CLAIMS:

1. A peptide mixture suitable for eliciting an immune response comprising a first and a second peptide, each corresponding to a fragment of the RAS protein wherein:

each of the first and second peptides comprises a region of at least 8 amino acids which includes position 13 of the RAS protein,

each of said regions of the first and second peptides independently has at least 6 amino acid residues, other than at said position 13, which are identical to the corresponding region of the RAS protein,

each of the first and the second peptides has a point mutation at the amino acid corresponding to said position 13, and

the point mutation of the first peptide is different from the point mutation of the second peptide.

2. A peptide mixture according to claim 1, wherein each of the point mutations is independently selected from a G13A, G13C, G13D, G13R, G13S or a G13V mutation.

3. A peptide mixture according to claim 1 or 2, wherein the peptide mixture further comprises:

at least one further peptide corresponding to a fragment of the RAS protein comprising a region of a least 8 amino acids which includes position 12 of the RAS protein, wherein each of said regions of the at least one further peptides independently has at least 6 amino acid residues, other than at said position 12, which are identical to the corresponding region of the RAS protein, and wherein there is a point mutation at the amino acid corresponding to position 12 of the RAS protein; and/or

at least one further peptide corresponding to a fragment of the RAS protein comprising a region of a least 8 amino acids which includes position 61 of the RAS protein, wherein each of said regions of the at least one further peptides independently has at least 6 amino acid residues, other than at said position 61, which are identical to the corresponding region of the RAS protein, and wherein there is a point mutation at the amino acid corresponding to position 61 of the RAS protein.

4. A peptide mixture according to claim 3, wherein the point mutation at the amino acid corresponding to position 12 of the RAS protein is selected from a G12A,

G12C, G12D, G12R, G12S or a G12V mutation and/or wherein the point mutation at the amino acid corresponding to position 61 of the RAS protein is selected from a Q61E, Q61H, Q61K, Q61L, a Q61P or a Q61R mutation.

5. A peptide mixture according to claim 3, wherein the first peptide is a peptide having a G13C mutation and the second peptide is a peptide having a G13D mutation, and wherein the at least one further peptide comprises:

a peptide having a G12A mutation,
a peptide having a G12C mutation,
a peptide having a G12D mutation,
a peptide having a G12R mutation,
a peptide having a G12S mutation, and
a peptide having a G12V mutation.

6. A peptide mixture according to claim 3, wherein the first peptide is a peptide having a G13R mutation and the second peptide is a peptide having a G13V mutation, and wherein the at least one further peptide comprises:

a peptide having a Q61H mutation,
a peptide having a Q61K mutation,
a peptide having a Q61L mutation, and
a peptide having a Q61R mutation.

7. A peptide mixture suitable for eliciting an immune response comprising at least five peptides, each corresponding to a fragment of the RAS protein wherein:

each of the at least five peptides comprises a region of at least 8 amino acids and includes position 13 of the RAS protein,

each of said regions of the at least five peptides independently has at least 6 amino acid residues other than at said position 13, which are identical to the corresponding region of the RAS protein,

each of the peptides has a point mutation at the amino acid corresponding to said position 13, selected from a G13A, G13C, G13D, G13R, G13S or a G13V mutation, and

the point mutation of each peptide is different from the point mutation of the other peptides.

8. A peptide mixture suitable for eliciting an immune response consisting of six peptides each corresponding to a fragment of the RAS protein wherein:

each peptide comprises a region of at least 8 amino acids which includes position 12 of the RAS protein,

each of said regions of the peptides independently has at least 6 amino acid residues other than at said position 12, which are identical to the corresponding region of the RAS protein,

each of the peptides has a point mutation at the amino acid corresponding to said position 12, selected from a G12A, G12C, G12D, G12R, G12S or a G12V mutation, and

the point mutation of each peptide is different from the point mutation of the other peptides.

