

## **WHAT IS CLAIMED IS:**

1. Use of a composition in the manufacture of a medicament for use in adoptive cell therapy for treating a melanoma in a recipient subject, wherein the composition comprises:
  - (a) a MYC fusion peptide, comprising (i) a protein transduction domain; and (ii) a MYC polypeptide sequence; and
  - (b) one or more primary immune cells isolated from a donor subject that has a melanoma tumor, wherein the one or more primary immune cells are reactive against a melanoma-specific antigen.
2. The use of claim 1, wherein the MYC fusion peptide translocates to the nucleus of the one or more primary immune cells.
3. The use of any one of claims 1-2, wherein the MYC fusion peptide exhibits a biological activity of MYC.
4. The use of any one of claims 1-3, wherein the MYC fusion peptide further comprises one or more molecules that link the protein transduction domain and the MYC polypeptide.
5. The use of any one of claims 1-4, wherein the MYC fusion peptide comprises a MYC fusion peptide with the following general structure:

protein transduction domain-X-MYC sequence,

wherein -X- is molecule that links the protein transduction domain and the MYC sequence.
6. The use of any one of claims 1-5, wherein the protein transduction domain sequence is a TAT protein transduction domain sequence.
7. The use of claim 6, wherein the TAT protein transduction domain sequence is selected from the group consisting of TAT[48-57] and TAT[57-48].

8. The use of any one of claims 1-7, wherein the MYC fusion peptide comprises SEQ ID NO: 1.
9. The use of any one of claims 1-8, wherein the MYC fusion peptide is acetylated.
10. The use of any one of claims 1-9, wherein the one or more primary immune cells have antitumor activity against melanoma cells.
11. The use of any one of claims 1-10, wherein the one or more primary immune cells comprise one or more lymphocytes.
12. The use of claim 11, wherein the one or more lymphocytes comprise a T cell, a B cell, an NK cell, or any combination thereof.
13. The use of claim 12, wherein the T cell is selected from the group consisting of a naïve T cell, CD4+ T cell, CD8+ T cell, memory T cell, activated T cell, anergic T cell, tolerant T cell, chimeric T cell, and antigen-specific T cell.
14. The use of claim 12, wherein the B cell is selected from the group consisting of a naïve B cell, plasma B cell, activated B cell, memory B cell, anergic B cell, tolerant B cell, chimeric B cell, and antigen-specific B cell.
15. The use of any one of claims 11-14, wherein the one or more lymphocytes are a tumor-infiltrating lymphocyte, T-cell receptor modified lymphocyte, or a chimeric antigen receptor modified lymphocyte.
16. The use of claim 15, wherein the tumor-infiltrating lymphocyte has a CD8+CD28-CD152- signature, a CD8+CD25+ signature, or a CD4+CD25+ signature..

17. The use of any one of claims 1-16, wherein the one or more primary immune cells comprise a detectable moiety.
18. The use of any one of claims 11-17, wherein the one or more primary immune cells are derived from primary immune cells isolated from the recipient subject.
19. The use of any one of claims 1-17, wherein the one or more primary immune cells are derived from primary immune cells isolated from a separate donor subject having the same type of melanoma.
20. The use of any one of claims 18-19, wherein the one or more primary immune cells are prepared by contacting the primary immune cells *in vitro* with the MYC fusion peptide following isolation.
21. The use of claim 20, wherein the primary immune cells are expanded *in vitro* prior to contacting with the MYC fusion peptide.
22. The use of claim 20, wherein the primary immune cells are expanded following contacting with the MYC fusion peptide.
23. The use of any one of claims 21-22, wherein the primary immune cells are expanded using an anti-CD3 antibody.
24. The use of any one of claims 21-23, wherein the primary immune cells are expanded using an irradiated allogenic feeder cells.
25. The use of any one of claims 21-24, wherein the primary immune cells are expanded in the presence of an exogenous cytokine.
26. The use of claim 25, wherein the cytokine is interleukin-2.

27. The use of any one of claims 18-26, wherein the one or more primary immune cells are formulated to be administered intravenously, intraperitoneally, subcutaneously, intramuscularly, or intratumorally.
28. The use of any one of claims 18-27, wherein the recipient subject is lymphodepleted prior to administration of the one or more primary immune cells.
29. The use of any one of claims 18-28, wherein the recipient subject has been administered a cytokine prior to, during, or subsequent to administration of the one or more primary immune cells.
30. The use of claim 29, wherein the cytokine is selected from a group consisting of interferon  $\alpha$ , interferon  $\beta$ , interferon  $\gamma$ , complement C5a, IL-2, TNF $\alpha$ , CD40L, IL12, IL-23, IL15, IL17, CCL1, CCL11, CCL12, CCL13, CCL14-1, CCL14-2, CCL14-3, CCL15-1, CCL15-2, CCL16, CCL17, CCL18, CCL19, CCL19, CCL2, CCL20, CCL21, CCL22, CCL23-1, CCL23-2, CCL24, CCL25-1, CCL25-2, CCL26, CCL27, CCL28, CCL3, CCL3L1, CCL4, CCL4L1, CCL5, CCL6, CCL7, CCL8, CCL9, CCR10, CCR2, CCR5, CCR6, CCR7, CCR8, CCRL1, CCRL2, CX3CL1, CX3CR, CXCL1, CXCL10, CXCL11, CXCL12, CXCL13, CXCL14, CXCL15, CXCL16, CXCL2, CXCL3, CXCL4, CXCL5, CXCL6, CXCL7, CXCL8, CXCL9, CXCL9, CXCR1, CXCR2, CXCR4, CXCR5, CXCR6, CXCR7 and XCL2.
31. The use of any one of claims 18-30, wherein the melanoma is metastatic.
32. The use of any one of claims 18-31, wherein the recipient subject is a human or a non-human animal.
33. The use of any one of claims 18-32, wherein the recipient subject has been administered an additional cancer therapy.

