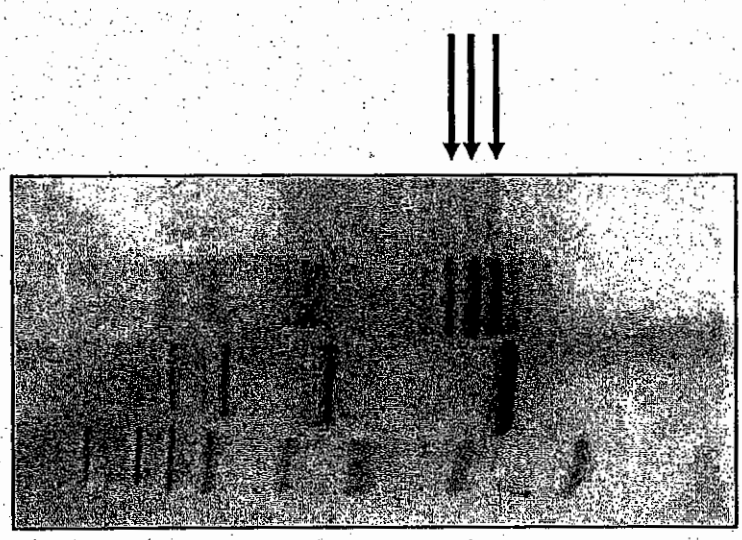


FIG. 1

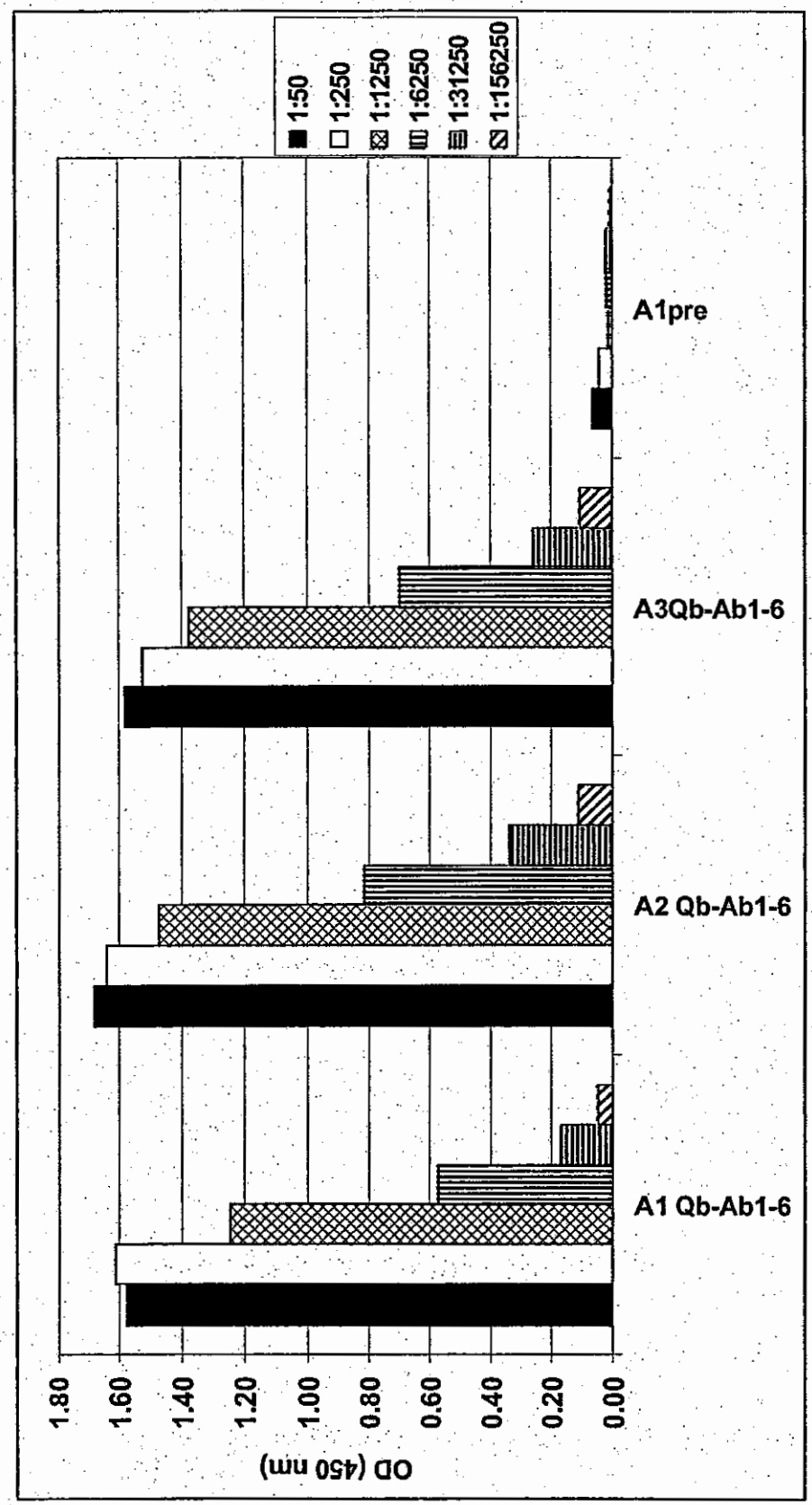

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1:250
1:1250
1:6250
1:31250
1:156250
A1pre
A3Qb-Ab1-6
A2 Qb-Ab1-6
A1 Qb-Ab1-6
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
OD (450 nm)

FIG. 2

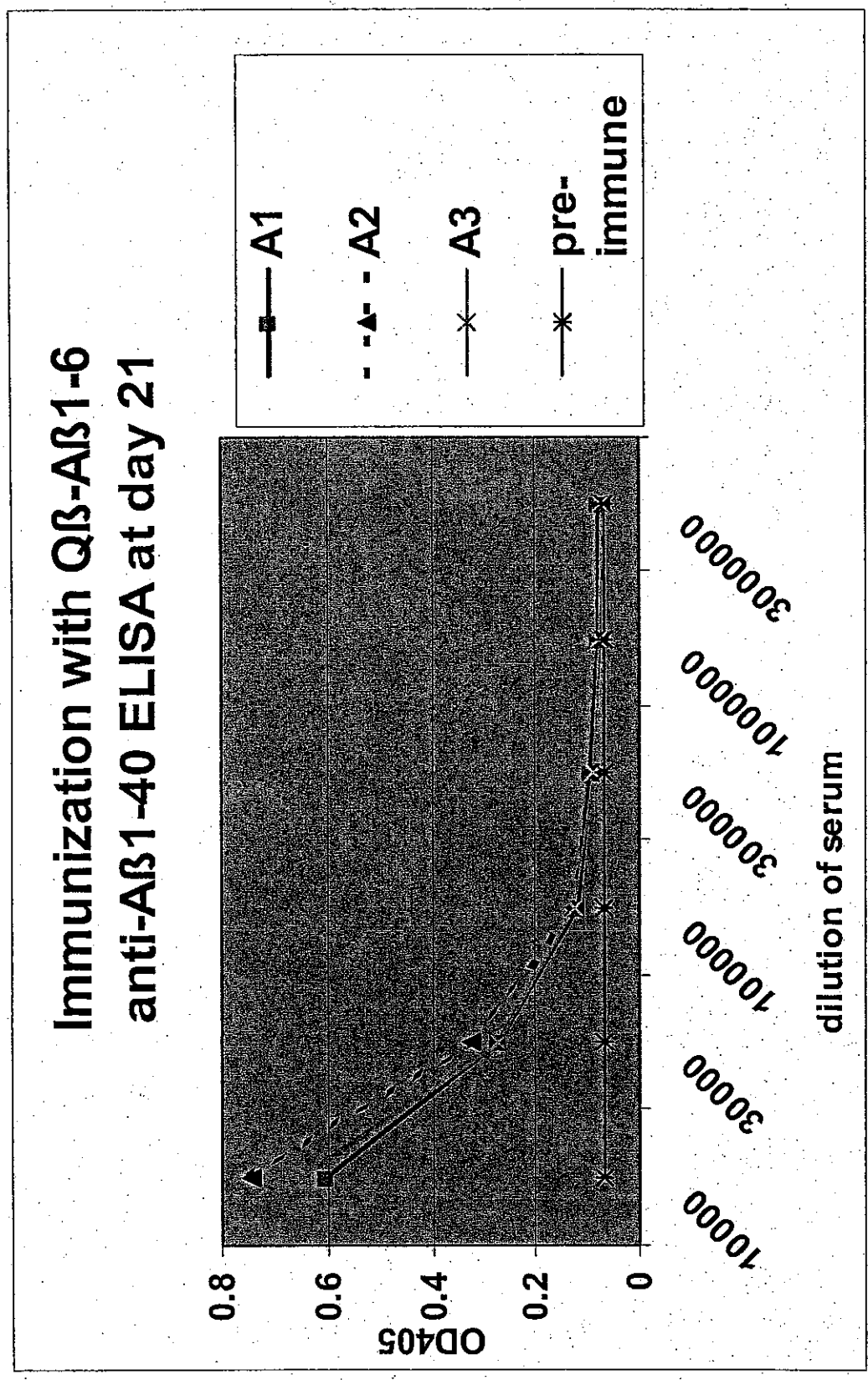

Immunization with Qß-Aß1-6
anti-Aß1-40 ELISA at day 21
A1
A2
A3
pre-immune
OD405
0.8
0.6
0.4
0.2
0
300000
100000
30000
10000
3000
1000
dilution of serum