9. A peptide mixture suitable for eliciting an immune response consisting of six peptides each corresponding to a fragment of the RAS protein wherein:

each peptide comprises a region of at least 8 amino acids which includes position 61 of the RAS protein,

each of said regions of the peptides independently has at least 6 amino acid residues other than at said position 61, which are identical to the corresponding region of the RAS protein,

each of the peptides has a point mutation at the amino acid corresponding to said position 61, selected from a Q61E, Q61H, Q61K, Q61L, a Q61P or a Q61R mutation, and

the point mutation of each peptide is different from the point mutation of the other peptides.

10. A peptide mixture suitable for eliciting an immune response consisting of a first, second, third and fourth peptide each corresponding to a fragment of the RAS protein wherein:

each of the first, second and third peptides comprises a region of at least 8 amino acids which includes position 12 of the RAS protein,

the fourth peptide comprises a region of at least 8 amino acids which includes position 13 of the RAS protein,

each of said regions of the first, second, third and fourth peptides independently has at least 6 amino acid residues other than at said position 12 or 13 respectively, which are identical to the corresponding region of the RAS protein,

each of the first, second, third and fourth peptides has a point mutation at the amino acid corresponding to said position 12 or 13 respectively, and

the first peptide is a peptide having a G12A mutation,

the second peptide is a peptide having a G12R mutation,

the third peptide is a peptide having a G12S mutation, and

the fourth peptide is a peptide having a G13C mutation.

11. A peptide for use as a vaccine or medicament and which corresponds to a fragment of the RAS protein wherein:

the peptide comprises a region of at least 8 amino acids which includes position 13 of the RAS protein,

said region has at least 6 amino acid residues, other than at said position 13, which are identical to the corresponding region of the RAS protein, and

the peptide has a G13C or a G13R point mutation at the amino acid corresponding to said position 13.

12. A peptide suitable for eliciting an immune response and which corresponds to a fragment of the RAS protein wherein:

the peptide comprises a region of at least 8 amino acids which includes position 13 of the RAS protein,

said region has at least 6 amino acid residues, other than at said position 13, which are identical to the corresponding region of the RAS protein,

the peptide comprises no more than 30 amino acid residues, and

the peptide has a G13C or a G13R point mutation at the amino acid corresponding to said position 13.

13. A T-cell mixture comprising T-cells specific for each of the peptides in one of the peptide mixtures according to any one of claims 1 to 10, or a T-cell preparation comprising T-cells specific for one of the peptides for use according to claim 11 or for one of the peptides according to claim 12, when presented on an MHC molecule.

14. A pharmaceutical composition comprising the peptide mixture of any of claims 1 to 10, a peptide for use according to claim 11, a peptide according to claim 12 or the T-cell mixture or T-cell preparation of claim 13 and a pharmaceutically acceptable carrier, diluent and/or excipient.

15. A peptide mixture according to any one of claims 1 to 10, a peptide for use according to claim 11, a peptide according to claim 12, a T-cell mixture or T-cell preparation according to claim 13 or a pharmaceutical composition according to claim 19 for use in the prophylaxis and/or treatment of cancer.

16. A peptide mixture according to claim 5 or a T-cell mixture according to claim 13 as referring to claim 5 for use in the prophylaxis and/or treatment of cancer, preferably wherein the cancer is colorectal, lung and/or pancreatic cancer.

17. A peptide mixture according to claim 6 or a T-cell mixture according to claim 13 as referring to claim 6 for use in the prophylaxis and/or treatment of malignant melanoma.

18. A peptide mixture, a peptide for use as a vaccine or medicament, a peptide, a T-cell mixture, a T-cell preparation or a pharmaceutical composition for use in a method comprising:

i) identifying RAS protein mutations present in a sample taken from a patient;

ii) selecting a peptide mixture according to any of claims 1-10 comprising a peptide comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a peptide for use according to claim 11 comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a peptide according to claim 12 comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a T-cell mixture or a T-cell preparation according to claim 13 comprising T-cells specific for a peptide, when presented on an MHC molecule, comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a pharmaceutical composition according to claim 14 comprising a peptide mixture, peptide for use as a vaccine or medicament or a peptide comprising a point mutation corresponding to at least one of the RAS protein

mutations identified in the sample, or a T-cell mixture or T-cell preparation comprising T-cells specific for a peptide, when presented on an MHC molecule, comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample and

iii) administering the peptide mixture, peptide for use as a vaccine or medicament, peptide, T-cell mixture or T-cell preparation to the patient.

