

Claims

1. An immunogenic peptide comprising a fragment of an HBV protein, wherein said fragment is 20-34 amino acids in length and wherein said fragment comprises:
- 5 a) at least 10 consecutive amino acids of the region from position 57 to position 78 of HBV-X, preferably comprising:
- the amino acid sequence set forth in SEQ ID NO:1(x70-78), and/or
 - the amino acid sequence set forth in SEQ ID NO:2(x67-75), and/or
 - the amino acid sequence set forth in SEQ ID NO:3(x62-73), and/or
 - 10 – the amino acid sequence set forth in SEQ ID NO:4(x58-66), and/or
 - the amino acid sequence set forth in SEQ ID NO:5(x57-66),
- or
- b) at least 11 consecutive amino acids of the region from position 103 to position 120 of HBV-X, preferably comprising:
- 15 – the amino acid sequence set forth in SEQ ID NO:6(x103-111), and/or
 - the amino acid sequence set forth in SEQ ID NO:7(x104-113), and/or
 - the amino acid sequence set forth in SEQ ID NO:8(x105-113), and/or
 - the amino acid sequence set forth in SEQ ID NO:9(x110-120),
- or
- 20 c) the amino acid sequence set forth in SEQ ID NO:10(x132-140),
- or
- d) the amino acid sequence set forth in SEQ ID NO:11(p124-133),
- or
- e) the amino acid sequence set forth in SEQ ID NO:12(p164-173),
- 25 or
- f) the amino acid sequence set forth in SEQ ID NO:13(p275-283),
- or
- g) at least 10 consecutive amino acids of the region from position 403 to position 415 of HBV polymerase, preferably comprising:
- 30 – the amino acid sequence set forth in SEQ ID NO:14(p403-412), and/or
 - the amino acid sequence set forth in SEQ ID NO:15(p404-412), and/or
 - the amino acid sequence set forth in SEQ ID NO:16(p407-415),
- or
- h) at least 9 consecutive amino acids of the region from position 509 to position 523
- 35 of HBV polymerase, preferably comprising:
- the amino acid sequence set forth in SEQ ID NO:17(p509-517), and/or
 - the amino acid sequence set forth in SEQ ID NO:18(p515-523),
- or

- i) at least 10 consecutive amino acids of the region from position 649 to position 658 of HBV polymerase, comprising:
- the amino acid sequence set forth in SEQ ID NO:19(p649-658), and/or
 - the amino acid sequence set forth in SEQ ID NO:20(p650-658),
- 5 or
- j) at least 10 consecutive amino acids of the region from position 693 to position 706 of HBV polymerase, preferably comprising:
- the amino acid sequence set forth in SEQ ID NO:21(p693-701), and/or
 - the amino acid sequence set forth in SEQ ID NO:22(p697-706),
- 10 or
- k) the amino acid sequence set forth in SEQ ID NO:23(p723-731),
- or
- l) at least 10 consecutive amino acids of the region from position 755 to position 765 of HBV polymerase, comprising:
- 15 – the amino acid sequence set forth in SEQ ID NO:24(p755-764), and/or
 - the amino acid sequence set forth in SEQ ID NO:25(p756-765),
- or
- m) the amino acid sequence set forth in SEQ ID NO:26(p829-837),
- 20 wherein the numbering of amino acid positions within HBV polymerase and HBV-X corresponds to the numbering in the consensus sequences set forth in SEQ ID NO:28 and SEQ ID NO:30, respectively.
2. The peptide according to claim 1, wherein the peptide consists of said fragment
- 25 of an HBV protein.
3. The peptide according to claim 1 or 2, wherein said peptide is 20-34 amino acids in length, such as 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33 or 34 amino acids length, such as 20-33 amino acids in length, e.g. 20-32 amino acids in length,
- 30 such as 20-31 amino acids in length, e.g. 20-30 amino acids in length, such as 20-29 amino acids in length, e.g. 20-28 amino acids in length, such as 20-27 amino acids in length, e.g. 20-26 or 20-25 amino acids in length.
4. The peptide according to any one of the preceding claims, wherein said fragment
- 35 is 20-33 amino acids in length, such as 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 or, 33 amino acids length, such as 20-32 amino acids in length, such as 20-31 amino acids in length, e.g. 20-30 amino acids in length, such as 20-29 amino

acids in length, e.g. 20-28 amino acids in length, such as 20-27 amino acids in length, e.g. 20-26 or 20-25 amino acids in length.