FIG. 3

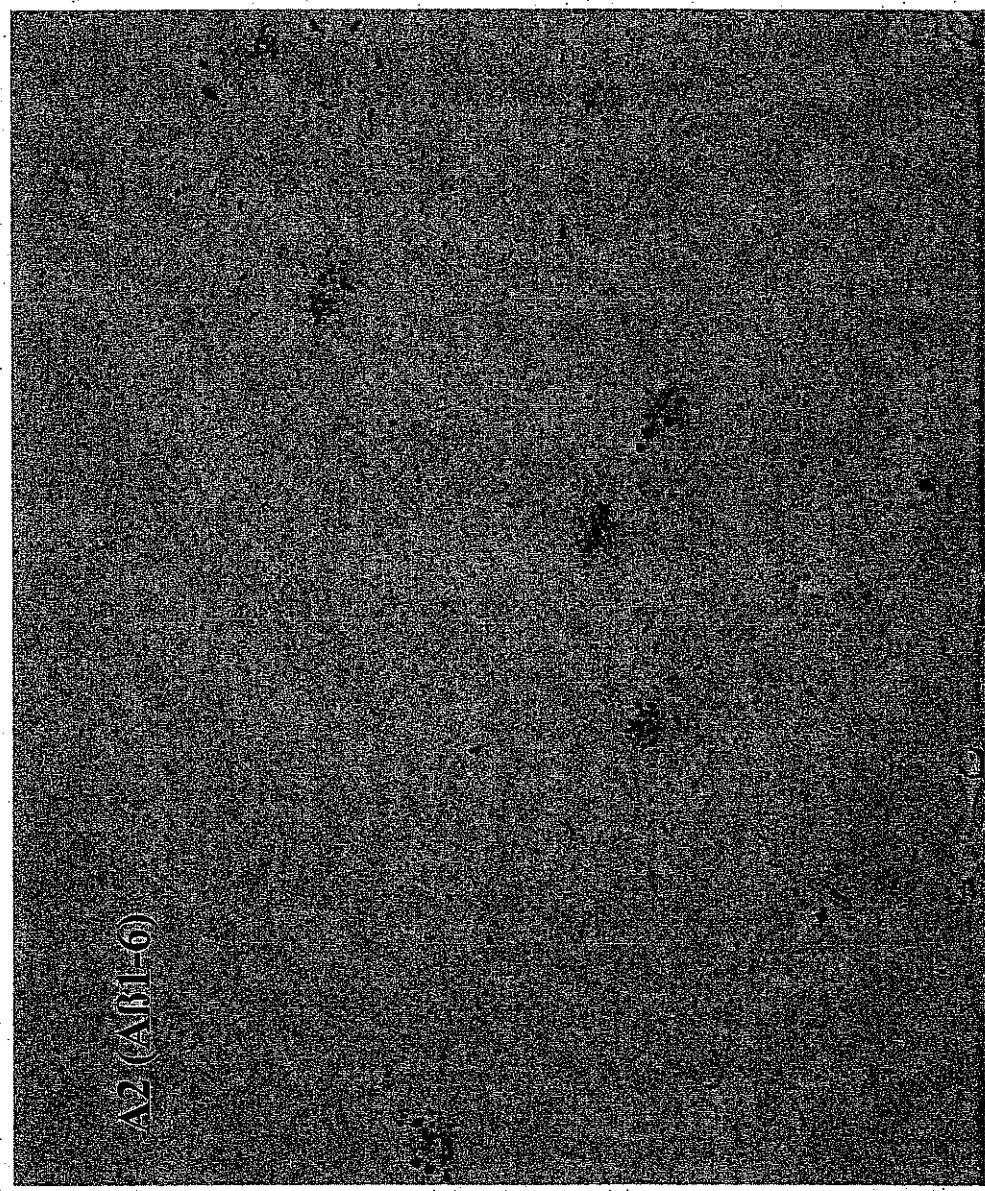


FIG. 4A

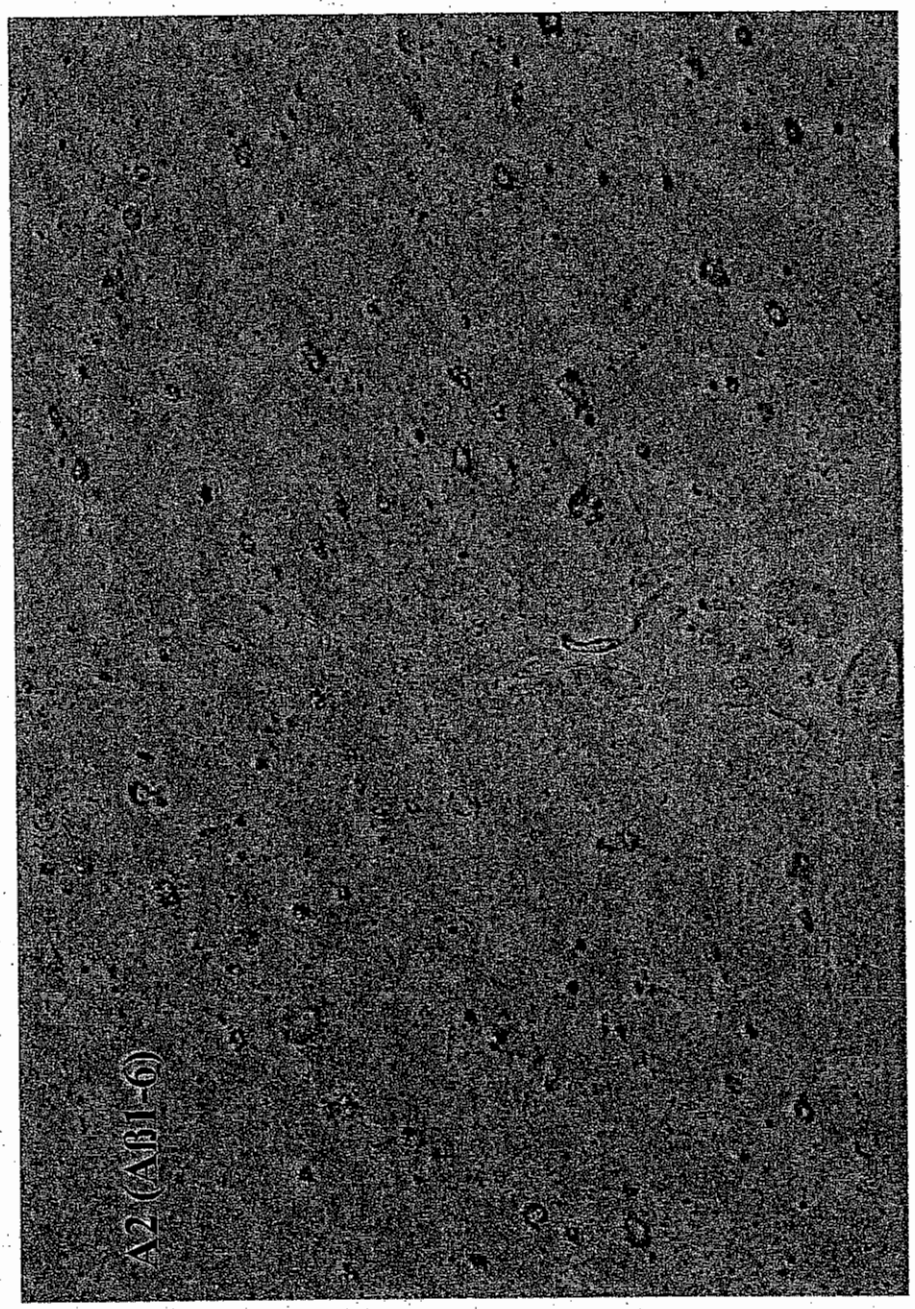
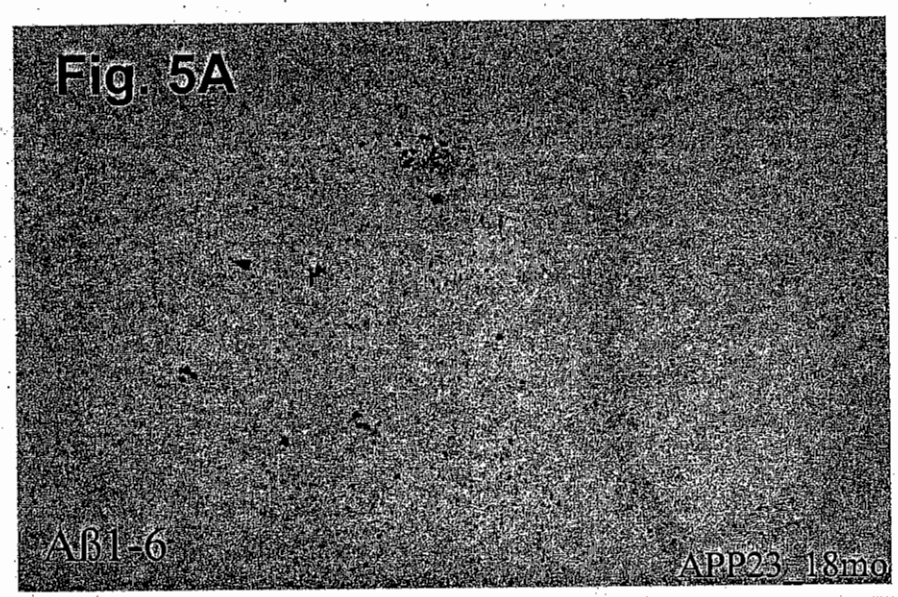
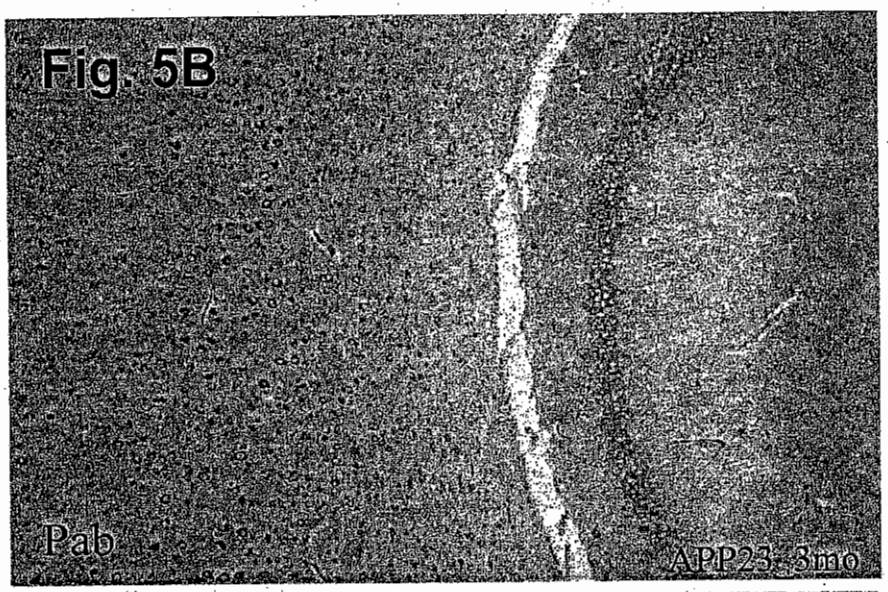


