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<110> F. Hoffmann-La Roche AG

<120> Covalently linked antigen-antibody conjugates

<130> 31087 WO

<150> EP12174947.7
<151> 2012-07-04

<160> 192

<170> PatentIn version 3.5

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Gly

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Ser Leu Lys Leu Ser Cys Ala Val Ser Gly Phe Thr Phe Ser Asp Tyr
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Ala Met Ser Trp Ile Arg Gln Thr Pro Glu Asn Arg Leu Glu Trp Val

35 40 45

Ala Ser Ile Asn Ile Gly Ala Thr Tyr Ala Tyr Tyr Pro Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Phe
65 70 75 80

Leu Gln Met Ser Ser Leu Gly Ser Glu Asp Thr Ala Met Tyr Tyr Cys
85 90 95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
100 105 110

Ala Tyr Trp Gly Pro Gly Thr Ser Val Thr Val Ser Ser
115 120 125

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Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
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Ser Ala Lys Thr Leu Ala Asp
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<210> 7
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<400> 7

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

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<213> Mus musculus

<400> 8

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

Asp Arg Val Thr Ile Ser Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr

20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Gly Thr Val Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Arg Gly Ser Gly Thr Asp Phe Ser Leu Thr Ile Thr Asn Leu Glu Arg
65 70 75 80

Glu Asp Ile Ala Thr Tyr Phe Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105

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<400> 9

Asp Tyr Ala Met Ser
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<220>
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<400> 10

Ser Ile Asn Ile Gly Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val Lys
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Gly

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<220>
<223> humanized anti-digoxigenin antibody HVR-H3

<400> 11

Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met Ala Tyr
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<400> 12

Gln Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asp Tyr
20 25 30

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

Ser Ser Ile Asn Ile Gly Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
100 105 110

Ala Tyr Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser
115 120 125

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<400> 13

Arg Ala Ser Gln Asp Ile Lys Asn Tyr Leu Asn
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<400> 14

Tyr Ser Ser Thr Leu Leu Ser

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<220>
<223> humanized anti-digoxigenin antibody HVR-L3

<400> 15

Gln Gln Ser Ile Thr Leu Pro Pro Thr
1 5

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<220>
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<400> 16

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys Arg
100 105

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<400> 17

Asp Tyr Ala Met Ser
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<210> 18
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<220>
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<400> 18

Ser Ile Asn Ile Cys Ala Thr Tyr Ala Tyr Tyr Pro Asp Ser Val Lys
1 5 10 15

Gly

<210> 19
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<213> Mus musculus

<400> 19

Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met Ala Tyr
1 5 10 15

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<213> Artificial Sequence

<220>
<223> murine anti-digoxigenin antibody VH52bC VH

<400> 20

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1 5 10 15

Ser Leu Lys Leu Ser Cys Ala Val Ser Gly Phe Thr Phe Ser Asp Tyr
20 25 30

Ala Met Ser Trp Ile Arg Gln Thr Pro Glu Asn Arg Leu Glu Trp Val
35 40 45

Ala Ser Ile Asn Ile Cys Ala Thr Tyr Ala Tyr Tyr Pro Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Phe
65 70 75 80

Leu Gln Met Ser Ser Leu Gly Ser Glu Asp Thr Ala Met Tyr Tyr Cys
85 90 95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
100 105 110

Ala Tyr Trp Gly Pro Gly Thr Ser Val Thr Val Ser Ser
115 120 125

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<400> 21

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 22
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<400> 22

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 23
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<400> 23

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 24
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<400> 24

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

Asp Arg Val Thr Ile Ser Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Gly Thr Val Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Arg Gly Ser Gly Thr Asp Phe Ser Leu Thr Ile Thr Asn Leu Glu Arg
65 70 75 80

Glu Asp Ile Ala Thr Tyr Phe Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 25
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<220>
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<400> 25

Asp Tyr Ala Met Ser
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<210> 26
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<220>
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<400> 26

Ser Ile Asn Ile Cys Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 27
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<212> PRT
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<220>
<223> humanized anti-digoxigenin antibody VH52bC HVR-H3

