

CLAIMS

1. A peptide comprising
 - (i) a cellular uptake signal; and
 - (ii) a BNIP3 fragment comprising positions 13 to 20 of SEQ ID NO: 1, optionally comprising 1, 2 or 3 amino acid substitutions compared to positions 13 to 20 of SEQ ID NO: 1, wherein the BNIP3 fragment has a length of 12 amino acids or less;wherein the peptide has a length of 50 amino acids or less.
2. The peptide according to claim 1, wherein the BNIP3 fragment has a length of 10 amino acids or less, in particular 8 amino acids.
3. The peptide according to claim 1 or 2, wherein the amino acid substitutions are present at one or more of the position corresponding to position 15, 17 and 19 of SEQ ID NO: 1.
4. The peptide according to any one of claims 1 to 3, wherein the amino acid substitutions are selected from
 - (i) glutamic acid at position 15 of SEQ ID NO: 1 to phenylalanine, isoleucine, leucine, valine, tyrosine, cysteine, histidine, arginine or threonine, and
 - (ii) histidine at position 17 of SEQ ID NO: 1 to valine, and
 - (iii) serine at position 19 of SEQ ID NO: 1 to tyrosine, cysteine, phenylalanine or histidine.
5. The peptide according to any one of claims 1 to 4, wherein the BNIP3 fragment comprises a phenylalanine residue at the position corresponding to position 19 of SEQ ID NO: 1.
6. The peptide according to any one of claims 1 to 5, wherein the BNIP3 fragment
 - (i) comprises positions 12 to 20 of SEQ ID NO: 1, optionally comprising 1, 2 or 3 amino acid substitutions compared to positions 12 to 20 of SEQ ID NO: 1; or
 - (ii) consists of an amino acid sequence selected from the group consisting of SEQ ID NOs: 3 to 17 and 27 to 30.
7. The peptide according to claim 1, wherein the BNIP3 fragment comprises a D-retro-inverso sequence of positions 13 to 20 of SEQ ID NO: 1 or of any of the amino acid sequences defined in claims 2 to 6.
8. The peptide according to any one of claims 1 to 7, wherein the cellular uptake signal

- (i) is a peptide having a length of 5 to 30 amino acids, in particular 8 to 20 amino acids or 10 to 16 amino acids, especially 12 amino acids;
 - (ii) is the protein transduction domain of the TAT protein of HIV; and/or
 - (iii) comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 31 to 50.
9. The peptide according to any one of claims 1 to 7, wherein the cellular uptake signal comprises a D-retro-inverso sequence of a cell penetrating peptide, in particular a cell penetrating peptide as defined in claim 8.
 10. The peptide according to any one of claims 1 to 9, consisting of the cellular uptake signal and the BNIP3 fragment, optionally comprising a linker between the cellular uptake signal and the BNIP3 fragment.
 11. The peptide according to any one of claims 1 to 10, having a length of 40 amino acids or less, in particular 35 amino acids or less, especially 30 amino acids or less.
 12. A pharmaceutical composition comprising the peptide according to any one of claims 1 to 11.
 13. The peptide according to any one of claims 1 to 11 for use in the treatment of reperfusion-related and/or mitochondria-related disorders as well as cancer therapy-induced cardiotoxicity.
 14. The peptide for use according to claim 13, wherein the reperfusion-related and/or mitochondria-related disorder is selected from the group consisting of myocardial infarction, stroke, acute kidney injury, trauma, circulatory arrest, and cessation of blood flow during organ transplantation.
 15. The peptide for use according to claim 13 or 14, wherein the peptide is administered to the patient during or after occurrence of impaired blood supply, especially prior to reperfusion of the tissue affected by the ischemia.
 16. The peptide for use according to claim 15, wherein the peptide is administered to the patient within 2 hours, in particular within 30 minutes prior to reperfusion.
 17. The peptide according to any one of claims 1 to 11 for use in the treatment or prevention of tissue damage due to mitochondria-induced apoptosis or necrosis.