

SEQUENCE LISTING

<110> BionTech AG et al.
 <120> TUMOR VACCINATION INVOLVING A HUMORAL IMMUNE RESPONSE AGAINST SELF-PROTEINS
 <130> 674-14 PCT
 <150> EP 10 002 775.4
 <151> 2010-03-16
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 <151> 2010-12-30
 <160> 80
 <170> PatentIn version 3.4
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 <212> PRT
 <213> Hepatitis B virus
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Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
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Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Pro Ala
 65 70 75 80

Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys
 85 90 95

Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110

Glu Thr Val Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125

Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140

Glu Thr Thr Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr
 145 150 155 160

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser
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Lys Ser Arg Glu Ser Gln Cys
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<211> 552
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 <213> Hepatitis B virus

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 Thr Ala Phe Ile Gly Asn Ser Ile Val Val Ala Gln Val Val Trp Glu
 35 40 45
 Gly Leu Trp Met Ser Cys Val Val Gln Ser Thr Gly Gln Met Gln Cys
 50 55 60
 Lys Val Tyr Asp Ser Leu Leu Ala Leu Pro Gln Asp Leu Gln Ala Ala
 65 70 75 80
 Arg Ala Leu Cys Val Ile Ala Leu Leu Val Ala Leu Phe Gly Leu Leu
 85 90 95
 Val Tyr Leu Ala Gly Ala Lys Cys Thr Thr Cys Val Glu Glu Lys Asp
 100 105 110
 Ser Lys Ala Arg Leu Val Leu Thr Ser Gly Ile Val Phe Val Ile Ser
 115 120 125
 Gly Val Leu Thr Leu Ile Pro Val Cys Trp Thr Ala His Ala Ile Ile
 130 135 140

Arg Asp Phe Tyr Asn Pro Leu Val Ala Glu Ala Gln Lys Arg Glu Leu
145 150 155 160

Gly Ala Ser Leu Tyr Leu Gly Trp Ala Ala Ser Gly Leu Leu Leu Leu
165 170 175

Gly Gly Gly Leu Leu Cys Cys Thr Cys Pro Ser Gly Gly Ser Gln Gly
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Pro Ser His Tyr Met Ala Arg Tyr Ser Thr Ser Ala Pro Ala Ile Ser
195 200 205

Arg Gly Pro Ser Glu Tyr Pro Thr Lys Asn Tyr Val
210 215 220

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Gln Asp Leu Tyr Asn Asn Pro Val Thr Ala Val Phe Asn Tyr Gln Gly
35 40 45

Leu Trp Arg Ser Cys Val Arg Glu Ser Ser Gly Phe Thr Glu Cys Arg
 50 55 60

Gly Tyr Phe Thr Leu Leu Gly Leu Pro Ala Met Leu Gln Ala Val Arg
 65 70 75 80

Ala Leu Met Ile Val Gly Ile Val Leu Gly Ala Ile Gly Leu Leu Val
 85 90 95

Ser Ile Phe Ala Leu Lys Cys Ile Arg Ile Gly Ser Met Glu Asp Ser
 100 105 110

Ala Lys Ala Asn Met Thr Leu Thr Ser Gly Ile Met Phe Ile Val Ser
 115 120 125

Gly Leu Cys Ala Ile Ala Gly Val Ser Val Phe Ala Asn Met Leu Val
 130 135 140

Thr Asn Phe Trp Met Ser Thr Ala Asn Met Tyr Thr Gly Met Gly Gly
 145 150 155 160

Met Val Gln Thr Val Gln Thr Arg Tyr Thr Phe Gly Ala Ala Leu Phe
 165 170 175

Val Gly Trp Val Ala Gly Gly Leu Thr Leu Ile Gly Gly Val Met Met
 180 185 190

Cys Ile Ala Cys Arg Gly Leu Ala Pro Glu Glu Thr Asn Tyr Lys Ala
 195 200 205

Val Ser Tyr His Ala Ser Gly His Ser Val Ala Tyr Lys Pro Gly Gly
 210 215 220

Phe Lys Ala Ser Thr Gly Phe Gly Ser Asn Thr Lys Asn Lys Lys Ile
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Lys His Asp Tyr Val
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<400> 7

Met Lys Val Phe Lys Phe Ile Gly Leu Met Ile Leu Leu Thr Ser Ala
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 20 25 30