<400> 27

Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met Ala Tyr
1 5 10 15

<210> 28
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<212> PRT
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<220>
<223> humanized anti-digoxigenin antibody VH52bC VH

<400> 28

Gln Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asp Tyr
20 25 30

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

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Ser Ser Ile Asn Ile Cys Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val
    50                  55                  60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65                  70                  75                  80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
            100                 105                 110

Ala Tyr Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser
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<220>
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<400> 29

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Arg Ala Ser Gln Asp Ile Lys Asn Tyr Leu Asn
1               5                   10
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<210> 30
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<212> PRT
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<220>
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<400> 30

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Tyr Ser Ser Thr Leu Leu Ser
1               5
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<210> 31
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<212> PRT
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<220>
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<400> 31

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Gln Gln Ser Ile Thr Leu Pro Pro Thr
1               5
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<210> 32
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<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH52bC VL

<400> 32

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Cys Gly Thr Lys Val Glu Ile Lys
100 105

<210> 33
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<400> 33

Asp Thr Phe Phe Gln
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<210> 34
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<213> Mus musculus

<400> 34

Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Asp Pro Lys Phe Gln
1 5 10 15

Gly

<210> 35
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<213> Mus musculus

<400> 35

Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr
1 5 10

<210> 36
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<212> PRT
<213> Mus musculus

<400> 36

Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Thr Ser Ser Gly Phe Asn Asn Lys Asp Thr
20 25 30

Phe Phe Gln Trp Val Lys Gln Arg Pro Glu Glu Cys Leu Glu Trp Ile
35 40 45

Gly Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Asp Pro Lys Phe
50 55 60

Gln Gly Lys Ala Thr Ile Thr Val Asp Thr Ser Ser Asn Thr Ala Tyr
65 70 75 80

Leu Gln Leu Asn Ser Leu Thr Ser Glu Asp Thr Ala Leu Tyr Tyr Cys
85 90 95

Thr Arg Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr Trp Gly Gln
100 105 110

Gly Thr Leu Val Thr Val Ser Ala
115 120

<210> 37
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<212> PRT
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<400> 37

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 38
<211> 7
<212> PRT
<213> Mus musculus

<400> 38

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 39
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<212> PRT
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<400> 39

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 40
<211> 107
<212> PRT
<213> Mus musculus

<400> 40

Asp Ile Gln Met Thr Gln Ser Pro Ala Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Glu Thr Val Thr Ile Thr Cys Arg Ala Ser Gly Asn Ile His Asn Tyr
20 25 30

Leu Ser Trp Phe Gln Gln Lys Gln Gly Lys Ser Pro Gln Leu Leu Val
35 40 45

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

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

Glu Asp Phe Gly Thr Tyr Tyr Cys Gln His Phe Trp Ser Ser Ile Tyr
85 90 95

Thr Phe Gly Cys Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 41
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<212> PRT
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<220>
<223> humanized anti-biotin antibody HVR-H1

<400> 41

Asp Thr Phe Phe Gln
1 5

<210> 42
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody HVR-H2

<400> 42

Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Ala Gln Lys Phe Gln
1 5 10 15

Gly

<210> 43
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody HVR-H3

<400> 43

Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr
1 5 10

<210> 44
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH

<400> 44

Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ser
1 5 10 15

Ser Val Lys Val Ser Cys Lys Ser Ser Gly Phe Asn Asn Lys Asp Thr
20 25 30

Phe Phe Gln Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
35 40 45

Gly Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Ala Gln Lys Phe
50 55 60

Gln Gly Arg Val Thr Ile Thr Ala Asp Thr Ser Thr Ser Thr Ala Tyr
65 70 75 80

Met Glu Leu Ser Ser Leu Arg Ser Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr Trp Gly Gln
100 105 110

Gly Thr Leu Val Thr Val Ser Ser
115 120

<210> 45
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody HVR-L1

<400> 45

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 46
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody HVR-L2

<400> 46

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 47
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody HVR-L3

<400> 47

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 48
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VL

<400> 48

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gly Asn Ile His Asn Tyr
20 25 30