FIG. 4B





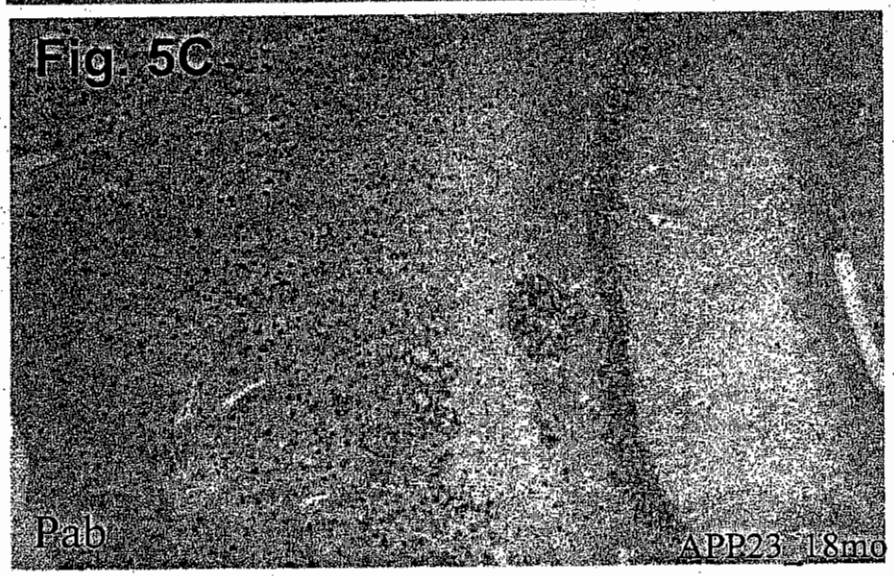


Fig. 5D

Aß1-6 APP23_18mo

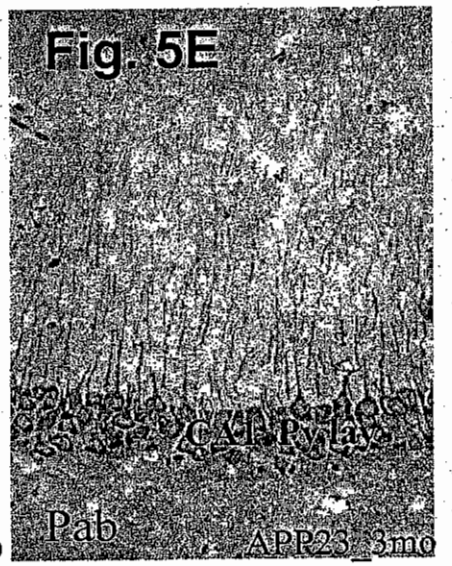


Fig. 5

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12 JAN 2007

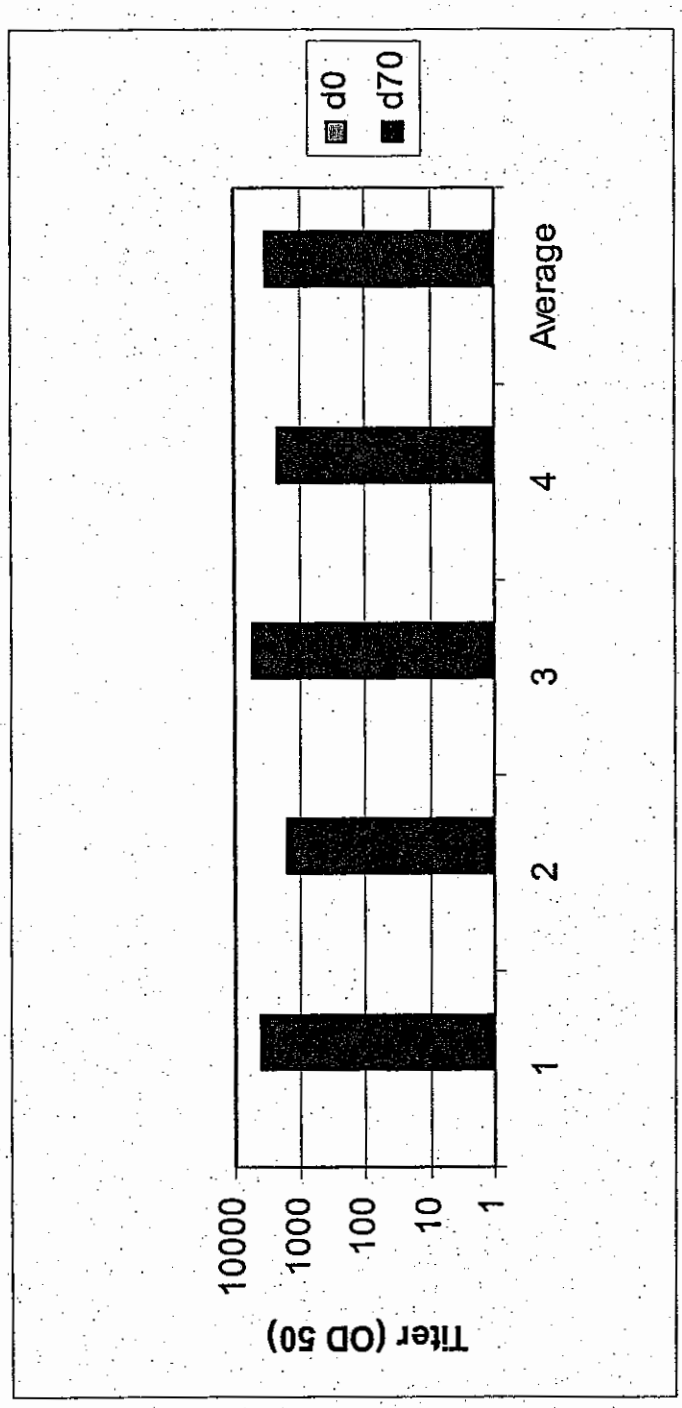


Fig. 6

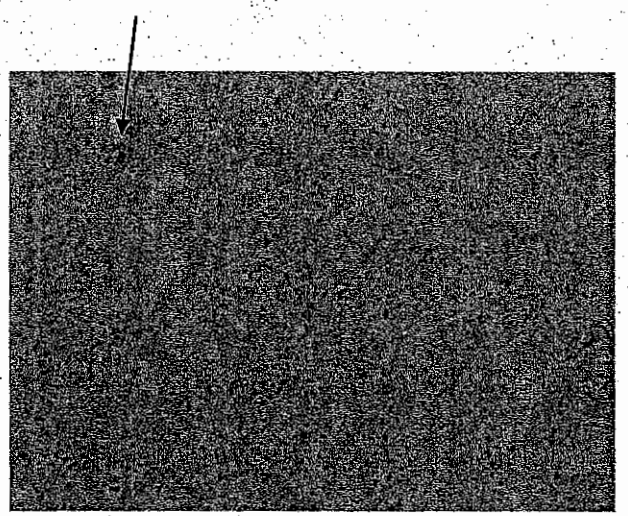


Fig. 7B

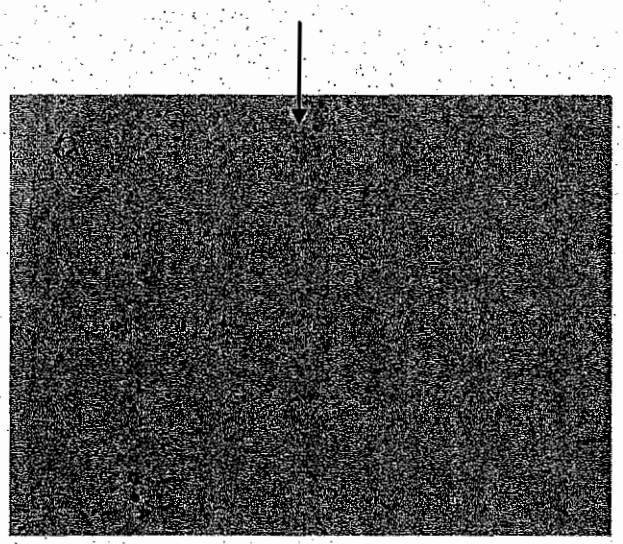


Fig. 7A

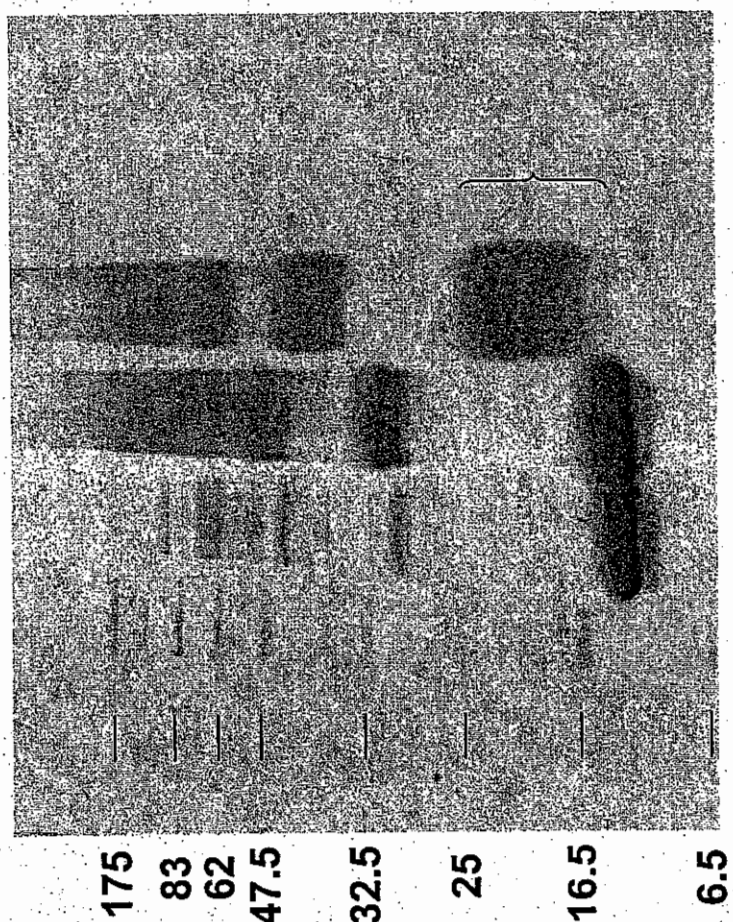


Fig. 8

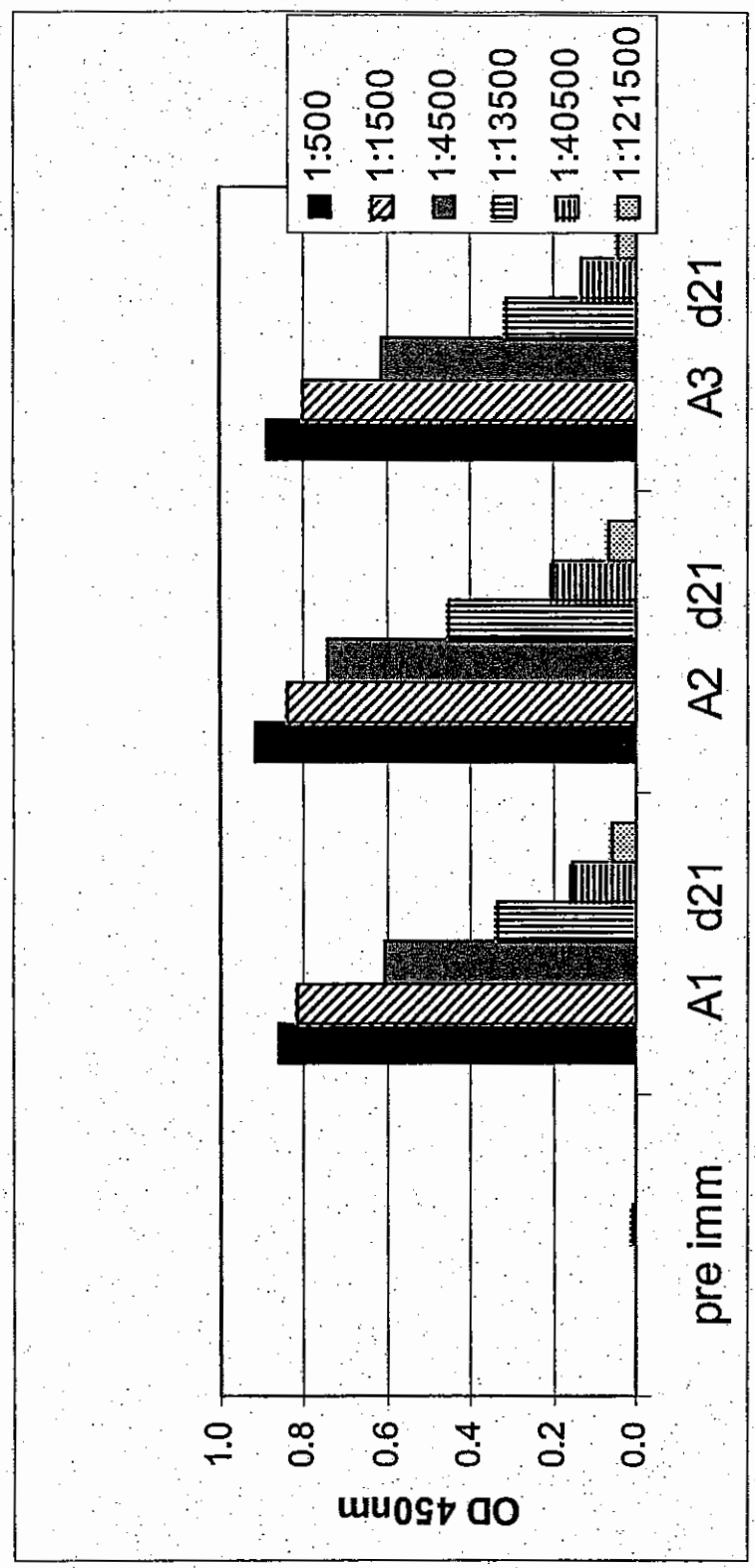

1:500
1:1500
1:4500
1:13500
1:40500
1:121500
OD 450nm
1.0
0.8
0.6
0.4
0.2
0.0
pre imm
A1 d21
A2 d21
A3 d21

Fig. 9

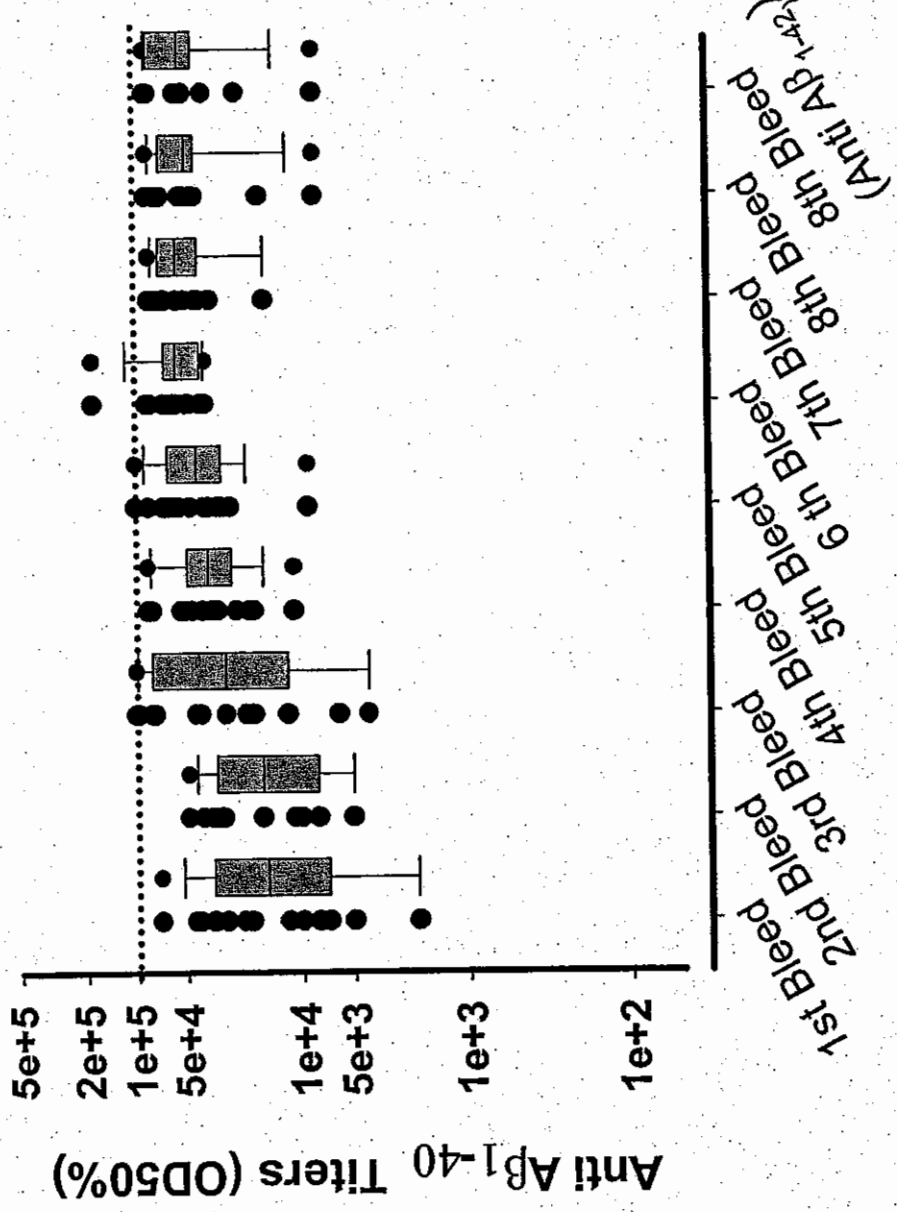

Anti Aβ1-40 Titers (OD50%)
5e+5
2e+5
1e+5
5e+4
1e+4
5e+3
1e+3
1e+2
1st Bleed
2nd Bleed
3rd Bleed
4th Bleed
5th Bleed
6th Bleed
7th Bleed
8th Bleed
8th Bleed
(Anti Aβ1-42)