Asp Trp Phe Met Val Thr Val His Pro Phe Met Leu Asn Asn Asp Val
 35 40 45

Cys Val His Phe His Glu Leu His Leu Gly Leu Gly Cys Pro Pro Asn
 50 55 60

His Val Gln Pro His Ala Tyr Gln Phe Thr Tyr Arg Val Thr Glu Cys
 65 70 75 80

Gly Ile Arg Ala Lys Ala Val Ser Gln Asp Met Val Ile Tyr Ser Thr
 85 90 95

Glu Ile His Tyr Ser Ser Lys Gly Thr Pro Ser Lys Phe Val Ile Pro
 100 105 110

Val Ser Cys Ala Ala Pro Gln Lys Ser Pro Trp Leu Thr Lys Pro Cys
 115 120 125

Ser Met Arg Val Ala Ser Lys Ser Arg Ala Thr Ala Gln Lys Asp Glu
 130 135 140

Lys Cys Tyr Glu Val Phe Ser Leu Ser Gln Ser Ser Gln Arg Pro Asn
 145 150 155 160

Cys Asp Cys Pro Pro Cys Val Phe Ser Glu Glu Glu His Thr Gln Val
165 170 175

Pro Cys His Gln Ala Gly Ala Gln Glu Ala Gln Pro Leu Gln Pro Ser
180 185 190

His Phe Leu Asp Ile Ser Glu Asp Trp Ser Leu His Thr Asp Asp Met
195 200 205

Ile Gly Ser Met
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<210> 8
<211> 639
<212> DNA
<213> Homo sapiens

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ggcatcaggg ccaaagctgt ctctcaggac atggttatct acagcactga gatacactac 300
tcttctaagg gcacgccatc taagtttgtg atcccagtg catgtgctgc cccccaaaag 360
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cagaaggatg agaaatgcta cgagggtgtc agcttgtcac agtccagtca aaggcccaac 480
tgcgattgtc caccttgtgt cttcagtga gaagagcata cccaggtccc ttgtcaccaa 540
gcaggggctc aggaggctca acctctgcag ccatctcact ttcttgatat ttctgaggat 600
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<210> 9
<211> 13
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 9

Pro Met Trp Lys Val Thr Ala Phe Ile Gly Asn Ser Ile
1 5 10

<210> 10
<211> 15
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 10

Met Trp Lys Val Thr Ala Phe Ile Gly Asn Ser Ile Val Val Ala
1 5 10 15

<210> 11
<211> 14
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 11

Phe Ile Gly Asn Ser Ile Val Val Ala Gln Val Val Trp Glu
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<210> 12
<211> 13
<212> PRT
<213> Artificial

<220>
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<400> 12

Val Val Ala Gln Val Val Trp Glu Gly Leu Trp Met Ser
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<210> 13
<211> 23
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 13

Val Ala Gln Val Val Trp Glu Gly Leu Trp Met Ser Cys Val Val Gln
1 5 10 15

Ser Thr Gly Gln Met Gln Cys
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<210> 14
<211> 16
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 14

Lys Val Thr Ala Phe Ile Gly Asn Ser Ile Val Val Ala Gln Val Val
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<210> 15
<211> 14
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 15

Lys Val Thr Ala Phe Ile Gly Asn Ser Ile Val Val Ala Gln
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<210> 16
<211> 13
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 16