Leu Ser Trp Tyr Gln Gln Lys Pro Gly Lys Val Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Val Ala Thr Tyr Tyr Cys Gln His Phe Trp Ser Ser Ile Tyr
85 90 95

Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 49
<211> 5
<212> PRT
<213> Mus musculus

<400> 49

Asp Thr Phe Phe Gln
1 5

<210> 50
<211> 17
<212> PRT
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<220>
<223> murine anti-biotin antibody VH53C HVR-H2

<400> 50

Arg Ile Asp Pro Cys Asn Gly Phe Thr Lys Tyr Asp Pro Lys Phe Gln
1 5 10 15

Gly

<210> 51
<211> 11
<212> PRT
<213> Mus musculus

<400> 51

Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr
1 5 10

<210> 52
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-biotin antibody VH53C VH

<400> 52

Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Thr Ser Ser Gly Phe Asn Asn Lys Asp Thr
20 25 30

Phe Phe Gln Trp Val Lys Gln Arg Pro Glu Glu Cys Leu Glu Trp Ile
35 40 45

Gly Arg Ile Asp Pro Cys Asn Gly Phe Thr Lys Tyr Asp Pro Lys Phe

50 55 60

Gln Gly Lys Ala Thr Ile Thr Val Asp Thr Ser Ser Asn Thr Ala Tyr
65 70 75 80

Leu Gln Leu Asn Ser Leu Thr Ser Glu Asp Thr Ala Leu Tyr Tyr Cys
85 90 95

Thr Arg Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr Trp Gly Gln
100 105 110

Gly Thr Leu Val Thr Val Ser Ala
115 120

<210> 53
<211> 11
<212> PRT
<213> Mus musculus

<400> 53

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 54
<211> 7
<212> PRT
<213> Mus musculus

<400> 54

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 55
<211> 9
<212> PRT
<213> Mus musculus

<400> 55

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 56
<211> 107
<212> PRT
<213> Mus musculus

<400> 56

Asp Ile Gln Met Thr Gln Ser Pro Ala Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Glu Thr Val Thr Ile Thr Cys Arg Ala Ser Gly Asn Ile His Asn Tyr
20 25 30

Leu Ser Trp Phe Gln Gln Lys Gln Gly Lys Ser Pro Gln Leu Leu Val

35 40 45

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

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

Glu Asp Phe Gly Thr Tyr Tyr Cys Gln His Phe Trp Ser Ser Ile Tyr
85 90 95

Thr Phe Gly Cys Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 57
<211> 5
<212> PRT
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<220>
<223> humanized anti-biotin antibody VH53C HVR-H1

<400> 57

Asp Thr Phe Phe Gln
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<210> 58
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH53C HVR-H2

<400> 58

Arg Ile Asp Pro Cys Asn Gly Phe Thr Lys Tyr Ala Gln Lys Phe Gln
1 5 10 15

Gly

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

<220>
<223> humanized anti-biotin antibody VH53C HVR-H3

<400> 59

Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr
1 5 10

<210> 60
<211> 120
<212> PRT

<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH53C VH

<400> 60

Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ser
1 5 10 15

Ser Val Lys Val Ser Cys Lys Ser Ser Gly Phe Asn Asn Lys Asp Thr
20 25 30

Phe Phe Gln Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
35 40 45

Gly Arg Ile Asp Pro Cys Asn Gly Phe Thr Lys Tyr Ala Gln Lys Phe
50 55 60

Gln Gly Arg Val Thr Ile Thr Ala Asp Thr Ser Thr Ser Thr Ala Tyr
65 70 75 80

Met Glu Leu Ser Ser Leu Arg Ser Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr Trp Gly Gln
100 105 110

Gly Thr Leu Val Thr Val Ser Ser
115 120

<210> 61
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH53C HVR-L1

<400> 61

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 62
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH53C HVR-L2

<400> 62

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 63

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

<220>
<223> humanized anti-biotin antibody VH53C HVR-L3

<400> 63

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 64
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH53C VL

<400> 64

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gly Asn Ile His Asn Tyr
20 25 30

Leu Ser Trp Tyr Gln Gln Lys Pro Gly Lys Val Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Val Ala Thr Tyr Tyr Cys Gln His Phe Trp Ser Ser Ile Tyr
85 90 95

Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 65
<211> 6
<212> PRT
<213> Mus musculus

<400> 65

Ser Asp Tyr Ala Trp Asn
1 5

<210> 66
<211> 16
<212> PRT
<213> Mus musculus

<400> 66

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Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu Lys Ser
1               5                   10                  15


<210>  67
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<212>  PRT
<213>  Mus musculus

<400>  67

Trp Val Asp Tyr Phe Asp Tyr
1               5


<210>  68
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<400>  68

Asp Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1               5                   10                  15


Ser Leu Ser Leu Thr Cys Ala Val Thr Gly Tyr Ser Ile Thr Ser Asp
            20                  25                  30


Tyr Ala Trp Asn Trp Ile Arg Gln Phe Pro Gly Asn Arg Leu Glu Trp
        35                  40                  45


Met Gly Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu
    50                  55                  60


Lys Ser Arg Ile Ser Ile Thr Arg Asp Thr Phe Lys Asn Gln Phe Phe
65                  70                  75                  80


Leu Gln Phe Asn Ser Val Thr Thr Glu Asp Thr Ala Thr Tyr Tyr Cys
                85                  90                  95


Ala Arg Trp Val Asp Tyr Phe Asp Tyr Trp Gly Gln Gly Thr Thr Leu
            100                 105                 110


Thr Val Ser Ser
        115


<210>  69
<211>  16
<212>  PRT
<213>  Mus musculus

<400>  69

Arg Ser Ser Gln Ser Ile Val Tyr Asn Asn Arg Tyr Thr Tyr Leu Glu
1               5                   10                  15


<210>  70
<211>  7
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<212> PRT
<213> Mus musculus

<400> 70

Gly Val Ser Asn Arg Phe Ser
1 5

<210> 71
<211> 9
<212> PRT
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<400> 71

Tyr Gln Gly Thr His Ala Pro Tyr Thr
1 5

<210> 72
<211> 112
<212> PRT
<213> Mus musculus

<400> 72

Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val Tyr Asn
20 25 30

Asn Arg Tyr Thr Tyr Leu Glu Trp Phe Val Gln Lys Pro Gly Gln Ser
35 40 45

Leu Lys Leu Leu Ile Tyr Gly Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Met Gly Val Tyr Tyr Cys Tyr Gln Gly
85 90 95

Thr His Ala Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 73
<211> 6
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<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody HVR-H1

<400> 73

Ser Asp Tyr Ala Trp Asn
1 5

<210> 74
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody HVR-H2

<400> 74

Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 75
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody HVR-H3

<400> 75

Trp Val Asp Tyr Phe Asp Tyr
1 5

<210> 76
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH

<400> 76

Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1 5 10 15

Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Tyr Ser Ile Thr Ser Asp
20 25 30

Tyr Ala Trp Asn Trp Ile Arg Gln His Pro Gly Lys Gly Leu Glu Trp
35 40 45

Ile Gly Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu
50 55 60

Lys Ser Arg Val Thr Ile Ser Arg Asp Thr Ser Lys Asn Gln Phe Ser
65 70 75 80

Leu Lys Leu Ser Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Trp Val Asp Tyr Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser

115

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

<220>
<223> humanized anti-theophylline antibody HVR-L1

<400> 77

Arg Ser Ser Gln Ser Ile Val Tyr Asn Asn Arg Tyr Thr Tyr Leu Glu
1 5 10 15

<210> 78
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody HVR-L2

<400> 78

Gly Val Ser Asn Arg Phe Ser
1 5

<210> 79
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody HVR-L3

<400> 79

Tyr Gln Gly Thr His Ala Pro Tyr Thr
1 5

<210> 80
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VL

<400> 80

Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Thr Leu Gly
1 5 10 15

Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val Tyr Asn
20 25 30

Asn Arg Tyr Thr Tyr Leu Glu Trp Phe Gln Gln Arg Pro Gly Gln Ser
35 40 45

Pro Arg Leu Leu Ile Tyr Gly Val Ser Asn Arg Phe Ser Gly Val Pro

50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Tyr Gln Gly
85 90 95

Thr His Ala Pro Tyr Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 81
<211> 6
<212> PRT
<213> Mus musculus

