy or concurrent chemotherapy.

~~20~~18. The use according to any one of claims ~~13~~11-~~19~~17, wherein the vector is to be administered with an auxiliary agent, selected from the group consisting of verapamil or another calcium channel blocker; an autophagy inducing agent; temozolomide; a substance capable to downregulating regulatory T-cells; cyclophosphamide; and any combination thereof in a subject to a subject.

2119. The use according to any one of claims 1311-2018, wherein the vector is to be administered with chemotherapy or anti-CD20 therapy or other approaches for blocking of neutralizing antibodies.

2220. An *in-vitro* method of producing CD40L in a cell, wherein the method comprises:

a) carrying a vehicle comprising an oncolytic adenoviral vector according to any one of claims 1-97 to a cell, and

b) expressing CD40L of said vector in the cell.

2321. A use of the oncolytic adenoviral vector according to any one of claims 1-97 in the manufacture of a medicament for producing CD40L in a cell.

2422. The use of the oncolytic adenoviral vector according to any one of claims 1-97 in the manufacture of a medicament for increasing tumor specific immune response, Th1->Th2 switch or reduction of immunosuppression in a subject.

2523. The use of the oncolytic adenoviral vector according to claim 2224, wherein amount of natural killer and/or cytotoxic T cells is increased in a target cell or tissue or suppressor cells (such as regulatory T-cells) are decreased.

2624. Use of a vehicle comprising an oncolytic adenoviral vector according to any one of claims 1-97 in the manufacture of a medicament for producing CD40L in a cell, wherein vehicle is to be carried to the cell, and wherein the CD40L of the vector is to be expressed in the cell.