5. The peptide according to any one of the preceding claims, wherein

- 5 a) the fragment comprises at least 10 consecutive amino acids of the region from position 57 to position 78 of HBV-X, and the fragment comprises:
- the amino acid sequence set forth in SEQ ID NO:1(x70-78) and the amino acid sequence set forth in SEQ ID NO:2(x67-75), or
 - 10 – the amino acid sequence set forth in SEQ ID NO:1(x70-78) and the amino acid sequence set forth in SEQ ID NO:3(x62-73), or
 - the amino acid sequence set forth in SEQ ID NO:1(x70-78) and the amino acid sequence set forth in SEQ ID NO:4(x58-66), or
 - the amino acid sequence set forth in SEQ ID NO:1(x70-78) and the amino acid sequence set forth in SEQ ID NO:5(x57-66), or
 - 15 – the amino acid sequence set forth in SEQ ID NO:2(x67-75) and the amino acid sequence set forth in SEQ ID NO:3(x62-73), or
 - the amino acid sequence set forth in SEQ ID NO:2(x67-75) and the amino acid sequence set forth in SEQ ID NO:4(x58-66), or
 - the amino acid sequence set forth in SEQ ID NO:2(x67-75) and the amino acid sequence set forth in SEQ ID NO:5(x57-66), or
 - 20 – the amino acid sequence set forth in SEQ ID NO:3(x62-73) and the amino acid sequence set forth in SEQ ID NO:4(x58-66), or
 - the amino acid sequence set forth in SEQ ID NO:3(x62-73) and the amino acid sequence set forth in SEQ ID NO:5(x57-66).
- 25 or
- b) the fragment comprises at least 11 consecutive amino acids of the region from position 103 to position 120 of HBV-X, and the fragment comprises:
- the amino acid sequence set forth in SEQ ID NO:6(x103-111) and the amino acid sequence set forth in SEQ ID NO:7(x104-113), or
 - 30 – the amino acid sequence set forth in SEQ ID NO:6(x103-111) and the amino acid sequence set forth in SEQ ID NO:8(x105-113), or
 - the amino acid sequence set forth in SEQ ID NO:6(x103-111) and the amino acid sequence set forth in SEQ ID NO:9(x110-120), or
 - the amino acid sequence set forth in SEQ ID NO:7(x104-113) and the amino acid sequence set forth in SEQ ID NO:9(x110-120), or
 - 35 – the amino acid sequence set forth in SEQ ID NO:8(x105-113) and the amino acid sequence set forth in SEQ ID NO:9(x110-120),
- or

- c) the fragment comprises at least 10 consecutive amino acids of the region from position 403 to position 415 of HBV polymerase, and the fragment comprises:
- the amino acid sequence set forth in SEQ ID NO:14(p403-412) and the amino acid sequence set forth in SEQ ID NO:16(p407-415), or
 - 5 – the amino acid sequence set forth in SEQ ID NO:15(p404-412) and the amino acid sequence set forth in SEQ ID NO:16(p407-415).
6. The peptide according to any one of the preceding claims, wherein the peptide comprises or consists of a sequence selected from the group consisting of:
- 10 SEQ ID NO:31(SLP1), SEQ ID NO:32(SLP2), SEQ ID NO:33(SLP3), SEQ ID NO:34(SLP4), SEQ ID NO:35(SLP5), SEQ ID NO:36(SLP6) and SEQ ID NO:37(SLP7).
7. An immunogenic peptide comprising a fragment of an HBV protein, wherein said peptide is 20-34 amino acids in length and wherein said fragment comprises a
- 15 sequence selected from the group consisting of: SEQ ID NO:1 to SEQ ID NO:26.
8. A polynucleotide comprising a nucleotide sequence encoding a peptide according to any one of the preceding claims.
- 20 9. A recombinant virus comprising a polynucleotide according to claim 8.
10. An immunogenic composition comprising:
- a peptide according to any one of the claims 1 to 7, a polynucleotide according to claim 8 or a recombinant virus according to claim 9, and
 - 25 - a pharmaceutically-acceptable carrier, optionally further comprising an adjuvant.
11. A method for the treatment or prevention of an HBV-related disease comprising administration to a human subject of:
- 30 – a peptide as described in claim 1a) and a peptide as described in claim 1b), or
- a peptide as described in claim 1a) and a peptide as described in claim 1c), or
 - a peptide as described in claim 1a) and a peptide as described in claim 1d), or
 - a peptide as described in claim 1a) and a peptide as described in claim 1e), or
 - a peptide as described in claim 1a) and a peptide as described in claim 1f), or
 - 35 – a peptide as described in claim 1a) and a peptide as described in claim 1g), or
 - a peptide as described in claim 1a) and a peptide as described in claim 1h), or
 - a peptide as described in claim 1a) and a peptide as described in claim 1i), or
 - a peptide as described in claim 1a) and a peptide as described in claim 1j), or