19. A method of selecting a peptide mixture, a peptide for use as a vaccine or medicament, a peptide, a T-cell preparation, a T-cell mixture or a pharmaceutical composition for administration to a patient comprising:

i) identifying RAS protein mutations present in a sample taken from a patient; and

ii) selecting a peptide mixture according to any of claims 1-10 comprising a peptide comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a peptide for use according to claim 11 comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a peptide according to claim 12 comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a T-cell mixture or T-cell preparation according to claim 13 comprising T-cells specific for a peptide, when presented on an MHC molecule, comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample; or selecting a pharmaceutical composition according to claim 14 comprising a peptide mixture, peptide for use as a vaccine or medicament or a peptide comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample, or a T-cell mixture or T-cell preparation comprising T-cells specific for a peptide, when presented on an MHC molecule, comprising a point mutation corresponding to at least one of the RAS protein mutations identified in the sample.

CLAIMS:

1. A peptide mixture suitable for eliciting an immune response comprising a first and a second peptide, each corresponding to a fragment of the RAS protein wherein:

each of the first and second peptides comprises a region of at least 8 amino acids which includes position 13 of the RAS protein,

each of said regions of the first and second peptides independently has at least 6 amino acid residues, other than at said position 13, which are identical to the corresponding region of the RAS protein,

the first peptide is a peptide having a G13C mutation and the second peptide is a peptide having a G13D mutation, and

wherein the peptide mixture further comprises:

six further peptides each corresponding to a fragment of the RAS protein comprising a region of a least 8 amino acids which includes position 12 of the RAS protein, wherein each of said regions of the six further peptides independently has at least 6 amino acid residues, other than at said position 12, which are identical to the corresponding region of the RAS protein, and wherein there is a point mutation at the amino acid corresponding to position 12 of the RAS protein, and wherein the six further peptides are:

a peptide having a G12A mutation,
a peptide having a G12C mutation,
a peptide having a G12D mutation,
a peptide having a G12R mutation,
a peptide having a G12S mutation, and
a peptide having a G12V mutation.

2. A peptide mixture according to claims 1, wherein the first, second and further peptides consist of the amino acid sequences of SEQ ID NOs: 19-26, respectively.

3. A T-cell mixture comprising T-cells specific for each of the peptides in the peptide mixture according to claim 1 or 2, when presented on an MHC molecule.

4. A pharmaceutical composition comprising the peptide mixture of claim 1 or 2, or the T-cell mixture of claim 3 and a pharmaceutically acceptable carrier, diluent and/or excipient.

5. A peptide mixture according to claim 1 or 2, a T-cell mixture according to claim 3 or a pharmaceutical composition according to claim 4 for use in the prophylaxis and/or treatment of cancer.

6. A peptide mixture according to claim 1 or 2, a T-cell mixture according to claim 3 or a pharmaceutical composition according to claim 4, for use in the prophylaxis and/or treatment of cancer, wherein the cancer is colorectal, lung and/or pancreatic cancer.

7. A peptide mixture, a T-cell mixture, or a pharmaceutical composition for use in a method comprising:

i) identifying RAS protein mutations present in a sample taken from a patient;

ii) selecting the peptide mixture according to claim 1 or 2 or selecting a T-cell mixture according to claim 3; or selecting a pharmaceutical composition according to claim 4 and

iii) administering the peptide mixture, or T-cell mixture to the patient.

8. A method of selecting a peptide mixture, a T-cell mixture or a pharmaceutical composition for administration to a patient comprising:

i) identifying RAS protein mutations present in a sample taken from a patient; and

ii) selecting the peptide mixture according to claim 1 or 2; or selecting a T-cell mixture according to claim 3; or selecting a pharmaceutical composition according to claim 4.