istering to the subject the CDH3, EPHA4, ECT2, HIG2, INHBB, KIF20A, KNTC2, TTK and/or URLC10 polypeptides, as well as pharmaceutical compositions for treating or preventing a disease associated with the over-expression of CDH3, EPHA4, ECT2, HIG2, INHBB, KIF20A, KNTC2, TTK and/or URLC10, e.g. cancer, that include the CDH3, EPHA4, ECT2, HIG2, INHBB, KIF20A, KNTC2, TTK and URLC10 polypeptides. Examples of such cancers include, but are not limited to., bladder cancer, breast cancer, cervical cancer, cholangincellular carcinoma, CML, colorectal cancer, endometriosis, esophageal cancer, gastric cancer, diffused type gastric cancer, liver cancer, NSCLC, lymphoma, osteosarcoma, ovarian cancer, pancreatic cancer, prostate cancer, renal carcinoma, SCLC, soft tissue tumor and testicular tumor.

[0012a] In a fifth aspect, there is provided a pharmaceutical composition for use in treating or preventing cancer expressing HLA-A2, said composition comprising one or more peptides of the first aspect or a polynucleotide encoding the peptides.

[0012b] In a sixth aspect, there is provided an *in vitro* method of inducing an antigen-presenting cell having a high cytotoxic T cell inducibility, said method comprising the step of (a) or (b) below:

(a) contacting an HLA-A2 positive antigen-presenting cell with a peptide; or

(b) transferring a gene comprising a polynucleotide encoding a peptide to an HLA-A2 positive antigen-presenting cell, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted.

[0012c] Provided is an an *in vitro* method of inducing a cytotoxic T cell by contacting a T cell with any one of the peptides of the first aspect.

[0012d] In a seventh aspect, there is provided an *in vitro* method of inducing a cytotoxic T cell, comprising the steps of (a) and (b) below:

(a) contacting an HLA-A2 positive antigen-presenting cell with a peptide, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted; and

(b) mixing the antigen-presenting cell of step (a) with a $CD8^+$ T cell and co-culturing.

[0012e] In an eighth aspect, there is provided an isolated cytotoxic T cell, which is induced by the method of the seventh aspect, or which is transduced with the nucleic acids encoding the TCR subunits polypeptides binding with a peptide in the context of HLA-A2, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted.

[0012f] In a ninth aspect, there is provided an antigen-presenting cell, which is induced by the method of the sixth aspect.

[0012g] In a tenth aspect, there is provided a vaccine for use in inhibiting proliferation of cancer expressing HLA-A2, wherein the vaccine comprises any one of the peptides of the first aspect as the active ingredient.

[0012h] In an eleventh aspect, there is provided use of at least one ingredient selected from the group consisting of (a) to (e) below:

(a) one or more types of peptides selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted;

(b) one or more types of polynucleotides encoding any one of the peptide(s) of (a) in an expressible form;

(c) an APC that presents on its cell surface a complex of any one of the peptides of (a) and an HLA-A2;

(d) an exosome that presents on its cell surface a complex of any one of the peptides of (a) and an HLA-A2; and

(e) a CTL that targets any one of the peptides of (a)

in the manufacture of a medicament for treating or preventing a cancer expressing HLA-A2.

[0012i] In a twelfth aspect, there is provided use of the peptide selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted

in the manufacture of a vaccine for inhibiting cancer expressing HLA-A2.

[0013]

The present disclosure further provides methods for preventing post-surgery recurrence of the disease mentioned above.

Regarding the specific aims and objectives recited above, it will be understood by those skilled in the art that one or more aspects of this

disclosure can meet certain objectives, while one or more other aspects can meet certain other objectives. Each objective may not apply equally, in all its respects, to every aspect of this disclosure. As such, the objects herein can be viewed in the alternative with respect to any one aspect of this disclosure.

[0014]

Additional objects and features of the disclosure will become more fully apparent when the following detailed description is read in conjunction with the accompanying figures and examples. However, it is to be understood that both the foregoing summary of the disclosure and the following detailed description are of preferred examples, and not restrictive of the disclosure or other alternate examples of the disclosure. In particular, while the disclosure is described herein with reference to a number of specific examples, it will be appreciated that the description is illustrative of the disclosure and is not constructed as limiting of the disclosure. Various modifications and applications may occur to those who are skilled in the art, without departing from the spirit and the scope of the disclosure, as described by the appended claims. Likewise, other objects, features, benefits and advantages of the present disclosure will be apparent from this summary and certain examples described below, and will be readily apparent to those skilled in the art. Such objects, features, benefits and advantages will be apparent from the above in conjunction with the accompanying examples, data, figures and all reasonable inferences to be drawn therefrom, alone or with consideration of the references incorporated herein.

Brief Description of Drawings

[0015]

Various aspects and applications of the present invention will become apparent to the skilled artisan upon consideration of the brief description of the figures and the

CLAIMS

[Claim 1] An isolated peptide consisting of the amino acid sequences of SEQ ID NO: 271.