Fig. 10

Fig. 11A

Fig. 11B

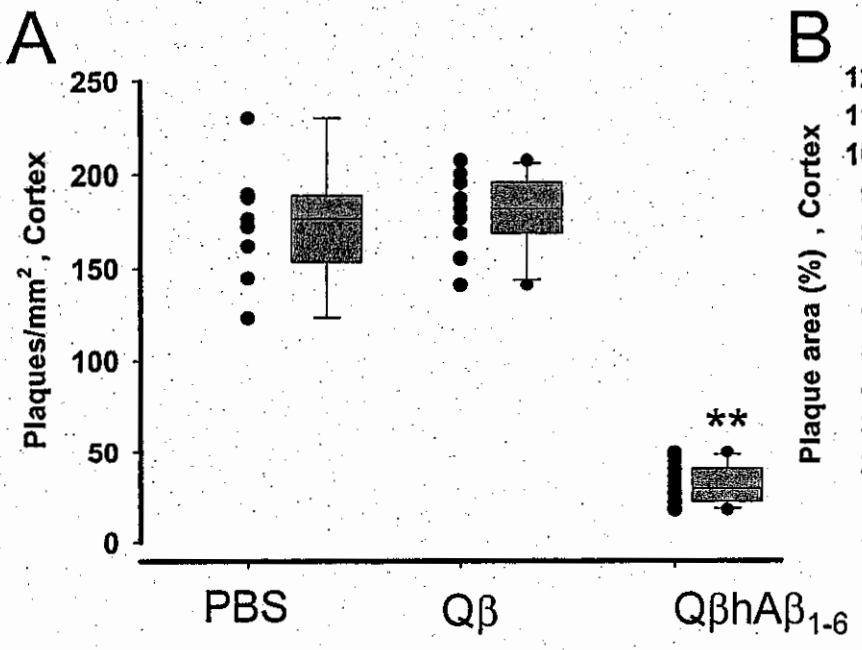


Fig. 12A

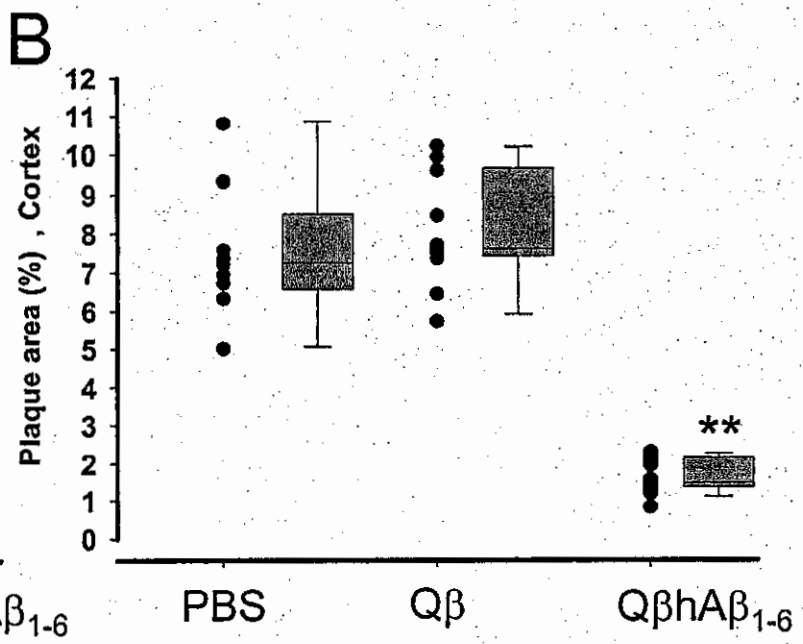


Fig. 12B

12 JAN 2007

12 JAN 2007

Fig. 12C

Fig. 12D

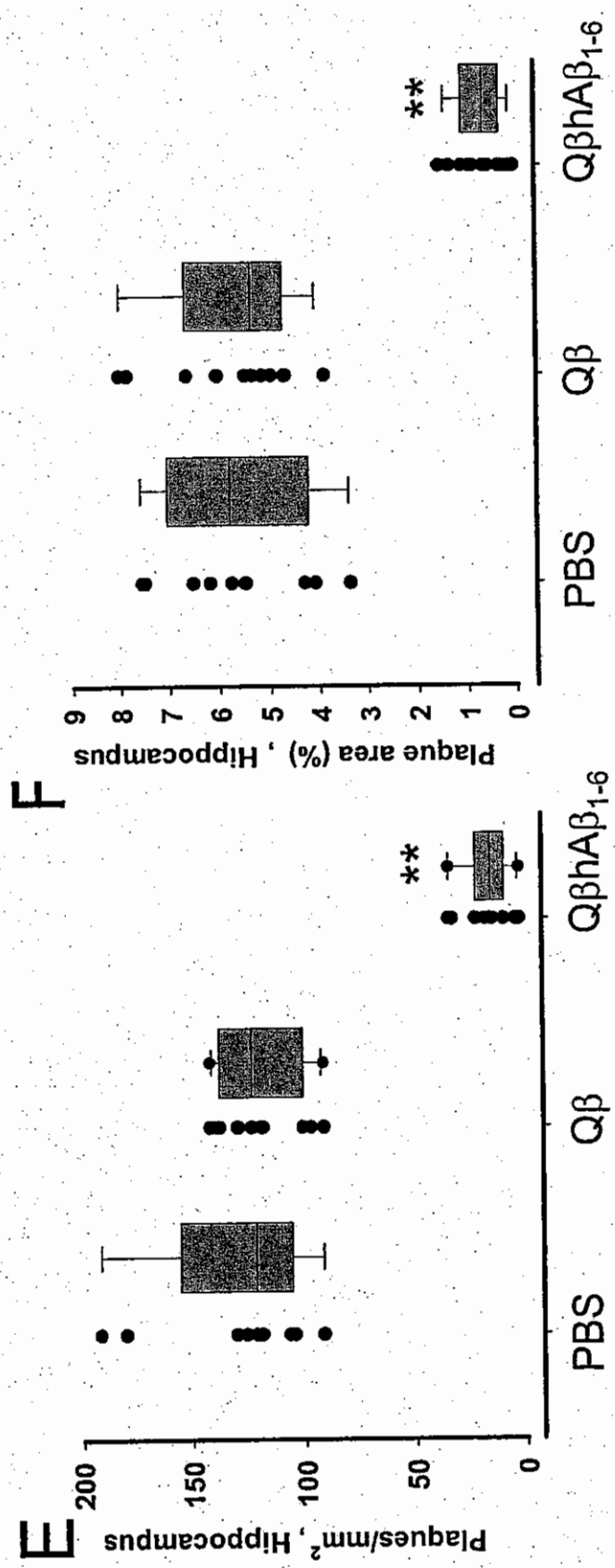


Fig. 12E

Fig. 12F

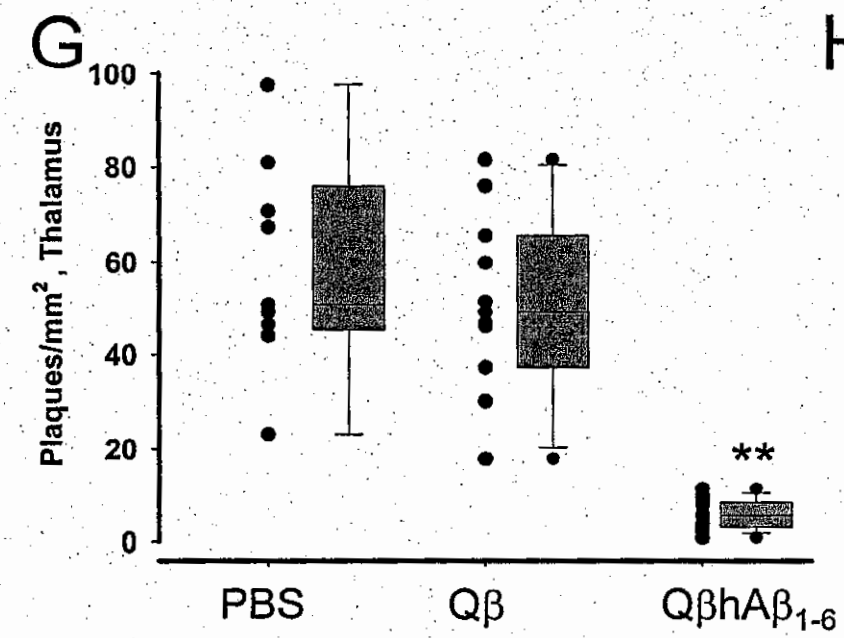


Fig. 12G

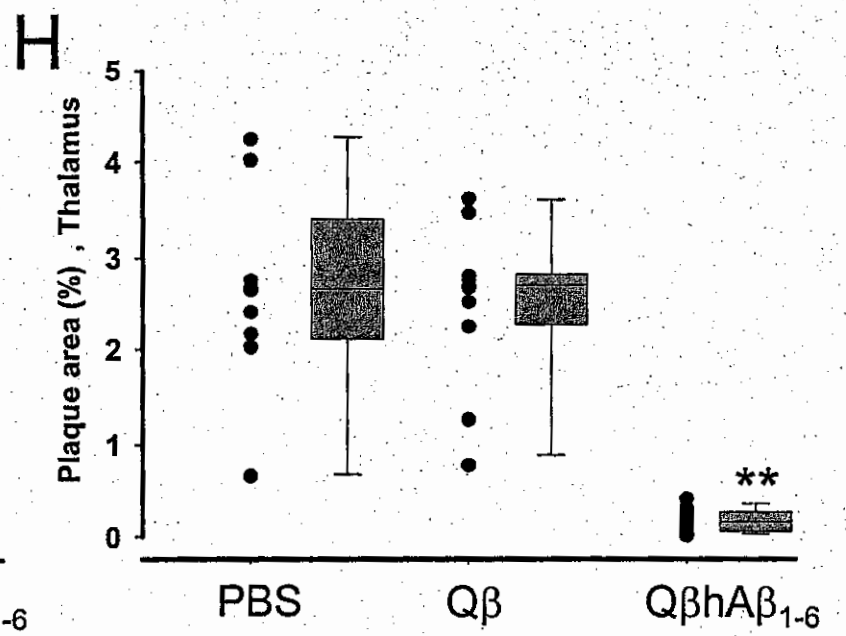


Fig. 12H

12 JAN 2007

12 JAN 2007

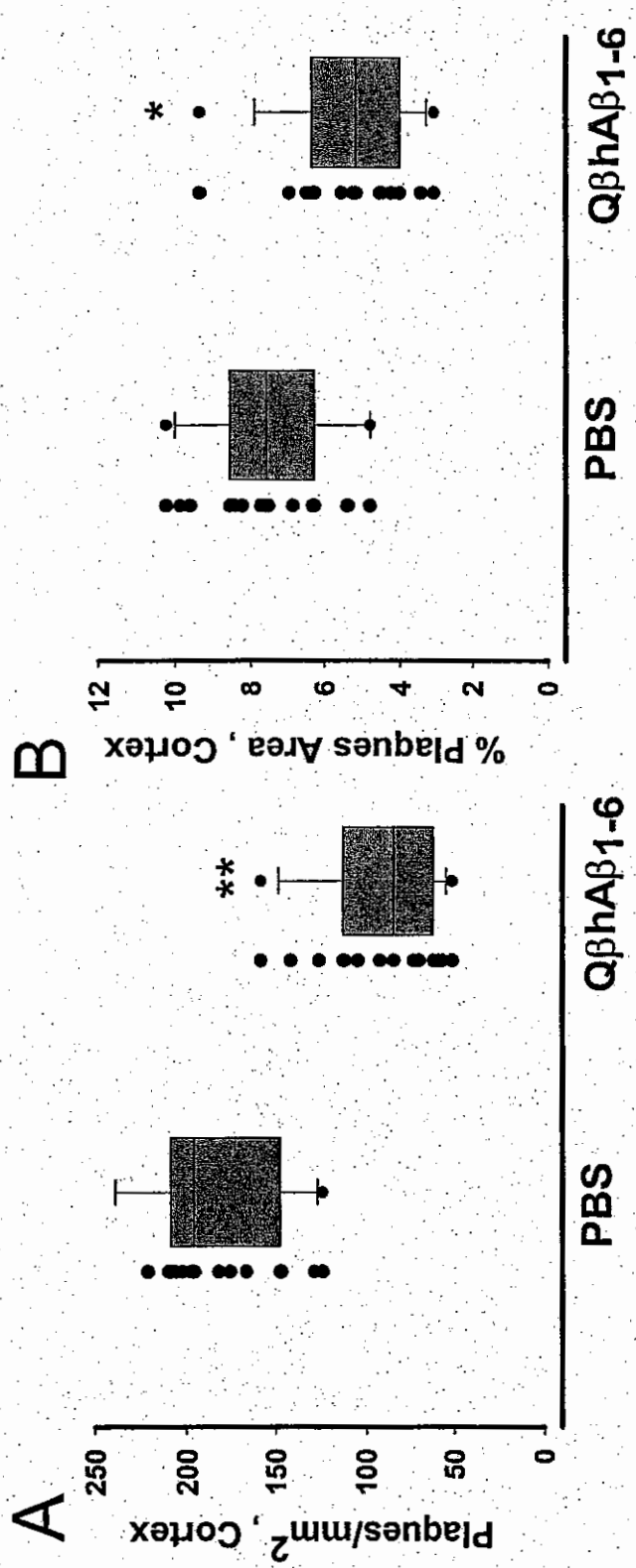


Fig. 13A

Fig. 13B

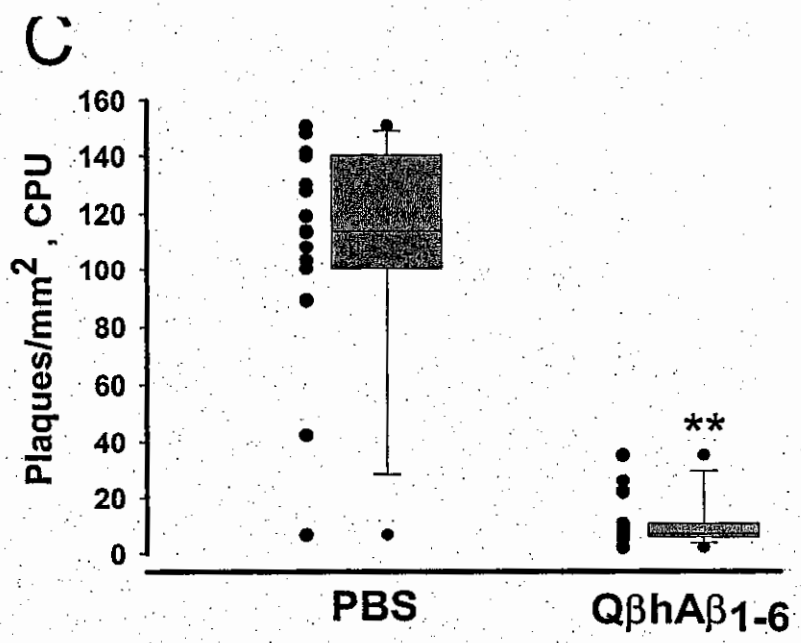


Fig. 13C

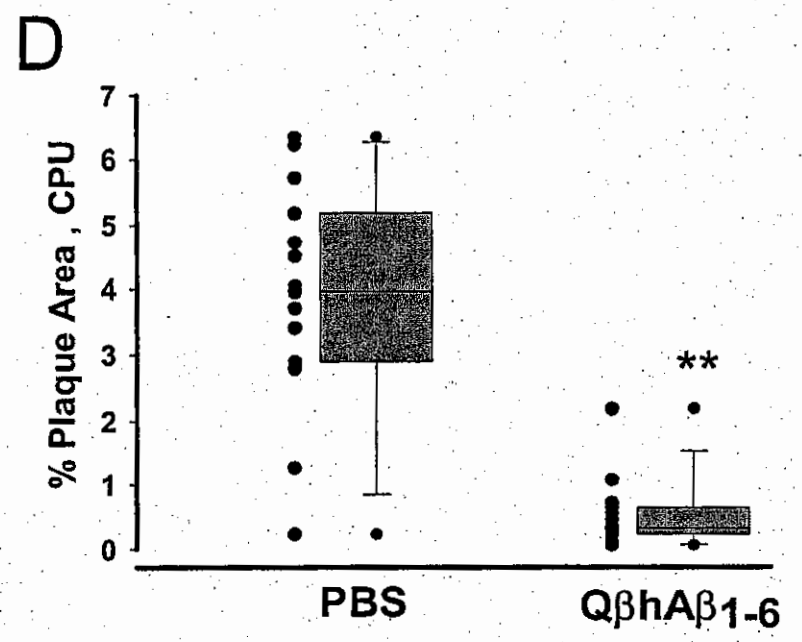


Fig. 13D

12 JAN 2007

12 JAN 2007

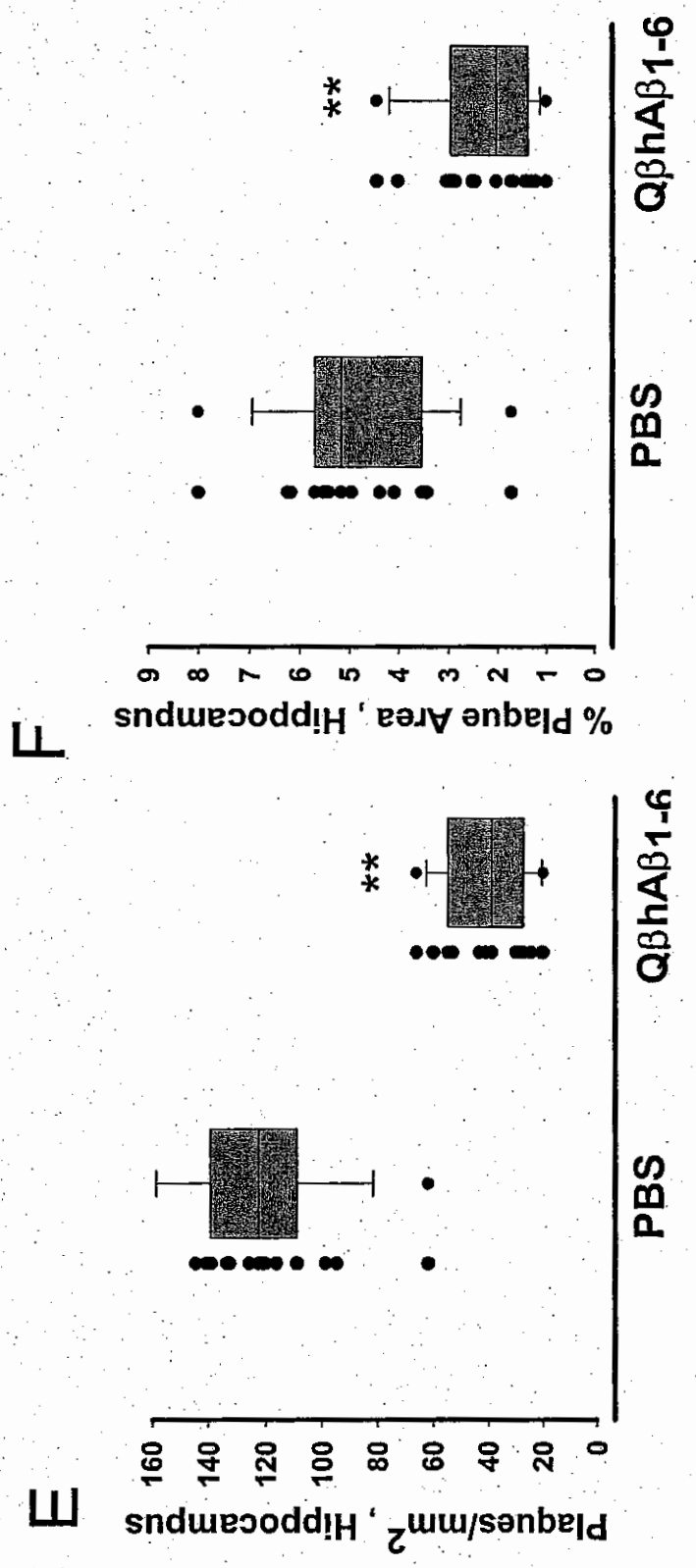


Fig. 13E

Fig. 13F

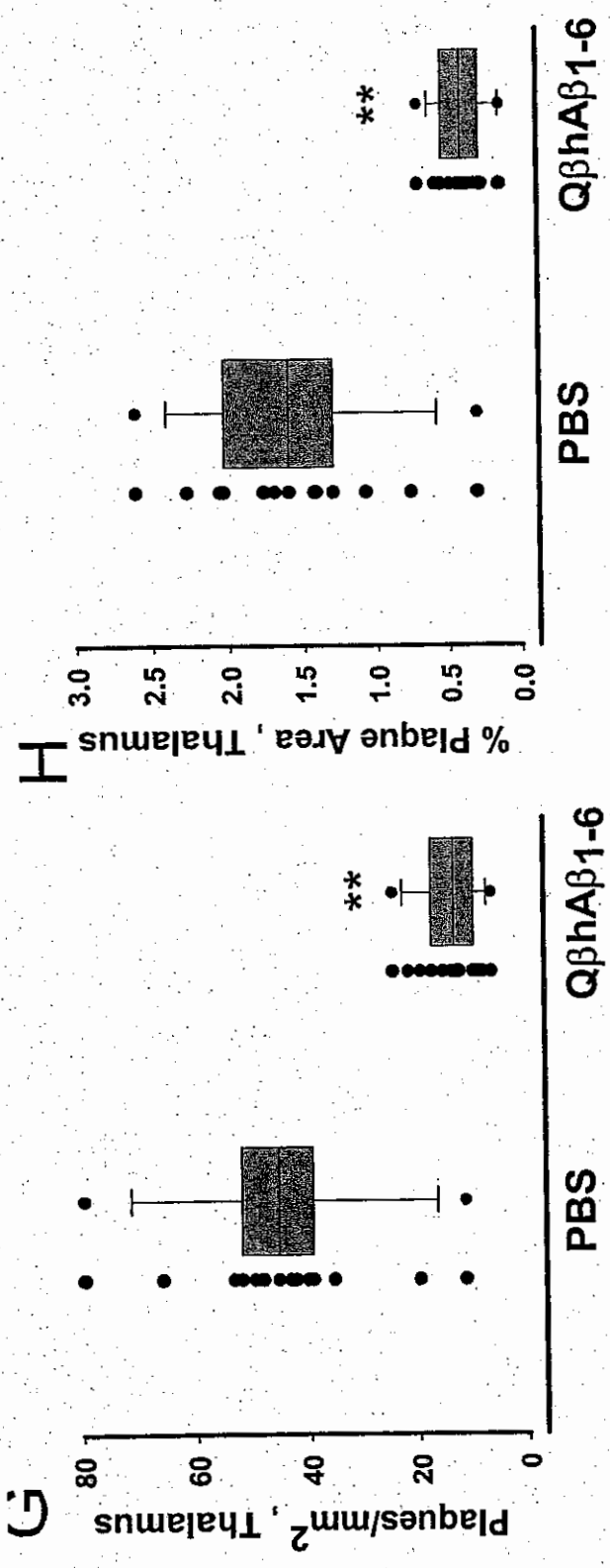


Fig. 13G

Fig. 13H

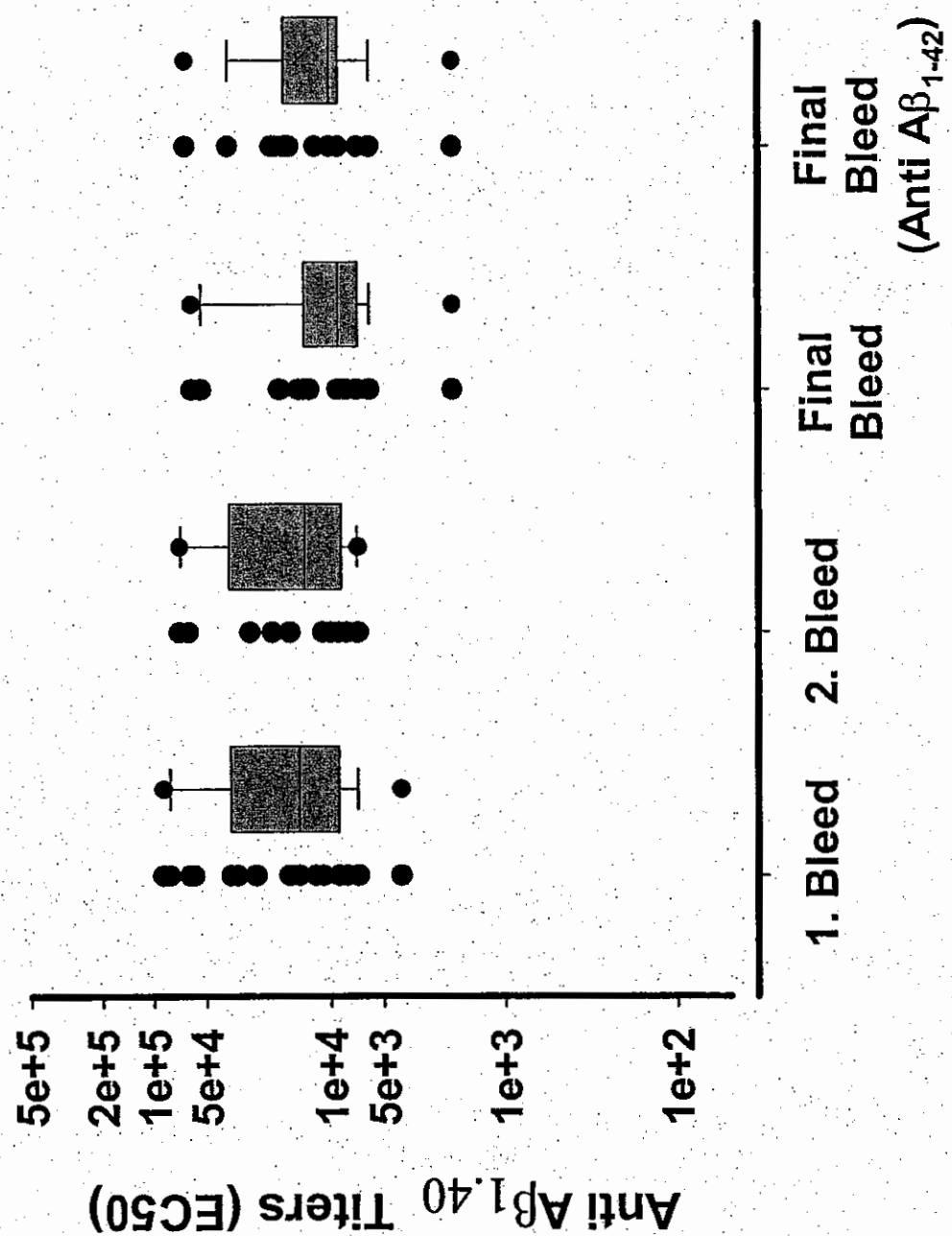

Anti Aβ1-40 Titers (EC50)
5e+5
2e+5
1e+5
5e+4
1e+4
5e+3
1e+3
1e+2
1. Bleed
2. Bleed
Final Bleed
Final Bleed (Anti Aβ1-42)

Fig. 14

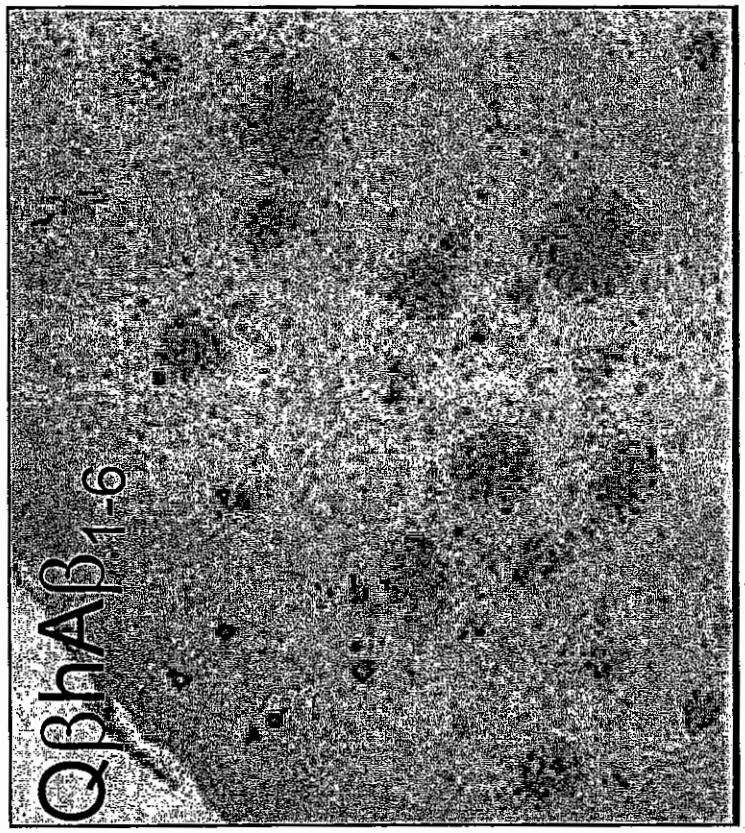


Fig. 15B

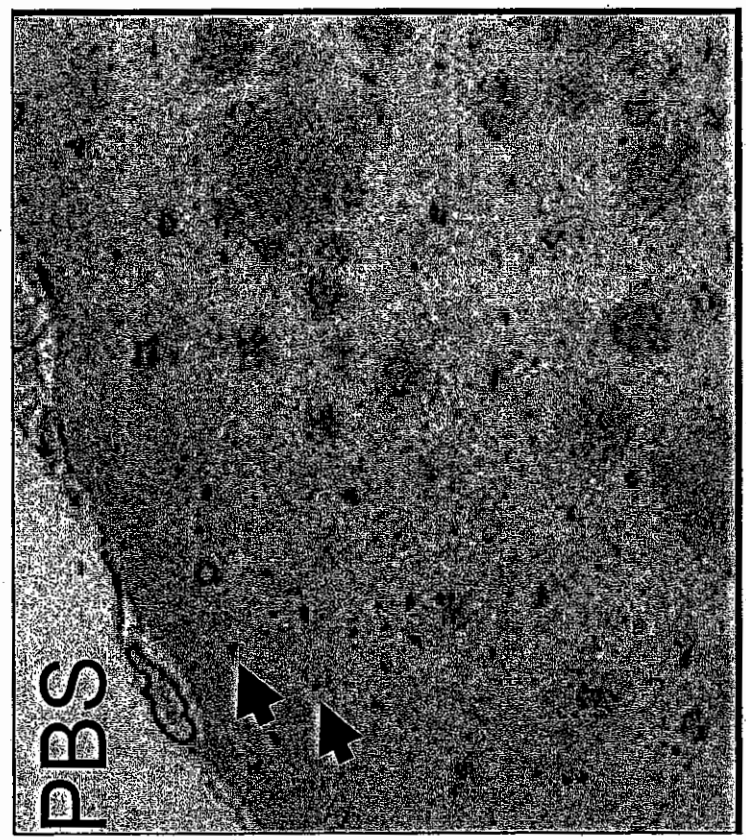


Fig. 15A

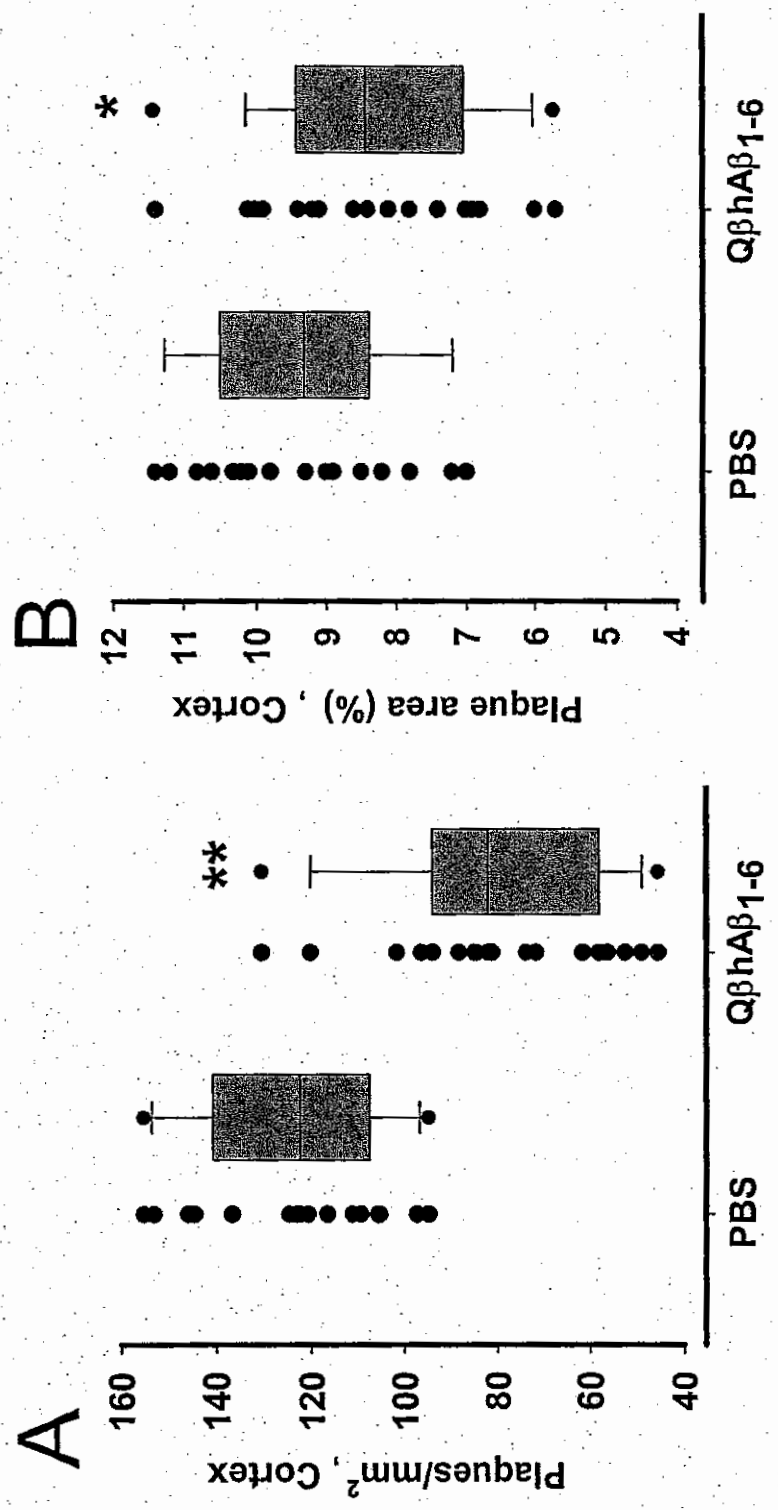


Fig. 16A

Fig. 16B

SEQUENCE LISTING

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Novartis Pharma AG
Bachmann, Martin F
Tissot, Alain
Ortmann, Rainer
Lüönd, Rainer
Staufenbiel, Matthias
Frey, Peter

<120> Amyloid Beta 1-6 Antigen Arrays

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<151> 2002-07-19

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<210> 1
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<212> PRT
<213> Escherichia coli

<400> 1

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Gly Gln Gly Arg Val Thr Phe Asn Gly Thr Val Val Asp Ala Pro Cys
            20                  25                  30

Ser Ile Ser Gln Lys Ser Ala Asp Gln Ser Ile Asp Phe Gly Gln Leu
        35                  40                  45

Ser Lys Ser Phe Leu Ala Asn Asp Gly Gln Ser Lys Pro Met Asn Leu
    50                  55                  60

Asp Ile Glu Leu Val Asn Cys Asp Ile Thr Ala Phe Lys Asn Gly Asn
65                  70                  75                  80

Ala Lys Thr Gly Ser Val Lys Leu Ala Phe Thr Gly Pro Thr Val Ser
                85                  90                  95

Gly His Pro Ser Glu Leu Ala Thr Asn Gly Gly Pro Gly Thr Ala Ile
            100                 105                 110