Arg Asp Phe Tyr Asn Pro Leu Val Ala Glu Ala Gln Lys
1 5 10

<210> 17
<211> 11
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 17

Asp Phe Tyr Asn Pro Leu Val Ala Glu Ala Gln
1 5 10

<210> 18
<211> 13
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 18

Thr Ala His Ala Ile Ile Arg Asp Phe Tyr Asn Pro Leu
1 5 10

<210> 19
<211> 12
<212> PRT
<213> Artificial

<220>
<223> CLDN6 epitope

<400> 19

Asp Phe Tyr Asn Pro Leu Val Ala Glu Ala Gln Lys
1 5 10

<210> 20
<211> 16
<212> PRT

<213> Artificial

<220>

<223> CLDN6 epitope

<400> 20

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<210> 21

<211> 10

<212> PRT

<213> Artificial

<220>

<223> CLDN18.2 epitope

<400> 21

Thr Gln Asp Leu Tyr Asn Asn Pro Val Thr
1 5 10

<210> 22

<211> 11

<212> PRT

<213> Artificial

<220>

<223> PLAC1 epitope

<400> 22

Val Phe Ser Glu Glu Glu His Thr Gln Val Pro
1 5 10

<210> 23

<211> 10

<212> PRT

<213> Artificial

<220>

<223> PLAC1 epitope

<400> 23

Val Phe Ser Glu Glu Glu His Thr Gln Val
1 5 10

<210> 24

<211> 9

<212> PRT

<213> Artificial

<220>

<223> linker sequence

<400> 24

Gly Gly Gly Gly Ser Gly Gly Gly Gly
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<210> 25

<211> 166

<212> PRT
<213> Artificial

<220>
<223> HBCAg Backbone "HBCAg Del 74-81" (Fig. 7A)

<400> 25

Met Val Asp Ala Ala Thr Ser Asp Ile Asp Pro Tyr Lys Glu Phe Gly
1 5 10 15

Ala Thr Val Glu Leu Leu Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser
20 25 30

Val Arg Asp Leu Leu Asp Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu
35 40 45

Glu Ser Pro Glu His Cys Ser Pro His His Thr Ala Leu Arg Gln Ala
50 55 60

Ile Leu Cys Trp Gly Glu Leu Met Thr Leu Ala Thr Trp Val Gly Gly
65 70 75 80

Gly Gly Gly Ser Gly Gly Gly Gly Arg Asp Leu Val Val Ser Tyr Val
85 90 95

Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His Ile
100 105 110

Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu Tyr Leu Val Ser
115 120 125

Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro Asn Ala
130 135 140

Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val Arg Gly Gly Ser
145 150 155 160

His His His His His His
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<210> 26
<211> 168
<212> PRT
<213> Artificial

<220>
<223> HBCAg Backbone "HBCAg Del 76-81" (Fig. 7B)

<400> 26

Met Val Asp Ala Ala Thr Ser Asp Ile Asp Pro Tyr Lys Glu Phe Gly
1 5 10 15

Ala Thr Val Glu Leu Leu Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser
20 25 30

Val Arg Asp Leu Leu Asp Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu
35 40 45

Glu Ser Pro Glu His Cys Ser Pro His His Thr Ala Leu Arg Gln Ala
50 55 60

Ile Leu Cys Trp Gly Glu Leu Met Thr Leu Ala Thr Trp Val Gly Val
65 70 75 80

Asn Gly Gly Gly Gly Ser Gly Gly Gly Gly Arg Asp Leu Val Val Ser
85 90 95

Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe
100 105 110

His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu Tyr Leu
115 120 125

Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro
130 135 140

Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val Arg Gly
145 150 155 160

Gly Ser His His His His His His
165

<210> 27
<211> 170
<212> PRT
<213> Artificial

<220>
<223> HBCAg Backbone "HBCAg Del 76-79" (Fig. 7C)

<400> 27

Met Val Asp Ala Ala Thr Ser Asp Ile Asp Pro Tyr Lys Glu Phe Gly
1 5 10 15

Ala Thr Val Glu Leu Leu Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser
20 25 30

Val Arg Asp Leu Leu Asp Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu
35 40 45

Glu Ser Pro Glu His Cys Ser Pro His His Thr Ala Leu Arg Gln Ala
50 55 60

Ile Leu Cys Trp Gly Glu Leu Met Thr Leu Ala Thr Trp Val Gly Val
65 70 75 80

Asn Gly Gly Gly Gly Ser Gly Gly Gly Gly Ala Ser Arg Asp Leu Val
85 90 95

Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu
100 105 110

Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu
115 120 125

Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg
130 135 140

Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val
145 150 155 160

Arg Gly Gly Ser His His His His His His
165 170

<210> 28
<211> 166
<212> PRT
<213> Artificial

<220>
<223> HBCAg Backbone "HBCAg Del 79-80 linker" (Fig. 7D)

<400> 28

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
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Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Gly Gly
65 70 75 80

Gly Gly Ser Gly Gly Gly Gly Ser Arg Asp Leu Val Val Ser Tyr Val
85 90 95

Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His Ile
100 105 110

Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu Tyr Leu Val Ser
115 120 125

Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro Asn Ala
130 135 140

Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val Arg Gly Gly Ser
Page 12

145

150

155

160

His His His His His His
165

<210> 29
<211> 174
<212> PRT
<213> Artificial

<220>
<223> HBCAg Backbone "HBCAg 77-Linker-78" (Fig. 7E)

<400> 29

Met Val Asp Ala Ala Thr Ser Asp Ile Asp Pro Tyr Lys Glu Phe Gly
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Ala Thr Val Glu Leu Leu Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser
20 25 30

Val Arg Asp Leu Leu Asp Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu
35 40 45

Glu Ser Pro Glu His Cys Ser Pro His His Thr Ala Leu Arg Gln Ala
50 55 60

Ile Leu Cys Trp Gly Glu Leu Met Thr Leu Ala Thr Trp Val Gly Val
65 70 75 80

Asn Leu Glu Gly Gly Gly Gly Ser Gly Gly Gly Gly Asp Pro Ala Ser
85 90 95

Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe
100 105 110

Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu
115 120 125

Thr Val Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro
130 135 140

Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu
145 150 155 160

Thr Thr Val Val Arg Gly Gly Ser His His His His His His
165 170

<210> 30
<211> 157
<212> PRT
<213> Artificial

<220>
<223> HBCAg Backbone "HBCAg Del 79-80" (Fig. 7F)

<400> 30

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Ser Arg
65 70 75 80

Asp Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg
85 90 95

Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr
100 105 110

Val Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro
115 120 125

Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr
130 135 140

Thr Val Val Arg Gly Gly Ser His His His His His His
145 150 155

<210> 31
<211> 498
<212> DNA
<213> Artificial

<220>
<223> HBcAg Backbone "HBcAg Del 74-81" (Fig. 7A)

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ccgccgaacg cgccgattct gagcaccctg ccggaaacca ccgtcgtacg tggcggcagc 480
catcatcatc atcaccat 498

<210> 32
 <211> 504
 <212> DNA
 <213> Artificial

<220>
 <223> HBcAg Backbone "HBcAg Del 76-81" (Fig. 7B)

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<400> 32
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agcgcgctgt atcgtgaagc gctggaaagc ccggaacatt gcagcccgca tcataaccgcg    180
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aacatggggc tgaaatttcg ccagctgctg tggtttcata tcagctgcct gacctttggc    360
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<210> 33
 <211> 510
 <212> DNA
 <213> Artificial

<220>
 <223> HBcAg Backbone "HBcAg Del 76-79" (Fig. 7C)

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agcgcgctgt atcgtgaagc gctggaaagc ccggaacatt gcagcccgca tcataaccgcg    180
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tttggccgtg aaaccgtgat tgaatatctg gtgagctttg gcgtgtggat tcgtacccccg    420
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cgtggcggca gccatcatca tcatcccat                                           510
  
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<210> 34
 <211> 498
 <212> DNA
 <213> Artificial

<220>
 <223> HBcAg Backbone "HBcAg Del 79-80 linker" (Fig. 7D)

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gcactggaaa gcccggaaca ttgtagcccg catcataccg cgctgcgta ggcgattctg 180
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ggcgatccg gtggcggtg ttctagagac ctggtggtga gctatgtgaa caccaacatg 300
ggcctgaaat ttcgccaact gctgtggtt catattagct gcctgacctt tggccgtgaa 360
accgtgattg aatatctggt gagctttggc gtttggttc gtaccccgcc agcgtatcgt 420
ccgccgaacg cgccgattct gagcaccctg ccggaaacca ccgttggtcg cggcggtagc 480
catcatcatc atcaccat 498

<210> 35
<211> 522
<212> DNA
<213> Artificial

<220>
<223> HBcAg Backbone "HBcAg 77-Linker-78" (Fig. 7E)

<400> 35
atggtcgacg cggcgactag tgatattgat ccgtataaag aatttggcgc gaccgtggaa 60
ctgctgtctt ttctgccgag cgattttttt ccgagcgtgc gtgatctgct ggataccgcg 120
agcgcgctgt atcgtgaagc gctggaaagc ccggaacatt gcagcccgc tcataccgcg 180
ctgcgtcagg cgattctgtg ctggggcgaa ctgatgacct tggccacctg ggtgggcgtg 240
aacctcgagg gcggtggagg atccggtggc ggtggcgatc cggcgtctag agatctggtg 300
gtgagctatg tgaacaccaa catgggcctg aaatttcgcc agctgctgtg gtttcatatc 360
agctgcctga cttttggccg tgaaccgtg attgaatatc tggtagctt tggcgtgtgg 420
attcgtaccc cgccggcata tcgtccgccg aacgcgccga ttctgagcac cctgccggaa 480
accaccgtcg tacgtggcgg cagccatcat catcatcacc at 522

