CLAIMS

1. A pharmaceutical composition comprising:

(i) a polypeptide comprising at least one amino acid sequence comprising at least 8 contiguous amino acids of:
PPLQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESK IMFATLQRSSLWCLCSNH (residues 26 to 97 of SEQ ID NO: 1297),

(ii) a nucleic acid encoding the polypeptide,

(iii) antigen presenting cells (APCs) comprising (i) or (ii), or

(iv) T cells stimulated with APCs comprising (i) or (ii), and

a pharmaceutically acceptable carrier.

2. A pharmaceutical composition according to Claim 1, in which the at least one amino acid sequence binds to a protein encoded by an HLA allele.

3. A pharmaceutical composition according to Claim 2, in which the at least one amino acid sequence binds to a protein encoded by an HLA-A, HLA-B or HLA-C allele with a K_D of less than 500 nM.

4. A pharmaceutical composition according to Claim 2, in which the at least one amino acid sequence binds to a protein encoded by a class II HLA allele with a binding affinity of less than 1000 nM.

5. A pharmaceutical composition according to Claim 1, in which the polypeptide is from 8 to 50 amino acids in length.

6. A pharmaceutical composition according to Claim 1, in which the polypeptide further comprises an amino acid sequence selected from the group consisting of AIQPVLWTT, QPVLWTTPPL,VLPEPHLAL, HMSSLSHISA, TTPPLQHGHR and SSLSHISAL.

7. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence ESKIMFATL (SEQ ID NO: 13457).

8. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence FATLQRSSL (SEQ ID NO: 13454).

9. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence FLKAESKIM (SEQ ID NO: 13438).

10. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence FLKAESKIMF (SEQ ID NO: 13488).

11. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence GPPARVPAV (SEQ ID NO: 13452).

12. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence IMKPKRDGYM (SEQ ID NO: 13477).

13. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence KIMFATLQR (SEQ ID NO: 13441).

14. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence KPKRDGYMF (SEQ ID NO: 13453).

15. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence KPKRDGYMFL (SEQ ID NO: 13485).

16. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence LHFCRSSIM (SEQ ID NO: 13456).

17. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence MFATLQRSSL (SEQ ID NO: 13487).

18. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence MFLKAESKI (SEQ ID NO: 13444).

19. TA pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence MLTGPPARV (SEQ ID NO: 13437).

20. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence SMLTGPPARV (SEQ ID NO: 13471).

21. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence TLQRSSLWCL (SEQ ID NO: 13473).

22. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence: YMFLKAESK (SEQ ID NO: 13440).

23. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence YMFLKAESKI (SEQ ID NO: 13472).

24. A pharmaceutical composition of Claim 1, in which the polypeptide comprises an amino acid sequence selected from the group consisting of CSMLTGPPAR, AVPFDLHFCR, AESKIMFATL, LQRSSLWCL, IMKPKRDGY, AESKIMFAT, VPFDLHFCR, ATLQRSSLW and RSSIMKPKR.

25. A pharmaceutical composition according to Claim 1, in which the pharmaceutical composition comprises (iv).

26. A pharmaceutical composition according to Claim 1, in which the pharmaceutical composition comprises (i) or (ii).

27. A pharmaceutical composition according to Claim 1, further comprising an adjuvant or an immunomodulator.

28. A pharmaceutical composition according to Claim 27, in which the immunomodulator or adjuvant is poly(I:C).

29. A pharmaceutical composition according to Claim 1, in which the pharmaceutical composition is an immunogenic composition or a vaccine composition.