Met Ile Gln Ala Ala Gly Lys Asn Val Pro Phe Asp Gly Thr Glu Gly
        115                 120                 125

Asp Pro Asn Leu Leu Lys Asp Gly Asp Asn Val Leu His Tyr Thr Thr
    130                 135                 140
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Val Gly Lys Lys Ser Ser Asp Gly Asn Ala Gln Ile Thr Glu Gly Ala
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Phe Ser Gly Val Ala Thr Phe Asn Leu Ser Tyr Gln
165 170

<210> 2
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<213> Escherichia coli

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20 25 30

Val His Phe Lys Gly Glu Val Val Asn Ala Ala Cys Ala Val Asp Ala
35 40 45

Gly Ser Val Asp Gln Thr Val Gln Leu Gly Gln Val Arg Thr Ala Ser
50 55 60

Leu Ala Gln Glu Gly Ala Thr Ser Ser Ala Val Gly Phe Asn Ile Gln
65 70 75 80

Leu Asn Asp Cys Asp Thr Asn Val Ala Ser Lys Ala Ala Val Ala Phe
85 90 95

Leu Gly Thr Ala Ile Asp Ala Gly His Thr Asn Val Leu Ala Leu Gln
100 105 110

Ser Ser Ala Ala Gly Ser Ala Thr Asn Val Gly Val Gln Ile Leu Asp
115 120 125

Arg Thr Gly Ala Ala Leu Thr Leu Asp Gly Ala Thr Phe Ser Ser Glu
130 135 140

Thr Thr Leu Asn Asn Gly Thr Asn Thr Ile Pro Phe Gln Ala Arg Tyr
145 150 155 160

Phe Ala Thr Gly Ala Ala Thr Pro Gly Ala Ala Asn Ala Asp Ala Thr
165 170 175

Phe Lys Val Gln Tyr Gln
180

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gtttgtccgc gatgctttac ctctatgagt caaaatggcc ccaatgtttc atcttttggg 180

ggaaactgtg cagtgttggc agtcaaactc gttgacaaac aaagtgtaca gaacgactgc 240

ccatgtcgat ttagaaatag ttttttgaaa ggaaagcagc atgaaaatta aaactctggc 300

aatcgttgtt ctgtcggctc tgtccctcag ttctacgacg gctctggccg ctgccacgac 360

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gaataacgga accaatacca ttccgttcca ggcgcgttat tttgcaaccg gggccgcaac 780

cccgggtgct gctaatgcgg atgcgacctt caaggttcag tatcaataac ctacctaggt 840

tcagggacgt tca 853

<210> 4
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 4

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Lys
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Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Ala Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu

115 120 125

Asn Pro Ala Tyr
130

<210> 5
<211> 329
<212> PRT
<213> Bacteriophage Q-beta

<400> 5

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

Lys Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly
20 25 30

Val Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
35 40 45

Val Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys
50 55 60

Val Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser
65 70 75 80

Cys Asp Pro Ser Val Thr Arg Gln Ala Tyr Ala Asp Val Thr Phe Ser
85 90 95

Phe Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu
100 105 110

Leu Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln
115 120 125

Leu Asn Pro Ala Tyr Trp Thr Leu Leu Ile Ala Gly Gly Gly Ser Gly
130 135 140

Ser Lys Pro Asp Pro Val Ile Pro Asp Pro Pro Ile Asp Pro Pro Pro
145 150 155 160

Gly Thr Gly Lys Tyr Thr Cys Pro Phe Ala Ile Trp Ser Leu Glu Glu
165 170 175

Val Tyr Glu Pro Pro Thr Lys Asn Arg Pro Trp Pro Ile Tyr Asn Ala
180 185 190

Val Glu Leu Gln Pro Arg Glu Phe Asp Val Ala Leu Lys Asp Leu Leu
195 200 205

Gly Asn Thr Lys Trp Arg Asp Trp Asp Ser Arg Leu Ser Tyr Thr Thr
210 215 220

```
Phe Arg Gly Cys Arg Gly Asn Gly Tyr Ile Asp Leu Asp Ala Thr Tyr
225                 230                 235                 240

Leu Ala Thr Asp Gln Ala Met Arg Asp Gln Lys Tyr Asp Ile Arg Glu
                245                 250                 255

Gly Lys Lys Pro Gly Ala Phe Gly Asn Ile Glu Arg Phe Ile Tyr Leu
            260                 265                 270

Lys Ser Ile Asn Ala Tyr Cys Ser Leu Ser Asp Ile Ala Ala Tyr His
        275                 280                 285

Ala Asp Gly Val Ile Val Gly Phe Trp Arg Asp Pro Ser Ser Gly Gly
    290                 295                 300

Ala Ile Pro Phe Asp Phe Thr Lys Phe Asp Lys Thr Lys Cys Pro Ile
305                 310                 315                 320

Gln Ala Val Ile Val Val Pro Arg Ala
                325

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<211>  129
<212>  PRT
<213>  Bacteriophage R17

<400>  6

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Asn Val Thr Val Ala Pro Ser Asn Phe Ala Asn Gly Val Ala Glu Trp
            20                  25                  30

Ile Ser Ser Asn Ser Arg Ser Gln Ala Tyr Lys Val Thr Cys Ser Val
        35                  40                  45

Arg Gln Ser Ser Ala Gln Asn Arg Lys Tyr Thr Ile Lys Val Glu Val
    50                  55                  60

Pro Lys Val Ala Thr Gln Thr Val Gly Gly Val Glu Leu Pro Val Ala
65                  70                  75                  80

Ala Trp Arg Ser Tyr Leu Asn Met Glu Leu Thr Ile Pro Ile Phe Ala
                85                  90                  95

Thr Asn Ser Asp Cys Glu Leu Ile Val Lys Ala Met Gln Gly Leu Leu
            100                 105                 110

Lys Asp Gly Asn Pro Ile Pro Ser Ala Ile Ala Ala Asn Ser Gly Ile
        115                 120                 125
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Tyr

<210> 7
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<212> PRT
<213> Bacteriophage fr

<400> 7

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1               5                  10                  15

Gly Asp Val Lys Val Ala Pro Ser Asn Phe Ala Asn Gly Val Ala Glu
            20                  25                  30

Trp Ile Ser Ser Asn Ser Arg Ser Gln Ala Tyr Lys Val Thr Cys Ser
        35                  40                  45

Val Arg Gln Ser Ser Ala Asn Asn Arg Lys Tyr Thr Val Lys Val Glu
    50                  55                  60

Val Pro Lys Val Ala Thr Gln Val Gln Gly Gly Val Glu Leu Pro Val
65                  70                  75                  80

Ala Ala Trp Arg Ser Tyr Met Asn Met Glu Leu Thr Ile Pro Val Phe
                85                  90                  95

Ala Thr Asn Asp Asp Cys Ala Leu Ile Val Lys Ala Leu Gln Gly Thr
            100                 105                 110

Phe Lys Thr Gly Asn Pro Ile Ala Thr Ala Ile Ala Ala Asn Ser Gly
        115                 120                 125

Ile Tyr
    130
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<210> 8
<211> 130
<212> PRT
<213> Bacteriophage GA

<400> 8

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1               5                  10                  15

Asn Val Thr Val Val Pro Val Ser Asn Ala Asn Gly Val Ala Glu Trp
            20                  25                  30

Leu Ser Asn Asn Ser Arg Ser Gln Ala Tyr Arg Val Thr Ala Ser Tyr
        35                  40                  45

Arg Ala Ser Gly Ala Asp Lys Arg Lys Tyr Ala Ile Lys Leu Glu Val
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50 55 60

Pro Lys Ile Val Thr Gln Val Val Asn Gly Val Glu Leu Pro Gly Ser
65 70 75 80

Ala Trp Lys Ala Tyr Ala Ser Ile Asp Leu Thr Ile Pro Ile Phe Ala
85 90 95

Ala Thr Asp Asp Val Thr Val Ile Ser Lys Ser Leu Ala Gly Leu Phe
100 105 110

Lys Val Gly Asn Pro Ile Ala Glu Ala Ile Ser Ser Gln Ser Gly Phe
115 120 125

Tyr Ala
130

<210> 9
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<212> PRT
<213> Bacteriophage SP

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1 5 10 15

Asp Gln Thr Leu Thr Leu Thr Pro Arg Gly Val Asn Pro Thr Asn Gly
20 25 30

Val Ala Ser Leu Ser Glu Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
35 40 45

Val Thr Val Ser Val Ala Gln Pro Ser Arg Asn Arg Lys Asn Phe Lys
50 55 60

Val Gln Ile Lys Leu Gln Asn Pro Thr Ala Cys Thr Arg Asp Ala Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Ser Ala Phe Ala Asp Val Thr Leu Ser Phe
85 90 95

Thr Ser Tyr Ser Thr Asp Glu Glu Arg Ala Leu Ile Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Asp Pro Leu Ile Val Asp Ala Ile Asp Asn Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 10
<211> 329

<212> PRT
<213> Bacteriophage SP

<400> 10

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Ala Lys Leu Asn Gln Val Thr Leu Ser Lys Ile Gly Lys Asn Gly Asp
1               5                  10                  15

Gln Thr Leu Thr Leu Thr Pro Arg Gly Val Asn Pro Thr Asn Gly Val
            20                  25                  30

Ala Ser Leu Ser Glu Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
        35                  40                  45

Thr Val Ser Val Ala Gln Pro Ser Arg Asn Arg Lys Asn Phe Lys Val
    50                  55                  60

Gln Ile Lys Leu Gln Asn Pro Thr Ala Cys Thr Arg Asp Ala Cys Asp
65                  70                  75                  80

Pro Ser Val Thr Arg Ser Ala Phe Ala Asp Val Thr Leu Ser Phe Thr
                85                  90                  95

Ser Tyr Ser Thr Asp Glu Glu Arg Ala Leu Ile Arg Thr Glu Leu Ala
            100                 105                 110

Ala Leu Leu Ala Asp Pro Leu Ile Val Asp Ala Ile Asp Asn Leu Asn
        115                 120                 125

Pro Ala Tyr Trp Ala Ala Leu Leu Val Ala Ser Ser Gly Gly Gly Asp
    130                 135                 140

Asn Pro Ser Asp Pro Asp Val Pro Val Val Pro Asp Val Lys Pro Pro
145                 150                 155                 160

Asp Gly Thr Gly Arg Tyr Lys Cys Pro Phe Ala Cys Tyr Arg Leu Gly
                165                 170                 175

Ser Ile Tyr Glu Val Gly Lys Glu Gly Ser Pro Asp Ile Tyr Glu Arg
            180                 185                 190

Gly Asp Glu Val Ser Val Thr Phe Asp Tyr Ala Leu Glu Asp Phe Leu
        195                 200                 205

Gly Asn Thr Asn Trp Arg Asn Trp Asp Gln Arg Leu Ser Asp Tyr Asp
    210                 215                 220

Ile Ala Asn Arg Arg Arg Cys Arg Gly Asn Gly Tyr Ile Asp Leu Asp
225                 230                 235                 240

Ala Thr Ala Met Gln Ser Asp Asp Phe Val Leu Ser Gly Arg Tyr Gly
                245                 250                 255
```

Val Arg Lys Val Lys Phe Pro Gly Ala Phe Gly Ser Ile Lys Tyr Leu
260 265 270

Leu Asn Ile Gln Gly Asp Ala Trp Leu Asp Leu Ser Glu Val Thr Ala
275 280 285

Tyr Arg Ser Tyr Gly Met Val Ile Gly Phe Trp Thr Asp Ser Lys Ser
290 295 300

Pro Gln Leu Pro Thr Asp Phe Thr Gln Phe Asn Ser Ala Asn Cys Pro
305 310 315 320

Val Gln Thr Val Ile Ile Ile Pro Ser
325

<210> 11
<211> 130
<212> PRT
<213> Bacteriophage MS2

<400> 11

Met Ala Ser Asn Phe Thr Gln Phe Val Leu Val Asp Asn Gly Gly Thr
1 5 10 15

Gly Asp Val Thr Val Ala Pro Ser Asn Phe Ala Asn Gly Val Ala Glu
20 25 30

Trp Ile Ser Ser Asn Ser Arg Ser Gln Ala Tyr Lys Val Thr Cys Ser
35 40 45

Val Arg Gln Ser Ser Ala Gln Asn Arg Lys Tyr Thr Ile Lys Val Glu
50 55 60

Val Pro Lys Val Ala Thr Gln Thr Val Gly Gly Val Glu Leu Pro Val
65 70 75 80

Ala Ala Trp Arg Ser Tyr Leu Asn Met Glu Leu Thr Ile Pro Ile Phe
85 90 95

Ala Thr Asn Ser Asp Cys Glu Leu Ile Val Lys Ala Met Gln Gly Leu
100 105 110

Leu Lys Asp Gly Asn Pro Ile Pro Ser Ala Ile Ala Ala Asn Ser Gly
115 120 125

Ile Tyr
130

<210> 12
<211> 133
<212> PRT
<213> Bacteriophage M11

<400> 12

Met Ala Lys Leu Gln Ala Ile Thr Leu Ser Gly Ile Gly Lys Lys Gly
1 5 10 15

Asp Val Thr Leu Asp Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly
20 25 30

Val Ala Ala Leu Ser Glu Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
35 40 45

Val Thr Ile Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys
50 55 60

Val Gln Val Lys Ile Gln Asn Pro Thr Ser Cys Thr Ala Ser Gly Thr
65 70 75 80

Cys Asp Pro Ser Val Thr Arg Ser Ala Tyr Ser Asp Val Thr Phe Ser
85 90 95

Phe Thr Gln Tyr Ser Thr Val Glu Glu Arg Ala Leu Val Arg Thr Glu
100 105 110

Leu Gln Ala Leu Leu Ala Asp Pro Met Leu Val Asn Ala Ile Asp Asn
115 120 125

Leu Asn Pro Ala Tyr
130

<210> 13
<211> 133
<212> PRT
<213> Bacteriophage MX1

<400> 13

Met Ala Lys Leu Gln Ala Ile Thr Leu Ser Gly Ile Gly Lys Asn Gly
1 5 10 15

Asp Val Thr Leu Asn Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly
20 25 30

Val Ala Ala Leu Ser Glu Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
35 40 45

Val Thr Ile Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys
50 55 60

Val Gln Val Lys Ile Gln Asn Pro Thr Ser Cys Thr Ala Ser Gly Thr
65 70 75 80

Cys Asp Pro Ser Val Thr Arg Ser Ala Tyr Ala Asp Val Thr Phe Ser
85 90 95

```
Phe Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Leu Val Arg Thr Glu
            100                 105                 110

Leu Lys Ala Leu Leu Ala Asp Pro Met Leu Ile Asp Ala Ile Asp Asn
        115                 120                 125

Leu Asn Pro Ala Tyr
    130
```

<210> 14
<211> 330
<212> PRT
<213> Bacteriophage NL95

<400> 14

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Met Ala Lys Leu Asn Lys Val Thr Leu Thr Gly Ile Gly Lys Ala Gly
1               5                   10                  15

Asn Gln Thr Leu Thr Leu Thr Pro Arg Gly Val Asn Pro Thr Asn Gly
            20                  25                  30

