CLAIMS

What is claimed is:

1. A recombinant expression vector for immune therapy, comprising:

    a sequence that encodes a polytope operably linked to a promoter to drive expression of the polytope;

    wherein the polytope comprises a trafficking element that directs the polytope to a sub-cellular location selected from the group consisting of cytoplasm, recycling endosome, sorting endosome, lysosome, and extracellular membrane, or wherein the trafficking element directs the polytope to an extracellular space; and

    wherein the polytope comprises a plurality of filtered neoepitope sequences.

2. The vector of claim 1 wherein the recombinant expression vector is an adenoviral expression vector having E1 and E2b genes deleted.

3. The vector of claim 1 wherein the promoter is a constitutive promoter or an inducible promoter that is inducible by hypoxia, IFN-gamma, or IL-8.

4. The vector of any one of claims 1-3 wherein the trafficking element is selected from the group consisting of a cleavable ubiquitin, a non-cleavable ubiquitin, a CD1b leader sequence, a CD1a tail, a CD1c tail, and a LAMP1-transmembrane sequence.

5. The vector of any one of claims 1-4 wherein the filtered neoepitope sequences are filtered by comparing tumor versus matched normal of the same patient, or wherein the filtered neoepitope sequences are filtered to have binding affinity to an MHC complex of equal or less than 200 nM, or wherein the filtered neoepitope sequences are filtered against known human SNP and somatic variations, or wherein the filtered neoepitope sequences have an arrangement within the polytope such that the polytope has a likelihood of a presence and/or strength of hydrophobic sequences or signal peptides that is below a predetermined threshold.

6. The vector of any one of claims 1-5 wherein the filtered neoepitope sequences bind to MHC-I and wherein the trafficking element directs the polytope to the cytoplasm or proteasome.

7. The vector of any one of claims 1-5 wherein the filtered neoepitope sequences bind to MHC-I and wherein the trafficking element directs the polytope to the recycling endosome, sorting endosome, or lysosome.

8. The vector of any one of claims 1-5 wherein the filtered neoepitope sequences bind to MHC-II and wherein the trafficking element directs the polytope to the recycling endosome, sorting endosome, or lysosome.

9. The vector of any one of claims 1-8 wherein the recombinant nucleic acid further comprises a sequence that encodes a second polytope, wherein the second polytope comprises a second trafficking element that directs the second polytope to a different sub-cellular location and wherein the second polytope comprises a second plurality of filtered neoepitope sequences.

10. The vector of any one of claims 1-9 wherein the recombinant nucleic acid further comprises a sequence that encodes at least one of a co-stimulatory molecule, an immune stimulatory cytokine, and a protein that interferes with or down-regulates checkpoint inhibition.

11. The vector of claim 10 wherein the co-stimulatory molecule is selected from the group consisting of CD80, CD86, CD30, CD40, CD30L, CD40L, ICOS-L, B7-H3, B7-H4, CD70, OX40L, 4-1BBL, GITR-L, TIM-3, TIM-4, CD48, CD58, TL1A, ICAM-1, and LFA3.

12. The vector of claim 10 wherein the immune stimulatory cytokine is selected from the group consisting of IL-2, IL-12, IL-15, IL-15 super agonist (ALT803), IL-21, IPS1, and LMP1.

13. The vector of claim 10 wherein the protein that interferes is an antibody or an antagonist of CTLA-4, PD-1, TIM1 receptor, 2B4, or CD160.

14. A recombinant virus comprising the vector of any one of claims 1-13.

15. Use of a recombinant virus of claim 14 in the manufacture of a medicament for the treatment of cancer.