- a peptide as described in claim 1e) and a peptide as described in claim 1k), or
 - a peptide as described in claim 1e) and a peptide as described in claim 1l), or
 - a peptide as described in claim 1e) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1f) and a peptide as described in claim 1g), or
 - 5 – a peptide as described in claim 1f) and a peptide as described in claim 1h), or
 - a peptide as described in claim 1f) and a peptide as described in claim 1i), or
 - a peptide as described in claim 1f) and a peptide as described in claim 1j), or
 - a peptide as described in claim 1f) and a peptide as described in claim 1k), or
 - a peptide as described in claim 1f) and a peptide as described in claim 1l), or
 - 10 – a peptide as described in claim 1f) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1g) and a peptide as described in claim 1h), or
 - a peptide as described in claim 1g) and a peptide as described in claim 1i), or
 - a peptide as described in claim 1g) and a peptide as described in claim 1j), or
 - a peptide as described in claim 1g) and a peptide as described in claim 1k), or
 - 15 – a peptide as described in claim 1g) and a peptide as described in claim 1l), or
 - a peptide as described in claim 1g) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1h) and a peptide as described in claim 1i), or
 - a peptide as described in claim 1h) and a peptide as described in claim 1j), or
 - a peptide as described in claim 1h) and a peptide as described in claim 1k), or
 - 20 – a peptide as described in claim 1h) and a peptide as described in claim 1l), or
 - a peptide as described in claim 1h) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1i) and a peptide as described in claim 1j), or
 - a peptide as described in claim 1i) and a peptide as described in claim 1k), or
 - a peptide as described in claim 1i) and a peptide as described in claim 1l), or
 - 25 – a peptide as described in claim 1i) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1j) and a peptide as described in claim 1k), or
 - a peptide as described in claim 1j) and a peptide as described in claim 1l), or
 - a peptide as described in claim 1j) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1k) and a peptide as described in claim 1l), or
 - 30 – a peptide as described in claim 1k) and a peptide as described in claim 1m), or
 - a peptide as described in claim 1l) and a peptide as described in claim 1m) or
 - one or two polynucleotides comprising sequences encoding any one of the aforementioned combinations of peptides.
- 35 12. The peptide according to any one of the claims 1 to 7, a polynucleotide according to claim 8, a recombinant virus according to claim 9 or an immunogenic composition according to claim 10 for use as a medicament.

13. The peptide according to any one of the claims 1 to 7, a polynucleotide according to claim 8, a recombinant virus according to claim 9 or an immunogenic composition according to claim 10 for use in the treatment or prevention of an HBV-related disease.

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14. The peptide according to any one of the claims 1 to 7 or a peptide comprising a sequence selected from the group consisting of: SEQ ID NO:1 to SEQ ID NO:26 for use in ex vivo stimulation of antigen-loaded activated antigen-presenting cells or expanded antigen-specific T cells.

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15. The peptide according to any one of the claims 1 to 7, a polynucleotide according to claim 8, a recombinant virus according to claim 9 or an immunogenic composition according to claim 10 for use in the treatment of an HBV-related disease, wherein the treatment comprises the following steps:

- 15
- (i) antiviral treatment is given to an HBV infected patient to reduce viral load,
 - (ii) when the viral load is significantly reduced, the immunogenic peptide(s), polynucleotide, recombinant virus or immunogenic composition is administered, and
 - (iii) when sufficient time has passed for an initial T cell response in the patient to have occurred, antiviral treatment is interrupted or discontinued.