What is claimed is:

1. An immunotherapeutic composition for use to reduce tumor burden, inhibit tumor growth, and/or increase survival of an individual who has a cancer that expresses MUC1, wherein the immunotherapeutic composition is to be administered to the individual, and wherein the immunotherapeutic composition comprises:

a) a yeast vehicle;

b) at least one MUC1 antigen expressed by the yeast vehicle, wherein the MUC1 antigen comprises an amino acid sequence that is at least 95% identical to SEQ ID NO:25 or to positions 92-566 of SEQ ID NO:25, and wherein the MUC1 antigen comprises 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 of the following amino acids L184, Y232, L233, V240, Y241, L242, Y483, V497, L535, F536, and Y551.

2. The use of Claim 1, wherein MUC1 expression is detected in the individual's cancer at the time the composition is first administered.

3. The use of Claim 1, wherein the individual has a stage I cancer.

4. The use of Claim 1, wherein the individual has a stage II cancer.

5. The use of Claim 1, wherein the individual has a stage III cancer.

6. The use of Claim 1, wherein the individual has a stage IV cancer.

7. The use of Claim 1, wherein the individual is being treated or has been treated with another therapy for cancer.

8. The use of Claim 7, wherein the therapy is chemotherapy.

9. The use of Claim 7, wherein the therapy is targeted cancer therapy.

10. The use of Claim 7, wherein the therapy is radiation therapy.

11. The use of Claim 7, wherein the therapy is adoptive T cell transfer.

12. The use of Claim 7, wherein the therapy is administration of one or more additional immunotherapeutic compositions.

13. The use of Claim 12, wherein the additional immunotherapeutic compositions comprise a second cancer antigen that is a MUC1 antigen or a cancer antigen that is not a MUC1 antigen.

14. The use of Claim 12, wherein the additional immunotherapeutic compositions comprise a yeast vehicle and a second cancer antigen that does not include MUC1 antigen.

15. The use of Claim 13, wherein the second cancer antigen is selected from the group consisting of: mutated Ras, carcinoembryonic antigen (CEA), Brachyury, EGFR, BCR-Abl, MART-1, MAGE-1, MAGE-3, GAGE, GP-100, MUC-2, PSMA, tyrosinase, gp75 TRP-1, NY-ESO-1, TRP-2, TAG72, KSA, CA-125, PSA, HER-2/neu/c-erb/B2, hTERT, p73, B-RAF, adenomatous polyposis coli (APC), Myc, von Hippel-Lindau protein (VHL), Rb-1, Rb-2, androgen receptor (AR), Smad4, MDR1, Flt-3, BRCA-1, BRCA-2, pax3-fkhr, ews-fli-1, HERV-H, HERV-K, TWIST, Mesothelin, and NGEP.

16. The use of Claim 12, wherein the additional immunotherapeutic composition is a viral vector vaccine.

17. The use of Claim 12, wherein the additional immunotherapeutic composition is a dendritic cell/tumor cell fusion.

18. The use of Claim 1, wherein the method further comprises surgical resection of a tumor from the individual.

19. The use of Claim 1, wherein the cancer is of epithelial cell origin.

20. The use of Claim 1, wherein the cancer is selected from the group consisting of: breast cancer, small intestine cancer, stomach cancer, pancreatic cancer, kidney cancer, bladder cancer, uterine cancer, ovarian cancer, testicular cancer, lung cancer, colon cancer, prostate cancer, melanoma, multiple myelogenous leukemia (MML), chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML), Burkitt's lymphoma, Hodgkin's lymphoma, cancers of secretory tissues, and metastatic cancers thereof.

21. The use of Claim 1, wherein the cancer is AML, and wherein the yeast-MUC1 immunotherapeutic composition is administered to both donor and recipient of bone marrow transplantation (BMT) therapy.

22. The use of Claim 1, wherein the cancer is AML, and wherein the yeast-MUC1 immunotherapeutic composition is administered to the individual in conjunction with cytarabine and anthracycline therapy.