CLAIMS

1. A pharmaceutical composition comprising:

(i) a polypeptide that is from 8 to 50 amino acids in length, in which the polypeptide comprises a tumor-specific neoepitope that binds to a protein encoded by an HLA allele, in which the tumor-specific neoepitope arises from a tumor-specific GATA3 frameshift mutation and in which the tumor-specific neoepitope is the amino acid sequence KIMFATLQR (SEQ ID NO: 13441), MLTGPPARV (SEQ ID NO: 13437), SMLTGPPARV (SEQ ID NO: 13471), TLQRSSLWCL (SEQ ID NO: 13473), FATLQRSSL (SEQ ID NO: 13454), MFATLQRSSL (SEQ ID NO: 13487), FLKAESKIM (SEQ ID NO: 13438), FLKAESKIMF (SEQ ID NO: 13488), GPPARVPAV (SEQ ID NO: 13452), KPKRDGYMF (SEQ ID NO: 13453), KPKRDGYMFL (SEQ ID NOs: 13485), CSMLTGPPAR (SEQ ID NO: 13474), AVPFDLHFCR (SEQ ID NO: 13481), AESKIMFATL (SEQ ID NO: 13498), ESKIMFATL (SEQ ID NO: 13457), LQRSSLWCL (SEQ ID NO: 13467), LHFCRSSIM (SEQ ID NO: 13456), IMKPKRDGY (SEQ ID NO: 13447), IMKPKRDGYM (SEQ ID NOs: 13477), AESKIMFAT (SEQ ID NO: 13538), VPFDLHFCR (SEQ ID NO: 13449), ATLQRSSLW (SEQ ID NO: 13466), RSSIMKPKR (SEQ ID NO: 13446), VLPEPHLAL (SEQ ID NO: 13434), MFLKAESKI (SEQ ID NO: 13444), YMFLKAESK (SEQ ID NO: 13440), or YMFLKAESKI (SEQ ID NO: 13472);

(ii) a nucleic acid encoding the polypeptide,

(iii) antigen presenting cells (APCs) comprising (i) or (ii), or

(iv) T cells stimulated with APCs comprising (i) or (ii); and

a pharmaceutically acceptable carrier.

2. A pharmaceutical composition according to Claim 1, in which the at least one amino acid sequence binds to a protein encoded by an HLA allele.

3. A pharmaceutical composition according to Claim 2, in which the at least one amino acid sequence binds to a protein encoded by an HLA-A, HLA-B or HLA-C allele with a K_D of less than 500 nM.

4. A pharmaceutical composition according to Claim 2, in which the at least one amino acid sequence binds to a protein encoded by a class II HLA allele with a binding affinity of less than 1000 nM.

5. A pharmaceutical composition according to Claim 1, in which the polypeptide further comprises an amino acid sequence selected from the group consisting of AIQPVLWTT, QPVLWTTPPL,VLPEPHLAL, HMSSLSHISA, TTPPLQHGHR and SSLSHISAL.

6. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence ESKIMFATL (SEQ ID NO: 13457).

7. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence FATLQRSSL (SEQ ID NO: 13454).

8. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence FLKAESKIM (SEQ ID NO: 13438).

9. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence FLKAESKIMF (SEQ ID NO: 13488).

10. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence GPPARVPAV (SEQ ID NO: 13452).

11. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence IMKPKRDGYM (SEQ ID NO: 13477).

12. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence KIMFATLQR (SEQ ID NO: 13441).

13. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence KPKRDGYMF (SEQ ID NO: 13453).

14. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence KPKRDGYMFL (SEQ ID NO: 13485).

15. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence LHFCRSSIM (SEQ ID NO: 13456).

16. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence MFATLQRSSL (SEQ ID NO: 13487).

17. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence MFLKAESKI (SEQ ID NO: 13444).

18. TA pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence MLTGPPARV (SEQ ID NO: 13437).

19. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence SMLTGPPARV (SEQ ID NO: 13471).

20. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence TLQRSSLWCL (SEQ ID NO: 13473).

21. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence: YMFLKAESK (SEQ ID NO: 13440).

22. A pharmaceutical composition according to Claim 1, in which the polypeptide comprises an amino acid sequence YMFLKAESKI (SEQ ID NO: 13472).

23. A pharmaceutical composition of Claim 1, in which the polypeptide comprises an amino acid sequence selected from the group consisting of CSMLTGPPAR, AVPFDLHFCR, AESKIMFATL, LQRSSLWCL, IMKPKRDGY, AESKIMFAT, VPFDLHFCR, ATLQRSSLW and RSSIMKPKR.

24. A pharmaceutical composition according to Claim 1, in which the pharmaceutical composition comprises (iv).

25. A pharmaceutical composition according to Claim 1, in which the pharmaceutical composition comprises (i) or (ii).

26. A pharmaceutical composition according to Claim 1, further comprising an adjuvant or an immunomodulator.

27. A pharmaceutical composition according to Claim 1, in which the pharmaceutical composition is an immunogenic composition or a vaccine composition.