<210> 36
<211> 471
<212> DNA
<213> Artificial

<220>
<223> HBcAg Backbone "HBcAg Del 79-80" (Fig. 7F)

<400> 36
atggacattg atccgtataa agaatttggc gcgaccgttg aactgctgag ctttctgccg 60
agcgattttt ttccgagcgt gcgtgatctg ctggataccg cgagcgcgct gtatcgtgaa 120
gcactggaaa gcccggaaca ttgtagcccg catcataccg cgctgcgta ggcgattctg 180
tggtggggtg aactgatgac cctggcgacc tgggttggtg ttaatctcga ggactctaga 240
gacctggtg tgagctatgt gaacaccaac atgggcctga aatttcgcca actgctgtgg 300
tttcatatta gctgcctgac ctttggccgt gaaaccgtga ttgaatatct ggtgagcttt 360
ggcgttttga ttcgtacccc gccagcgtat cgtccgccga acgcgccgat tctgagcacc 420
ctgccggaaa ccaccgttgt tcgcggcggg agccatcatc atcatcacca t 471

<210> 37
 <211> 185
 <212> PRT
 <213> Artificial

<220>
 <223> chimeric HBcAg construct "HBcAg Del 79-80 linker CLDN18.2-EC1 short" (Fig. 8A)

<400> 37

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Gly Gly
 65 70 75 80

Gly Gly Ser Gly Gly Gly Gly Thr Gln Asp Leu Tyr Asn Asn Pro Val
 85 90 95

Thr Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Arg Asp Leu Val Val
 100 105 110

Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu Trp
 115 120 125

Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu Tyr
 130 135 140

Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro
 145 150 155 160

Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val Arg
 165 170 175

Gly Gly Ser His His His His His His
 180 185

<210> 38
 <211> 167
 <212> PRT
 <213> Artificial

<220>
 <223> chimeric HBcAg construct "HBcAg Del 79-80 CLDN18.2-EC1 short" (Fig. 8B)

<400> 38

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr val Glu Leu Leu
1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Thr Gln
65 70 75 80

Asp Leu Tyr Asn Asn Pro Val Thr Ser Arg Asp Leu Val Val Ser Tyr
85 90 95

Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His
100 105 110

Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu Tyr Leu Val
115 120 125

Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro Asn
130 135 140

Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val Arg Gly Gly
145 150 155 160

Ser His His His His His His
165

<210> 39

<211> 186

<212> PRT

<213> Artificial

<220>
<223> chimeric HBCAg construct "HBCAg Del 79-80 linker PLAC1 3rd Loop
A" (Fig. 8C)

<400> 39

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr val Glu Leu Leu
1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Gly Gly
65 70 75 80

Gly Gly Ser Gly Gly Gly Gly Val Phe Ser Glu Glu Glu His Thr Gln
85 90 95

Val Pro Gly Gly Gly Gly Ser Gly Gly Gly Ser Arg Asp Leu Val
100 105 110

Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu
115 120 125

Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu
130 135 140

Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg
145 150 155 160

Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val
165 170 175

Arg Gly Gly Ser His His His His His His
180 185

<210> 40
<211> 167
<212> PRT
<213> Artificial

<220>
<223> chimeric HBCAg construct "HBCAg Del 79-80 PLAC1 3rd Loop B" (Fig. 8D)

<400> 40

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Val Phe
65 70 75 80

Ser Glu Glu Glu His Thr Gln Val Ser Arg Asp Leu Val Val Ser Tyr
85 90 95

Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His
100 105 110

Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val Ile Glu Tyr Leu Val
115 120 125

Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro Asn
130 135 140

Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr Val Val Arg Gly Gly
145 150 155 160

Ser His His His His His His
165

<210> 41
<211> 555
<212> DNA
<213> Artificial

<220>
<223> chimeric HBcAg construct "HBcAg Del 79-80 linker CLDN18.2-EC1 short" (Fig. 8A)