34. The use of claim 33, wherein the additional cancer therapy is selected from among chemotherapy, radiation therapy, immunotherapy, monoclonal antibodies, anti-cancer nucleic acids or proteins, anti-cancer viruses or microorganisms, and any combinations thereof
35. A method for preparing modified immune cells for adoptive cell therapy for melanoma in a recipient subject, comprising contacting one or more immune cells *in vitro* with a MYC fusion polypeptide, wherein the immune cells are from a donor that has been exposed to one or more tumor antigens and wherein the MYC fusion peptide comprises (i) a protein transduction domain; and (ii) a MYC polypeptide sequence and are reactive to a tumor-specific antigen, wherein the one or more modified immune cells have antitumor activity against melanoma cells in the subject.
36. The method of claim 35, wherein the one or more modified immune cells are derived from primary immune cells isolated from a subject having melanoma.
37. The method of any one of claims 35-36, further comprising expanding the modified immune cells *in vitro* prior to contacting with the MYC fusion peptide.
38. The method of any one of claims 35-36, further comprising expanding the modified immune cells following contacting with the MYC fusion peptide.
39. The method of any one of claims 35-38, wherein the cells are expanded using an anti-CD3 antibody.
40. The method of any one of claims 35-39, wherein the cells are expanded using an irradiated allogenic feeder cells.
41. The method of any one of claims 35-40, wherein the cells are expanded in the presence of an exogenous cytokine.
42. The method of claim 41, wherein the cytokine is interleukin-2.

43. The method of any one of claims 35-42, wherein the MYC fusion peptide translocates to the nucleus of the immune cell.
44. The method of any one of claims 35-43, wherein the MYC fusion peptide exhibits a biological activity of MYC.
45. The method of any one of claims 35-44, wherein the MYC fusion peptide further comprises one or more molecules that link the protein transduction domain and the MYC polypeptide.
46. The method of any one of claims 35-45, wherein the MYC fusion peptide comprises a MYC fusion peptide with the following general structure:  
protein transduction domain-X-MYC sequence,  
wherein -X- is molecule that links the protein transduction domain and the MYC sequence.
47. The method of any one of claims 35-46, wherein the protein transduction domain sequence is a TAT protein transduction domain sequence.
48. The method of claim 47, wherein the TAT protein transduction domain sequence is selected from the group consisting of TAT[48-57] and TAT[57-48].
49. The method of any one of claims 35-48, wherein the MYC fusion peptide comprises SEQ ID NO: 1.
50. The method of any one of claims 35-49, wherein the MYC fusion peptide is acetylated.
51. The method of any one of claims 35-50, wherein the one or more modified immune cells have antitumor activity.

52. The method of any one of claims 35-51, wherein the one or more modified immune cells comprise one or more anergic immune cells.
53. The method of any one of claims 35-52, wherein the one or more immune cells comprises one or more lymphocytes.
54. The method of claim 53, wherein the one or more lymphocytes comprise a T cell, a B cell, an NK, or any combination thereof.
55. The method of claim 54, wherein the T cell is selected from the group consisting of a naïve T cell, CD4+ T cell, CD8+ T cell, memory T cell, activated T cell, anergic T cell, tolerant T cell, chimeric T cell, and antigen-specific T cell.
56. The method of claim 54, wherein the B cell is selected from the group consisting of a naïve B cell, plasma B cell, activated B cell, memory B cell, anergic B cell, tolerant B cell, chimeric B cell, and antigen-specific B cell.
57. The method of claim 53, wherein the one or more lymphocytes comprise a tumor-infiltrating lymphocyte, T-cell receptor modified lymphocyte, or a chimeric antigen receptor modified lymphocyte.
58. The method of claim 53, wherein the lymphocyte has a CD8+CD28-CD152- signature, a CD8+CD25+ signature, or a CD4+CD25+ signature.
59. A method for preparing a composition for adoptive cell therapy for use in treating a melanoma in a recipient subject, the method comprising contacting one or more primary immune cells *in vitro* with MYC fusion peptide, comprising (i) a protein transduction domain; and (ii) a MYC polypeptide sequence, wherein one or more primary immune cells are isolated from a patient having melanoma, and wherein one or more primary immune cells are reactive to a melanoma-specific antigen.

60. Use of a composition in the manufacture of a medicament for use in adoptive cell therapy for treating a melanoma in a recipient subject, wherein the composition comprises:

- (a) one or more isolated primary immune cells that have been exposed to a melanoma cell line; and
- (b) a MYC fusion peptide, comprising (i) a protein transduction domain; and (ii) a MYC polypeptide sequence;

wherein the one or more primary immune cells are reactive against a melanoma-specific antigen.