effect (Example 8) in syngeneic cancer-bearing mouse models.

[0009]

More specifically, the present disclosure may encompass, as a substance or method useful in medicine or industry, the following include:

[1] In an aspect, there is provided a vaccinia virus comprising the following (1) and (2):

(1) a polynucleotide encoding interleukin-7 (IL-7); and

(2) a polynucleotide encoding interleukin-12 (IL-12).

[2] In another aspect, there is provided a pharmaceutical composition selected from the following (1) or (2):

(1) a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-12 to be used in combination with a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-7; or

(2) a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-7 to be used in combination with a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-12.

[3] In another aspect, there is provided a combination kit comprising the following vaccinia viruses (1) and (2):

(1) a vaccinia virus comprising a polynucleotide encoding IL-7; and

adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma, myeloma, ovarian cancer, colorectal cancer, pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[20] A method for preventing or treating cancer, comprising the step of administering the vaccinia virus according to any one of [1] and [4]-[9] to a subject in need of the prevention or treatment for cancer.

[21] The method according to [20], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma, myeloma, ovarian cancer, colorectal cancer, pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[22] In another aspect, there is provided the vaccinia virus according to any one of [1] and [4]-[9], for use in preventing or treating cancer.

[23] The vaccinia virus according to [22], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma, myeloma, ovarian cancer, colorectal cancer,

pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[24] In another aspect, there is provided use of the vaccinia virus according to any one of [1] and [4]-[9] for the manufacture of a pharmaceutical composition for preventing or treating cancer.

[25] The use according to [24], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma, myeloma, ovarian cancer, colorectal cancer, pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[26] A method for preventing or treating cancer, comprising the step of administering

(1) a vaccinia virus comprising a polynucleotide encoding IL-7; and

(2) a vaccinia virus comprising a polynucleotide encoding IL-12 to a subject in need of the prevention or treatment for cancer.

[27] The method according to [26], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma,

myeloma, ovarian cancer, colorectal cancer, pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[28] A vaccinia virus selected from the following (1) or (2):

(1) a vaccinia virus comprising a polynucleotide encoding IL-7, for preventing or treating cancer in combination with a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-12; or

(2) a vaccinia virus comprising a polynucleotide encoding IL-12, for preventing or treating cancer in combination with a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-7.

[29] The vaccinia virus according to [28], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma, myeloma, ovarian cancer, colorectal cancer, pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[30] In another aspect, there is provided use of a vaccinia virus selected from the following (1) or (2):

(1) use of a vaccinia virus comprising a polynucleotide encoding IL-7 for the manufacture of a pharmaceutical composition for preventing or treating cancer to be used

in combination with a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-12; or

(2) use of a vaccinia virus comprising a polynucleotide encoding IL-12 for the manufacture of a pharmaceutical composition for preventing or treating cancer to be used in combination with a pharmaceutical composition comprising a vaccinia virus comprising a polynucleotide encoding IL-7.

[31] The use according to [30], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma, myeloma, ovarian cancer, colorectal cancer, pancreatic cancer, prostate cancer, hepatocellular carcinoma, mesothelioma, cervical cancer or gastric cancer.

[32] In another aspect, there is provided use of (1) a vaccinia virus comprising a polynucleotide encoding IL-7 and (2) a vaccinia virus comprising a polynucleotide encoding IL-12 for the manufacture of a combination kit for preventing or treating cancer.

[33] The use according to [32], wherein the cancer is malignant melanoma, lung adenocarcinoma, lung cancer, small cell lung cancer, lung squamous carcinoma, kidney cancer, bladder cancer, head and neck cancer, breast cancer, esophageal cancer, glioblastoma, neuroblastoma,