<400> 41
atggacattg atccgtataa agaatttggc gcgaccgttg aactgctgag ctttctgccg 60
agcgattttt ttccgagcgt gcgtgatctg ctggataccg cgagcgcgct gtatcgtgaa 120
gcactggaaa gcccggaaca ttgtagcccc catcataccg cgctgcgtca ggcgattctg 180
tggtggggtg aactgatgac cctggcgacc tgggttggtg ttaatctcga ggatggtggc 240
ggcggatccg gcggaggcgg aaccaggat ctgtataaca atccggtgac cggcggaggc 300
ggatccggtg gcggtggttc tagagacctg gtggtgagct atgtgaacac caacatgggc 360
ctgaaatttc gccaaactgct gtggtttcat attagctgcc tgacctttgg ccgtgaaacc 420
gtgattgaat atctggtgag ctttggcggt tggattcgta ccccgccagc gtatcgtccg 480
ccgaacgcgc cgattctgag caccctgccg gaaaccaccg ttgttcgcgg cggtagccat 540
catcatcatc accat 555

<210> 42
<211> 501
<212> DNA
<213> Artificial

<220>
<223> chimeric HBcAg construct "HBcAg Del 79-80 CLDN18.2-EC1 short" (Fig. 8B)

<400> 42
atggacattg atccgtataa agaatttggc gcgaccgttg aactgctgag ctttctgccg 60
agcgattttt ttccgagcgt gcgtgatctg ctggataccg cgagcgcgct gtatcgtgaa 120
gcactggaaa gcccggaaca ttgtagcccc catcataccg cgctgcgtca ggcgattctg 180

tggtggggtg aactgatgac cctggcgacc tgggttggtg ttaatctcga ggacacccag	240
gatctgtata acaacccggt gacctctaga gacctgggtg tgagctatgt gaacaccaac	300
atgggcctga aatttcgcca actgctgtgg ttcatatta gctgcctgac ctttggccgt	360
gaaaccgtga ttgaatatct ggtgagcttt ggcgtttgga ttcgtacccc gccagcgtat	420
cgtccgccga acgcgccgat tctgagcacc ctgccggaaa ccaccgttgt tcgcggcggt	480
agccatcatc atcatcacca t	501

<210> 43
 <211> 558
 <212> DNA
 <213> Artificial

<220>
 <223> chimeric HBcAg construct "HBcAg Del 79-80 linker PLAC1 3rd Loop A" (Fig. 8C)

<400> 43	
atggacattg atccgtataa agaatttggc gcgaccgttg aactgctgag ctttctgccg	60
agcgattttt ttccgagcgt gcgtgatctg ctggataccg cgagcgcgct gtatcgtgaa	120
gcactggaaa gcccggaaca ttgtagcccg catcataccg cgctgcgtca ggcgattctg	180
tggtggggtg aactgatgac cctggcgacc tgggttggtg ttaatctcga ggatggtggc	240
ggcggatccg gcggaggcgg agttttctct gaagaagaac acaccaggt tccgggcgga	300
ggcggatccg gtggcggttg ttctagagac ctggtggtga gctatgtgaa caccaacatg	360
ggcctgaaat ttcgccaact gctgtggttt catattagct gcctgacctt tggccgtgaa	420
accgtgattg aatatctggt gagctttggc gtttggttgc gtaccccgcc agcgtatcgt	480
ccgccgaacg cgccgattct gagcaccctg ccggaaacca ccgttgttcg cggcggtagc	540
catcatcatc atcaccat	558

<210> 44
 <211> 501
 <212> DNA
 <213> Artificial

<220>
 <223> chimeric HBcAg construct "HBcAg Del 79-80 PLAC1 3rd Loop B" (Fig. 8D)

<400> 44	
atggacattg atccgtataa agaatttggc gcgaccgttg aactgctgag ctttctgccg	60
agcgattttt ttccgagcgt gcgtgatctg ctggataccg cgagcgcgct gtatcgtgaa	120
gcactggaaa gcccggaaca ttgtagcccg catcataccg cgctgcgtca ggcgattctg	180
tggtggggtg aactgatgac cctggcgacc tgggttggtg ttaatctcga ggacgttttc	240
tctgaagaag aacacaccca ggtttctaga gacctgggtg tgagctatgt gaacaccaac	300
atgggcctga aatttcgcca actgctgtgg ttcatatta gctgcctgac ctttggccgt	360
gaaaccgtga ttgaatatct ggtgagcttt ggcgtttgga ttcgtacccc gccagcgtat	420
cgtccgccga acgcgccgat tctgagcacc ctgccggaaa ccaccgttgt tcgcggcggt	480