[Claim 2] A peptide having cytotoxic T cell inducibility, wherein said peptide consists of the amino acid sequence of SEQ ID NO: 271, in which 1 or 2 amino acids are substituted.

[Claim 3] The peptide of claim 2, wherein the second amino acid from the N-terminus is leucine or methionine.

[Claim 4] The peptide of claim 2 or 3, wherein the C-terminal amino acid is valine or leucine.

[Claim 5] A pharmaceutical composition for use in treating or preventing cancer expressing HLA-A2, said composition comprising one or more peptides of any one of claims 1 to 4 or a polynucleotide encoding the peptides.

[Claim 6] A pharmaceutical composition for use of claim 5, wherein the cancer is selected from the group consisting of bladder cancer, breast cancer, cervical cancer, cholangiocellular carcinoma, CML, colorectal cancer, endometriosis, esophageal cancer, gastric cancer, diffused type gastric cancer, liver, NSCLC, lymphoma, osteosarcoma, ovarian cancer, pancreatic cancer, prostate cancer, renal carcinoma, SCLC, soft tissue tumor and testicular tumor.

[Claim 7] An exosome that presents on its surface a complex comprising a peptide and an HLA-A2, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted.

[Claim 8] The exosome of claim 7, wherein the HLA-A2 is HLA-A0201.

[Claim 9] An in vitro method of inducing an antigen-presenting cell having a high cytotoxic T cell inducibility, said method comprising the step of (a) or (b) below:

(a) contacting an HLA-A2 positive antigen-presenting cell with a peptide; or

(b) transferring a gene comprising a polynucleotide encoding a peptide to an HLA-A2 positive antigen-presenting cell, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted.

[Claim 10] An in vitro method of inducing a cytotoxic T cell, comprising the steps of (a) and (b) below:

(a) contacting an HLA-A2 positive antigen-presenting cell with a peptide, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted; and

(b) mixing the antigen-presenting cell of step (a) with a CD8+ T cell and co-culturing.

[Claim 11] An isolated cytotoxic T cell, which is induced by the method of claim 10, or which is transduced with the nucleic acids encoding the TCR subunits polypeptides binding with a peptide in the context of HLA-A2, wherein the peptide is selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid

sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted.

[Claim 12] An antigen-presenting cell, which comprises a complex formed between an HLA-A2 and a peptide selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted.

[Claim 13] An antigen-presenting cell, which is induced by the method of claim 9.

[Claim 14] A vaccine for use in inhibiting proliferation of cancer expressing HLA-A2, wherein the vaccine comprises the peptide of any one of claims 1 to 4 as the active ingredient.

[Claim 15] The vaccine for use of claim 14, wherein the cancer is selected from the group consisting of bladder cancer, breast cancer, cervical cancer, cholangiocellular carcinoma, CML, colorectal cancer, endometriosis, esophageal cancer, gastric cancer, diffused type gastric cancer, liver, NSCLC, lymphoma, osteosarcoma, ovarian cancer, pancreatic cancer, prostate cancer, renal carcinoma, SCLC, soft tissue tumor and testicular tumor.

[Claim 16] The vaccine for use of claim 15, which is formulated for administration to a subject whose HLA antigen is HLA-A2.

[Claim 17] The vaccine for use of claim 16, wherein the HLA-A2 is HLA-A0201.

[Claim 18] Use of at least one ingredient selected from the group consisting of (a) to (e) below:

(a) one or more types of peptides selected from the group consisting of

following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted;

(b) one or more types of polynucleotides encoding the peptide(s) of any one of (a) in an expressible form;

(c) an APC that presents on its cell surface a complex of the peptide of any one of (a) and an HLA-A2;

(d) an exosome that presents on its cell surface a complex of the peptide of any one of (a) and an HLA-A2; and

(e) a CTL that targets the peptide of any one of (a)

in the manufacture of a medicament for treating or preventing a cancer expressing HLA-A2.

[Claim 19] The use of claim 18, wherein the cancer is selected from the group consisting of bladder cancer, breast cancer, cervical cancer, cholangiocellular carcinoma, CML, colorectal cancer, endometriosis, esophageal cancer, gastric cancer, diffused type gastric cancer, liver, NSCLC, lymphoma, osteosarcoma, ovarian cancer, pancreatic cancer, prostate cancer, renal carcinoma, SCLC, soft tissue tumor and testicular tumor.

[Claim 20] Use of the peptide selected from the group consisting of following (i) and (ii):

(i) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272; and

(ii) a peptide of less than 15 amino acids comprising an amino acid sequence of SEQ ID NO: 288, 271 or 272 in which 1 or 2 amino acids are substituted

in the manufacture of a vaccine for inhibiting cancer expressing HLA-A2.

[Claim 21] The use of claim 20, wherein the cancer is selected from the group consisting of bladder cancer, breast cancer, cervical cancer, cholangiocellular carcinoma, CML, colorectal cancer, endometriosis, esophageal cancer, gastric cancer, diffused type gastric cancer, liver, NSCLC, lymphoma, osteosarcoma, ovarian cancer, pancreatic cancer, prostate cancer, renal carcinoma, SCLC, soft tissue tumor and testicular tumor.