Val Ala Ser Leu Ser Glu Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
        35                  40                  45

Val Thr Val Ser Val Ala Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys
    50                  55                  60

Val Gln Ile Lys Leu Gln Asn Pro Thr Ala Cys Thr Lys Asp Ala Cys
65                  70                  75                  80

Asp Pro Ser Val Thr Arg Ser Gly Ser Arg Asp Val Thr Leu Ser Phe
                85                  90                  95

Thr Ser Tyr Ser Thr Glu Arg Glu Arg Ala Leu Ile Arg Thr Glu Leu
            100                 105                 110

Ala Ala Leu Leu Lys Asp Asp Leu Ile Val Asp Ala Ile Asp Asn Leu
        115                 120                 125

Asn Pro Ala Tyr Trp Ala Ala Leu Leu Ala Ala Ser Pro Gly Gly Gly
    130                 135                 140

Asn Asn Pro Tyr Pro Gly Val Pro Asp Ser Pro Asn Val Lys Pro Pro
145                 150                 155                 160

Gly Gly Thr Gly Thr Tyr Arg Cys Pro Phe Ala Cys Tyr Arg Arg Gly
                165                 170                 175

Glu Leu Ile Thr Glu Ala Lys Asp Gly Ala Cys Ala Leu Tyr Ala Cys
            180                 185                 190
```

```
Gly Ser Glu Ala Leu Val Glu Phe Glu Tyr Ala Leu Glu Asp Phe Leu
        195                 200                 205

Gly Asn Glu Phe Trp Arg Asn Trp Asp Gly Arg Leu Ser Lys Tyr Asp
    210                 215                 220

Ile Glu Thr His Arg Arg Cys Arg Gly Asn Gly Tyr Val Asp Leu Asp
225                 230                 235                 240

Ala Ser Val Met Gln Ser Asp Glu Tyr Val Leu Ser Gly Ala Tyr Asp
                245                 250                 255

Val Val Lys Met Gln Pro Pro Gly Thr Phe Asp Ser Pro Arg Tyr Tyr
            260                 265                 270

Leu His Leu Met Asp Gly Ile Tyr Val Asp Leu Ala Glu Val Thr Ala
        275                 280                 285

Tyr Arg Ser Tyr Gly Met Val Ile Gly Phe Trp Thr Asp Ser Lys Ser
    290                 295                 300

Pro Gln Leu Pro Thr Asp Phe Thr Arg Phe Asn Arg His Asn Cys Pro
305                 310                 315                 320

Val Gln Thr Val Ile Val Ile Pro Ser Leu
                325                 330


<210>  15
<211>  129
<212>  PRT
<213>  Bacteriophage f2

<400>  15

Ala Ser Asn Phe Thr Gln Phe Val Leu Val Asn Asp Gly Gly Thr Gly
                5                   10                  15

Asn Val Thr Val Ala Pro Ser Asn Phe Ala Asn Gly Val Ala Glu Trp
            20                  25                  30

Ile Ser Ser Asn Ser Arg Ser Gln Ala Tyr Lys Val Thr Cys Ser Val
        35                  40                  45

Arg Gln Ser Ser Ala Gln Asn Arg Lys Tyr Thr Ile Lys Val Glu Val
    50                  55                  60

Pro Lys Val Ala Thr Gln Thr Val Gly Gly Val Glu Leu Pro Val Ala
65                  70                  75                  80

Ala Trp Arg Ser Tyr Leu Asn Leu Glu Leu Thr Ile Pro Ile Phe Ala
                85                  90                  95
```

Thr Asn Ser Asp Cys Glu Leu Ile Val Lys Ala Met Gln Gly Leu Leu
100 105 110

Lys Asp Gly Asn Pro Ile Pro Ser Ala Ile Ala Ala Asn Ser Gly Ile
115 120 125

Tyr

<210> 16
<211> 128
<212> PRT
<213> Bacteriophage PP7

<400> 16

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

Thr Glu Ile Gln Ser Thr Ala Asp Arg Gln Ile Phe Glu Glu Lys Val
20 25 30

Gly Pro Leu Val Gly Arg Leu Arg Leu Thr Ala Ser Leu Arg Gln Asn
35 40 45

Gly Ala Lys Thr Ala Tyr Arg Val Asn Leu Lys Leu Asp Gln Ala Asp
50 55 60

Val Val Asp Cys Ser Thr Ser Val Cys Gly Glu Leu Pro Lys Val Arg
65 70 75 80

Tyr Thr Gln Val Trp Ser His Asp Val Thr Ile Val Ala Asn Ser Thr
85 90 95

Glu Ala Ser Arg Lys Ser Leu Tyr Asp Leu Thr Lys Ser Leu Val Ala
100 105 110

Thr Ser Gln Val Glu Asp Leu Val Val Asn Leu Val Pro Leu Gly Arg
115 120 125

<210> 17
<211> 132
<212> PRT
<213> Artificial Sequence

<220>
<223> Bacteriophage Qbeta 240 mutant

<400> 17

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

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

```
Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
        35                  40                  45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
    50                  55                  60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65                  70                  75                  80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
                85                  90                  95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
            100                 105                 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
        115                 120                 125

Asn Pro Ala Tyr
    130
```

<210> 18
<211> 132
<212> PRT
<213> Artificial Sequence

<220>
<223> Bacteriophage Q-beta 243 mutant

<400> 18

```
Ala Lys Leu Glu Thr Val Thr Leu Gly Lys Ile Gly Lys Asp Gly Lys
1               5                   10                  15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
            20                  25                  30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
        35                  40                  45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
    50                  55                  60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65                  70                  75                  80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
                85                  90                  95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
            100                 105                 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
```

115 120 125

Asn Pro Ala Tyr
130

<210> 19
<211> 132
<212> PRT
<213> Artificial Sequence

<220>
<223> Bacteriophage Q-beta 250 mutant

<400> 19

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

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 20
<211> 132
<212> PRT
<213> Artificial Sequence

<220>
<223> Bacteriophage Q-beta 251 mutant

<400> 20

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

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val

20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 21
<211> 132
<212> PRT
<213> Artificial Sequence

<220>
<223> Bacteriophage Q-beta 259 mutant

<400> 21

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

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 22
<211> 185
<212> PRT
<213> Hepatitis B virus

<400> 22

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 Asn Asn Leu Glu Asp Pro Ala
65 70 75 80

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

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

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

Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
165 170 175

Arg Ser Gln Ser Arg Glu Ser Gln Cys
180 185

<210> 23
<211> 212
<212> PRT
<213> Hepatitis B virus

<400> 23

Met Gln Leu Phe His Leu Cys Leu Ile Ile Ser Cys Ser Cys Pro Thr
1 5 10 15

Val Gln Ala Ser Lys Leu Cys Leu Gly Trp Leu Trp Gly Met Asp Ile
20 25 30

Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu Ser Phe Leu
35 40 45

Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser
50 55 60

Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser Pro His
65 70 75 80

His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp Leu Met Asn
85 90 95

Leu Ala Thr Trp Val Gly Gly Asn Leu Glu Asp Pro Val Ser Arg Asp
100 105 110

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

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

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

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

Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro
180 185 190

Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Arg
195 200 205

Glu Ser Gln Cys
210

<210> 24
<211> 188
<212> PRT
<213> Hepatitis B virus

<400> 24

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

```
Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

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

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln
65                  70                  75                  80

Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
                85                  90                  95

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

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

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

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

Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro
                165                 170                 175

Arg Arg Arg Arg Ser Gln Ser Pro Ser Thr Asn Cys
            180                 185
```

<210> 25
<211> 185
<212> PRT
<213> Hepatitis B virus

<400> 25

```
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 Asn Asn Leu Glu Asp Pro Ala
65                  70                  75                  80

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

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

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

Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
                165                 170                 175

Arg Ser Gln Ser Arg Glu Ser Gln Cys
            180                 185


<210>  26
<211>  152
<212>  PRT
<213>  Hepatitis B virus

<400>  26

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 Ala Ala Leu Tyr Arg Asp 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 Asp
    50                  55                  60

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

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

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

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

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

Thr Leu Pro Glu Thr Thr Val Val
145 150

<210> 27
<211> 3635
<212> DNA
<213> Artificial Sequence

<220>
<223> plasmid pAP283-58

<400> 27
cgagctcgcc cctggcttat cgaaattaat acgactcact atagggagac cggaattcga 60

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ggaaaatcac atggcaaata agccaatgca accgatcaca tctacagcaa ataaaattgt 180

gtggtcggat ccaactcgtt tatcaactac attttcagca agtctgttac gccaacgtgt 240

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tcctgcacct aaaccggaag gttgtgcaga tgcctgtgtc attatgccga atgaaaacca 360

atccattcgc acagtgattt cagggtcagc cgaaaacttg gctaccttaa aagcagaatg 420

ggaaactcac aaacgtaacg ttgacacact cttcgcgagc ggcaacgccg gtttgggttt 480

ccttgaccct actgcggcta tcgtatcgtc tgatactact gcttaagctt gtattctata 540

gtgtcaccta aatcgtatgt gtatgataca taaggttatg tattaattgt agccgcgttc 600

taacgacaat atgtacaagc ctaattgtgt agcatctggc ttactgaagc agaccctatc 660

atctctctcg taaactgccg tcagagtcgg tttggttgga cgaaccttct gagtttctgg 720

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ggctgcttcc taatgcagga gtcgcataag ggagagcgtc gatatggtgc actctcagta 1080

caatctgctc tgatgccgca tagttaagcc aactccgcta tcgctacgtg actgggtcat 1140

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ggttctggca aatattctga aatgagctgt tgacaattaa tcatcgaact agttaactag 3600

tacgcaagtt cacgtaaaaa gggtatcgcg gaatt 3635

<210> 28
<211> 131
<212> PRT
<213> Bacteriophage AP205

<400> 28

Met Ala Asn Lys Pro Met Gln Pro Ile Thr Ser Thr Ala Asn Lys Ile
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Val Trp Ser Asp Pro Thr Arg Leu Ser Thr Thr Phe Ser Ala Ser Leu
20 25 30

Leu Arg Gln Arg Val Lys Val Gly Ile Ala Glu Leu Asn Asn Val Ser
35 40 45

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
50 55 60

Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
65 70 75 80

Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
85 90 95

Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
100 105 110

Ala Gly Leu Gly Phe Leu Asp Pro Thr Ala Ala Ile Val Ser Ser Asp
115 120 125

Thr Thr Ala
130

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<212> PRT
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<223> AP205 coat protein

<400> 29

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20 25 30

Leu Arg Gln Arg Val Lys Val Gly Ile Ala Glu Leu Asn Asn Val Ser
35 40 45

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
50 55 60

Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
65 70 75 80

Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
85 90 95

Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
100 105 110

Ala Gly Leu Gly Phe Leu Asp Pro Thr Ala Ala Ile Val Ser Ser Asp
115 120 125

Thr Thr Ala
130

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tcaactacat tttcagcaag tctgttacgc caacgtgtta aagttggtat agccgaactg 240

aataatgttt caggtcaata tgtatctgtt tataagcgtc ctgcacctaa accgaaggtc 300

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actcttcgcg agcggcaacg ccggtttggg tttccttgac cctactgcgg ctatcgtatc 480

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acataaggtt atgtattaat ggtagccgcg ttctaacgac aatatgtaca agcctaattg 600

tgtagcatct ggcttactga agcagaccct atcatctctc tcgtaaactg ccgtcagagt 660

cggttgggtt ggacagacct ctgagtttct ggtaacgccg ttccgcaccc cggaaatggt 720

caccgaacca ttcagcaggg tcatcgctag ccagatcctc tacgccggac gcatcgtggc 780

ccgcatcacc ggcgccacag gtgcggtgct ggcgcctata tcgccgacat caccgatggg 840

gaagatcggg ctcgccactt cgggctcatg atcgctggtt tccgcctggg tatggtggca 900

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caactccgct atcgctacgt gactgggtca tggctgcgcc ccgacacccg ccaacacccg 1140

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atggcatgac agtaagagaa ttatgcagtg ctgccataac catgagtgat aacactgcgg 1860

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tgggggatca tgtaactcgc cttgatcgtt gggaaccgga gctgaatgaa gccataccaa 1980

acgacgagcg tgacaccacg atgcctgtac gaacggcaac aacgttgcgc aaactattaa 2040

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aagttgcagg accacttctg cgctcggccc ttccggctgg ctggtttatt gctgataaat 2160

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cggaatt 3607

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<220>
<223> N-terminal linker

<400> 31

Cys Gly Asp Glu Gly Gly
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<210> 32
<211> 6
<212> PRT
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<220>
<223> C-terminal linker

<400> 32

Gly Gly Glu Asp Gly Cys
1 5

<210> 33
<211> 5
<212> PRT
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<220>
<223> Linker

<400> 33

Gly Gly Lys Gly Gly
1 5

<210> 34

<211> 3
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal glycine linker

<220>
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<222> (1)..(1)
<223> Glycine can be repeated from zero to five times

<220>
<221> REPEAT
<222> (3)..(3)
<223> Glycine can be repeated from zero to twelve times

<400> 34

Gly Cys Gly
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<210> 35
<211> 9
<212> PRT
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<220>
<223> N terminal glycine serine linkers

<220>
<221> REPEAT
<222> (1)..(1)
<223> Glycine can be repeated from zero to five times

<220>
<221> REPEAT
<222> (3)..(3)
<223> Glycine can be repeated from zero to ten times

<220>
<221> REPEAT
<222> (4)..(4)
<223> Serine can be repeated from zero to two times

<220>
<221> REPEAT
<222> (5)..(9)
<223> These residues can be repeated from zero to three times as a group

<400> 35

Gly Cys Gly Ser Gly Gly Gly Gly Ser
1 5

<210> 36
<211> 3
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal glycine linker

<220>
<221> REPEAT
<222> (1)..(1)
<223> Glycine can be repeated from zero to twelve times

<220>
<221> REPEAT
<222> (3)..(3)
<223> Glycine can be repeated from zero to five times

<400> 36

Gly Cys Gly
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<210> 37
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<220>
<223> C terminal glycine serine linkers

<220>
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<222> (1)..(1)
<223> Glycine can be repeated from zero to ten times

<220>
<221> REPEAT
<222> (2)..(2)
<223> Serine can be repeated from zero to two times

<220>
<221> REPEAT
<222> (3)..(7)
<223> These residues can be repeated from zero to three times as a group

<220>
<221> REPEAT
<222> (8)..(8)
<223> Glycine can be repeated from zero to eight times

<220>
<221> REPEAT
<222> (10)..(10)
<223> Glycine can be repeated from zero to five times

<400> 37

Gly Ser Gly Gly Gly Gly Ser Gly Cys Gly
1 5 10

<210> 38
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Glycine serine linker

<220>

<221> REPEAT
<222> (1)..(5)
<223> These residues can be repeated any times as a group