agccatcatc atcatcacca t

<210> 45
 <211> 16
 <212> PRT
 <213> Artificial

<220>
 <223> CLDN18.2 epitope

<400> 45

Asp Leu Tyr Asn Asn Pro Val Thr Ala Val Phe Asn Tyr Gln Gly Leu
 1 5 10 15

<210> 46
 <211> 11
 <212> PRT
 <213> Artificial

<220>
 <223> CLDN18.2 epitope

<400> 46

Asn Asn Pro Val Thr Ala Val Phe Asn Tyr Gln
 1 5 10

<210> 47
 <211> 10
 <212> PRT
 <213> Artificial

<220>
 <223> CLDN18.2 epitope

<400> 47

Val Thr Ala Val Phe Asn Tyr Gln Gly Leu
 1 5 10

<210> 48
 <211> 9
 <212> PRT
 <213> Artificial

<220>
 <223> CLDN18.2 epitope

<400> 48

Ser Cys Val Arg Glu Ser Ser Gly Phe
 1 5

<210> 49
 <211> 8
 <212> PRT
 <213> Artificial

<220>
 <223> CLDN18.2 epitope

<400> 49

Val Arg Glu Ser Ser Gly Phe Thr
1 5

<210> 50
<211> 9
<212> PRT
<213> Artificial

<220>
<223> CLDN18.2 epitope

<400> 50

Val Arg Glu Ser Ser Gly Phe Thr Glu
1 5

<210> 51
<211> 9
<212> PRT
<213> Artificial

<220>
<223> CLDN18.2 epitope

<400> 51

Arg Gly Tyr Phe Thr Leu Leu Gly Leu
1 5

<210> 52
<211> 11
<212> PRT
<213> Artificial

<220>
<223> CLDN18.2 epitope

<400> 52

Glu Cys Arg Gly Tyr Phe Thr Leu Leu Gly Leu
1 5 10

<210> 53
<211> 16
<212> PRT
<213> Artificial

<220>
<223> CLDN18.2 epitope

<400> 53

Ala Val Phe Asn Tyr Gln Gly Leu Trp Arg Ser Cys Val Arg Glu Ser
1 5 10 15

<210> 54
<211> 20
<212> PRT
<213> Artificial

<220>
<223> CLDN18.2 epitope

<400> 54

Asp Gln Trp Ser Thr Gln Asp Leu Tyr Asn Asn Pro Val Thr Ala Val
1 5 10 15

Phe Asn Tyr Gln
20

<210> 55

<211> 23

<212> PRT

<213> Artificial

<220>

<223> CLDN18.2 epitope

<400> 55

Met Asp Gln Trp Ser Thr Gln Asp Leu Tyr Asn Asn Pro Val Thr Ala
1 5 10 15

Val Phe Asn Tyr Gln Gly Leu
20

<210> 56

<211> 31

<212> PRT

<213> Artificial

<220>

<223> CLDN18.2 epitope

<400> 56

Trp Arg Ser Cys Val Arg Glu Ser Ser Gly Phe Thr Glu Cys Arg Gly
1 5 10 15

Tyr Phe Thr Leu Leu Gly Leu Pro Ala Met Leu Gln Ala Val Arg
20 25 30

<210> 57

<211> 17

<212> PRT

<213> Artificial

<220>

<223> CLDN18.2 epitope

<400> 57

Arg Ile Gly Ser Met Glu Asp Ser Ala Lys Ala Asn Met Thr Leu Thr
1 5 10 15

Ser

<210> 58

<211> 27

<212> PRT

<213> Artificial

<220>
<223> CLDN18.2 epitope

<400> 58

Thr Asn Phe Trp Met Ser Thr Ala Asn Met Tyr Thr Gly Met Gly Gly
1 5 10 15

Met Val Gln Thr Val Gln Thr Arg Tyr Thr Phe
20 25

<210> 59
<211> 11
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 59

Ala Pro Gln Lys Ser Pro Trp Leu Thr Lys Pro
1 5 10

<210> 60
<211> 9
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 60

Gln Lys Ser Pro Trp Leu Thr Lys Pro
1 5

<210> 61
<211> 9
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 61

Ala Pro Gln Lys Ser Pro Trp Leu Thr
1 5

<210> 62
<211> 8
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 62

Met Arg Val Ala Ser Lys Ser Arg
1 5

<210> 63
<211> 6
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 63

Ala Pro Gln Lys Ser Pro
1 5

<210> 64
<211> 7
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 64

Thr Ala Gln Lys Asp Glu Lys
1 5

<210> 65
<211> 7
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 65

Ser Lys Gly Thr Pro Ser Lys
1 5

<210> 66
<211> 10
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 66