<400> 38

Gly Gly Gly Gly Ser
1 5

<210> 39
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal gamma1

<400> 39

Cys Gly Asp Lys Thr His Thr Ser Pro Pro
1 5 10

<210> 40
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal gamma 1

<400> 40

Asp Lys Thr His Thr Ser Pro Pro Cys Gly
1 5 10

<210> 41
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal gamma 3

<400> 41

Cys Gly Gly Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala
1 5 10 15

Pro

<210> 42
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal gamma 3

<400> 42

Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala Pro Gly Gly
1 5 10 15

Cys Gly

<210> 43
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal glycine linker

<400> 43

Gly Cys Gly Gly Gly Gly
1 5

<210> 44
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal glycine linker

<400> 44

Gly Gly Gly Gly Cys Gly
1 5

<210> 45
<211> 6
<212> PRT
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<220>
<223> C-terminal glycine-lysine linker

<400> 45

Gly Gly Lys Lys Gly Cys
1 5

<210> 46
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal glycine-lysine linker

<400> 46

Cys Gly Lys Lys Gly Gly
1 5

<210> 47
<211> 4
<212> PRT
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<220>

<223> C.terminal linker

<400> 47

Gly Gly Cys Gly
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<210> 48
<211> 37
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<220>
<223> Oligonucleotide primer

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ggtaacatcg gtcgagatgg aaaacaaact ctggtcc 37

<210> 49
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Oligonucleotide primer

<400> 49
ggaccagagt ttgttttcca tctcgaccga tgttacc 37

<210> 50
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Oligonucleotide primer

<400> 50
agctcgcccg gggatcctct ag 22

<210> 51
<211> 40
<212> DNA
<213> Artificial Sequence

<220>
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<400> 51
cgatgcattt catccttagt tatcaatacg ctgggttcag 40

<210> 52
<211> 36
<212> DNA
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<220>
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<400> 52
ggcaaaatta gagactgtta ctttaggtaa gatcgg 36

<210> 53
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Oligonucleotide primer

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ccgatcttac ctaaagtaac agtctctaat tttgcc 36

<210> 54
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<210> 55
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<212> DNA
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<220>
<223> Oligonucleotide primer

<400> 55
gatttaggtg acactatag 19

<210> 56
<211> 37
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<220>
<223> Oligonucleotide primer

<400> 56
gatggacgtc aaactctggt cctcaatccg cgtgggg 37

<210> 57
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Oligonucleotide primer

<400> 57
ccccacgcgg attgaggacc agagtttgac gtccatc 37

<210> 58
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> EcoRIHBcAg(s) primer

<400> 58
ccggaattca tggacattga cccttataaa g 31

<210> 59
<211> 51
<212> DNA
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<220>
<223> Lys-HBcAg(as) primer

<400> 59
cctagagcca cctttgccac catcttctaa attagtaccc acccaggtag c 51

<210> 60
<211> 48
<212> DNA
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<220>
<223> Lys-HBcAg(s) primer

<400> 60
gaagatggtg gcaaaggtgg ctctagggac ctagtagtca gttatgtc 48

<210> 61
<211> 38
<212> DNA
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<220>
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cgcgtcccaa gcttctaaac aacagtagtc tccggaag 38

<210> 62
<211> 37
<212> DNA
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<220>
<223> 48as primer

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gtgcagtatg gtgaggtgag gaatgctcag gagactc 37

<210> 63
<211> 37
<212> DNA
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<223> 48s primer

<400> 63
gagtctcctg agcattcctc acctcaccat actgcac 37

<210> 64
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<220>
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<400> 64
cttccaaaag tgagggaaga aatgtgaaac cac 33

<210> 65
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<223> HBcAg149hind-as

<400> 65
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<210> 66
<211> 33
<212> DNA
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<220>
<223> 107s primer

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gtggtttcac atttcttccc tcacttttgg aag 33

<210> 67
<211> 38
<212> DNA
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<220>
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<400> 67
cgcgtcccaa gcttctaaca ttgagattcc cgagattg 38

<210> 68
<211> 10
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<213> Artificial Sequence

<220>
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<400> 68

Val Asn Leu Thr Trp Ser Arg Ala Ser Gly
1 5 10

<210> 69
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> CeH3fwd primer

<220>

<221> CDS
<222> (1)..(51)

<400> 69
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Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Ala Ser Arg Asp Leu Val
1 5 10 15

gtc 51
Val

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

<220>
<223> CeH3fwd primer

<400> 70

Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Ala Ser Arg Asp Leu Val
1 5 10 15

Val

<210> 71
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> CeH3rev primer

<400> 71
accagaagca cgagaccagg tcaagttaac atcttccaaa ttattaccca c 51

<210> 72
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> CeH3rev primer peptide

<400> 72

Asp Glu Leu Asn Asn Gly Val
1 5

<210> 73
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> HBcAg-wt EcoRI fwd primer

<400> 73
ccggaattca tggacattga cccttataaa g 31

<210> 74
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> HBCAg-wt Hind III rev primer

<400> 74
cgcgtcccaa gcttctaaca ttgagattcc cgagattg 38

<210> 75
<211> 6
<212> PRT
<213> Homo sapiens

<400> 75

Asp Ala Glu Phe Arg His
1 5

<210> 76
<211> 6
<212> PRT
<213> Mus musculus

<400> 76

Asp Ala Glu Phe Gly His
1 5

<210> 77
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Abeta 1-6 GGC

<400> 77

Asp Ala Glu Phe Arg His Gly Gly Cys
1 5

<210> 78
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> murine Abeta 1-6 GGC

<400> 78

Asp Ala Glu Phe Gly His Gly Gly Cys
1 5

<210> 79
<211> 28
<212> DNA
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<220>
<223> primer p1.44

<400> 79
aaccatggca aataagccaa tgcaaccg 28

<210> 80
<211> 30
<212> DNA
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<220>
<223> primer p1.45

<400> 80
aatctagaat tttctgcgca cccatcccgg 30

<210> 81
<211> 30
<212> DNA
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<223> primer p1.46

<400> 81
aaaagcttaa gcagtagtat cagacgatac 30

<210> 82
<211> 43
<212> DNA
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<220>
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<400> 82
gagtgatcca actcgtttat caactacatt ttcagcaagt ctg 43

<210> 83
<211> 43
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<220>
<223> primer p1.48

<400> 83
cagacttgct gaaaatgtag ttgataaacg agttggatca ctc 43

<210> 84
<211> 6
<212> PRT
<213> homo sapiens

<400> 84

Asp Ala Glu Phe Arg His
1 5

<210> 85
<211> 6

<212> PRT
<213> Oryctolagus cuniculus

<400> 85

Asp Ala Glu Phe Arg His
1 5

<210> 86
<211> 6
<212> PRT
<213> Xenopus laevis

<400> 86

Asp Ser Glu Tyr Arg His
1 5

<210> 87
<211> 6
<212> PRT
<213> Rattus norvegicus

<400> 87

Asp Ala Glu Phe Gly His
1 5

<210> 88
<211> 6
<212> PRT
<213> Cavia porcellus

<400> 88

Asp Ala Glu Phe Arg His
1 5

<210> 89
<211> 15
<212> PRT
<213> Mus musculus

<400> 89

Val His Glu Pro His Glu Phe Arg His Val Ala Leu Asn Pro Val
1 5 10 15

<210> 90
<211> 6
<212> PRT
<213> Mus musculus

<400> 90

Tyr Tyr Glu Phe Arg His
1 5

<210> 91
<211> 42
<212> PRT
<213> Homo sapiens

<400> 91

Asp Ala Glu Phe Arg His Asp Ser Gly Tyr Glu Val His His Gln Lys
1 5 10 15

Leu Val Phe Phe Ala Glu Asp Val Gly Ser Asn Lys Gly Ala Ile Ile
20 25 30

Gly Leu Met Val Gly Gly Val Val Ile Ala
35 40

<210> 92
<211> 770
<212> PRT
<213> Homo sapiens

<400> 92

Met Leu Pro Gly Leu Ala Leu Leu Leu Leu Ala Ala Trp Thr Ala Arg
1 5 10 15

Ala Leu Glu Val Pro Thr Asp Gly Asn Ala Gly Leu Leu Ala Glu Pro
20 25 30

Gln Ile Ala Met Phe Cys Gly Arg Leu Asn Met His Met Asn Val Gln
35 40 45

Asn Gly Lys Trp Asp Ser Asp Pro Ser Gly Thr Lys Thr Cys Ile Asp
50 55 60

Thr Lys Glu Gly Ile Leu Gln Tyr Cys Gln Glu Val Tyr Pro Glu Leu
65 70 75 80

Gln Ile Thr Asn Val Val Glu Ala Asn Gln Pro Val Thr Ile Gln Asn
85 90 95

Trp Cys Lys Arg Gly Arg Lys Gln Cys Lys Thr His Pro His Phe Val
100 105 110

Ile Pro Tyr Arg Cys Leu Val Gly Glu Phe Val Ser Asp Ala Leu Leu
115 120 125

Val Pro Asp Lys Cys Lys Phe Leu His Gln Glu Arg Met Asp Val Cys
130 135 140

Glu Thr His Leu His Trp His Thr Val Ala Lys Glu Thr Cys Ser Glu
145 150 155 160

Lys Ser Thr Asn Leu His Asp Tyr Gly Met Leu Leu Pro Cys Gly Ile
165 170 175

Asp Lys Phe Arg Gly Val Glu Phe Val Cys Cys Pro Leu Ala Glu Glu
180 185 190

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Ser Asp Asn Val Asp Ser Ala Asp Ala Glu Glu Asp Asp Ser Asp Val
        195                 200                 205

Trp Trp Gly Gly Ala Asp Thr Asp Tyr Ala Asp Gly Ser Glu Asp Lys
    210                 215                 220

Val Val Glu Val Ala Glu Glu Glu Glu Val Ala Glu Val Glu Glu Glu
225                 230                 235                 240

Glu Ala Asp Asp Asp Glu Asp Asp Glu Asp Gly Asp Glu Val Glu Glu
                245                 250                 255

Glu Ala Glu Glu Pro Tyr Glu Glu Ala Thr Glu Arg Thr Thr Ser Ile
            260                 265                 270

Ala Thr Thr Thr Thr Thr Thr Thr Glu Ser Val Glu Glu Val Val Arg
        275                 280                 285

Glu Val Cys Ser Glu Gln Ala Glu Thr Gly Pro Cys Arg Ala Met Ile
    290                 295                 300

Ser Arg Trp Tyr Phe Asp Val Thr Glu Gly Lys Cys Ala Pro Phe Phe
305                 310                 315                 320

Tyr Gly Gly Cys Gly Gly Asn Arg Asn Asn Phe Asp Thr Glu Glu Tyr
                325                 330                 335

Cys Met Ala Val Cys Gly Ser Ala Met Ser Gln Ser Leu Leu Lys Thr
            340                 345                 350

Thr Gln Glu Pro Leu Ala Arg Asp Pro Val Lys Leu Pro Thr Thr Ala
        355                 360                 365

Ala Ser Thr Pro Asp Ala Val Asp Lys Tyr Leu Glu Thr Pro Gly Asp
    370                 375                 380

Glu Asn Glu His Ala His Phe Gln Lys Ala Lys Glu Arg Leu Glu Ala
385                 390                 395                 400

Lys His Arg Glu Arg Met Ser Gln Val Met Arg Glu Trp Glu Glu Ala
                405                 410                 415

Glu Arg Gln Ala Lys Asn Leu Pro Lys Ala Asp Lys Lys Ala Val Ile
            420                 425                 430

Gln His Phe Gln Glu Lys Val Glu Ser Leu Glu Gln Glu Ala Ala Asn
        435                 440                 445

Glu Arg Gln Gln Leu Val Glu Thr His Met Ala Arg Val Glu Ala Met
    450                 455                 460
```

```
Leu Asn Asp Arg Arg Arg Leu Ala Leu Glu Asn Tyr Ile Thr Ala Leu
465                 470                 475                 480

Gln Ala Val Pro Pro Arg Pro Arg His Val Phe Asn Met Leu Lys Lys
                485                 490                 495

Tyr Val Arg Ala Glu Gln Lys Asp Arg Gln His Thr Leu Lys His Phe
            500                 505                 510

Glu His Val Arg Met Val Asp Pro Lys Lys Ala Ala Gln Ile Arg Ser
        515                 520                 525

Gln Val Met Thr His Leu Arg Val Ile Tyr Glu Arg Met Asn Gln Ser
    530                 535                 540

Leu Ser Leu Leu Tyr Asn Val Pro Ala Val Ala Glu Glu Ile Gln Asp
545                 550                 555                 560

Glu Val Asp Glu Leu Leu Gln Lys Glu Gln Asn Tyr Ser Asp Asp Val
                565                 570                 575

Leu Ala Asn Met Ile Ser Glu Pro Arg Ile Ser Tyr Gly Asn Asp Ala
            580                 585                 590

Leu Met Pro Ser Leu Thr Glu Thr Lys Thr Thr Val Glu Leu Leu Pro
        595                 600                 605

Val Asn Gly Glu Phe Ser Leu Asp Asp Leu Gln Pro Trp His Ser Phe
    610                 615                 620

Gly Ala Asp Ser Val Pro Ala Asn Thr Glu Asn Glu Val Glu Pro Val
625                 630                 635                 640

Asp Ala Arg Pro Ala Ala Asp Arg Gly Leu Thr Thr Arg Pro Gly Ser
                645                 650                 655

Gly Leu Thr Asn Ile Lys Thr Glu Glu Ile Ser Glu Val Lys Met Asp
            660                 665                 670

Ala Glu Phe Arg His Asp Ser Gly Tyr Glu Val His His Gln Lys Leu
        675                 680                 685

Val Phe Phe Ala Glu Asp Val Gly Ser Asn Lys Gly Ala Ile Ile Gly
    690                 695                 700

Leu Met Val Gly Gly Val Val Ile Ala Thr Val Ile Val Ile Thr Leu
705                 710                 715                 720

Val Met Leu Lys Lys Lys Gln Tyr Thr Ser Ile His His Gly Val Val
                725                 730                 735
```

```
Glu Val Asp Ala Ala Val Thr Pro Glu Glu Arg His Leu Ser Lys Met
            740                 745                 750

Gln Gln Asn Gly Tyr Glu Asn Pro Thr Tyr Lys Phe Phe Glu Gln Met
        755                 760                 765

Gln Asn
    770

<210>  93
<211>  82
<212>  PRT
<213>  Homo sapiens

<400>  93

Gly Ser Gly Leu Thr Asn Ile Lys Thr Glu Glu Ile Ser Glu Val Lys
                5                   10                  15

Met Asp Ala Glu Phe Arg His Asp Ser Gly Tyr Glu Val His His Gln
            20                  25                  30

Lys Leu Val Phe Phe Ala Glu Asp Val Gly Ser Asn Lys Gly Ala Ile
        35                  40                  45

Ile Gly Leu Met Val Gly Gly Val Val Ile Ala Thr Val Ile Ile Ile
    50                  55                  60

Thr Leu Val Met Leu Lys Lys Gln Tyr Thr Ser Asn His His Gly Val
65                  70                  75                  80

Val Glu
```