Ala Pro Gln Lys Ser Pro Trp Leu Thr Lys
1 5 10

<210> 67
<211> 8
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 67

Gln Lys Ser Pro Trp Leu Thr Lys
1 5

<210> 68
<211> 17
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 68

Ser Met Arg Val Ala Ser Lys Ser Arg Ala Thr Ala Gln Lys Asp Glu
1 5 10 15

Lys

<210> 69
<211> 18
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 69

Pro Pro Asn His Val Gln Pro His Ala Tyr Gln Phe Thr Tyr Arg Val
1 5 10 15

Thr Glu

<210> 70
<211> 17
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 70

Ser Met Arg Val Ala Ser Lys Ser Lys Arg Ala Thr Ala Gln Lys Asp
1 5 10 15

Glu

<210> 71
<211> 16
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 71

Ser Met Arg Val Ala Ser Lys Ser Lys Arg Ala Thr Ala Gln Lys Asp
1 5 10 15

<210> 72
<211> 15
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 72

Ser Met Arg Val Ala Ser Lys Ser Lys Arg Ala Thr Ala Gln Lys
1 5 10 15

<210> 73
<211> 11
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 73

Arg Val Ala Ser Lys Ser Lys Arg Ala Thr Ala
1 5 10

<210> 74
<211> 14
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 74

Tyr Glu Val Phe Ser Leu Ser Gln Ser Ser Gln Arg Pro Asn
1 5 10

<210> 75
<211> 11
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 75

Glu Val Phe Ser Leu Ser Gln Ser Ser Gln Arg
1 5 10

<210> 76
<211> 17
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 76

Ile Asp Trp Phe Met Val Thr Val His Pro Phe Met Leu Asn Asn Asp
1 5 10 15

val

<210> 77
<211> 16
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 77

Ile Asp Trp Phe Met Val Thr Val His Pro Phe Met Leu Asn Asn Asp
1 5 10 15

<210> 78
<211> 15
<212> PRT
<213> Artificial

<220>
<223> PLAC1 epitope

<400> 78

Ile Asp Trp Phe Met Val Thr Val His Pro Phe Met Leu Asn Asn
1 5 10 15

<210> 79
<211> 159
<212> PRT
<213> Artificial

<220>
<223> HBcAg (delta); C-terminal deletion, including a C-terminal
glycine linker and His-tag

<400> 79

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Pro Ala
65 70 75 80

Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys
85 90 95

Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
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105

110

Glu Thr Val Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125

Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140

Glu Thr Thr Val Val Arg Gly Gly Ser His His His His His His
 145 150 155

<210> 80
 <211> 477
 <212> DNA
 <213> Artificial

<220>
 <223> codon-optimized nucleic acid sequence encoding HBcAg(delta),
 C-terminal truncation including a C-terminal glycine linker and
 His-tag

<400> 80
 atggacattg atccgtataa agaatttggc gcgaccgttg aactgctgag ctttctgccg 60
 agcgattttt ttccgagcgt gcgtgatctg ctggataccg cgagcgcgct gtatcgtgaa 120
 gcaactggaaa gcccgaaca ttgtagcccg catcataccg cgctgcgtca ggcgattctg 180
 tgttgggggtg aactgatgac cctggcgacc tgggttggtg ttaatctcga ggaccggct 240
 tctagagacc tgggtggtgag ctatgtgaac accaacaatg gcctgaaatt tcgccaactg 300
 ctgtggtttc atattagctg cctgaccttt ggccgtgaaa ccgtgattga atatctggtg 360
 agctttggcg ttggattcg taccgcca gcgtatcgtc cgccgaacgc gccgattctg 420
 agcacccctgc cggaaccac cgttgttcgc ggcggtagcc atcatcatca tcaccat 477