<400> 81

Ser Asp Tyr Ala Trp Asn
1 5

<210> 82
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-theophylline antibody VH53C HVR-H2

<400> 82

Tyr Ile Arg Cys Ser Gly His Thr Gly Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 83
<211> 7
<212> PRT
<213> Mus musculus

<400> 83

Trp Val Asp Tyr Phe Asp Tyr
1 5

<210> 84
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-theophylline antibody VH53C VH

<400> 84

Asp Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1 5 10 15

Ser Leu Ser Leu Thr Cys Ala Val Thr Gly Tyr Ser Ile Thr Ser Asp
20 25 30

```
Tyr Ala Trp Asn Trp Ile Arg Gln Phe Pro Gly Asn Arg Leu Glu Trp
        35                  40                  45

Met Gly Tyr Ile Arg Cys Ser Gly His Thr Gly Tyr Asn Pro Ser Leu
    50                  55                  60

Lys Ser Arg Ile Ser Ile Thr Arg Asp Thr Phe Lys Asn Gln Phe Phe
65                  70                  75                  80

Leu Gln Phe Asn Ser Val Thr Thr Glu Asp Thr Ala Thr Tyr Tyr Cys
                85                  90                  95

Ala Arg Trp Val Asp Tyr Phe Asp Tyr Trp Gly Gln Gly Thr Thr Leu
            100                 105                 110

Thr Val Ser Ser
        115
```

<210> 85
<211> 16
<212> PRT
<213> Mus musculus

<400> 85

```
Arg Ser Ser Gln Ser Ile Val Tyr Asn Asn Arg Tyr Thr Tyr Leu Glu
1               5                   10                  15
```

<210> 86
<211> 7
<212> PRT
<213> Mus musculus

<400> 86

```
Gly Val Ser Asn Arg Phe Ser
1               5
```

<210> 87
<211> 9
<212> PRT
<213> Mus musculus

<400> 87

```
Tyr Gln Gly Thr His Ala Pro Tyr Thr
1               5
```

<210> 88
<211> 112
<212> PRT
<213> Mus musculus

<400> 88

```
Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15
```

```
Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val Tyr Asn
            20                  25                  30

Asn Arg Tyr Thr Tyr Leu Glu Trp Phe Val Gln Lys Pro Gly Gln Ser
        35                  40                  45

Leu Lys Leu Leu Ile Tyr Gly Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Met Gly Val Tyr Tyr Cys Tyr Gln Gly
                85                  90                  95

Thr His Ala Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110
```

<210> 89
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C HVR-H1

<400> 89

```
Ser Asp Tyr Ala Trp Asn
1               5
```

<210> 90
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C HVR-H2

<400> 90

```
Tyr Ile Arg Cys Ser Gly His Thr Gly Tyr Asn Pro Ser Leu Lys Ser
1               5                   10                  15
```

<210> 91
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C HVR-H3

<400> 91

```
Trp Val Asp Tyr Phe Asp Tyr
1               5
```

<210> 92

<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C VH

<400> 92

Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1 5 10 15

Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Tyr Ser Ile Thr Ser Asp
20 25 30

Tyr Ala Trp Asn Trp Ile Arg Gln His Pro Gly Lys Gly Leu Glu Trp
35 40 45

Ile Gly Tyr Ile Arg Cys Ser Gly His Thr Gly Tyr Asn Pro Ser Leu
50 55 60

Lys Ser Arg Val Thr Ile Ser Arg Asp Thr Ser Lys Asn Gln Phe Ser
65 70 75 80

Leu Lys Leu Ser Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Trp Val Asp Tyr Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser
115

<210> 93
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C HVR-L1

<400> 93

Arg Ser Ser Gln Ser Ile Val Tyr Asn Asn Arg Tyr Thr Tyr Leu Glu
1 5 10 15

<210> 94
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C HVR-L2

<400> 94

Gly Val Ser Asn Arg Phe Ser
1 5

<210> 95
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C HVR-L3

<400> 95

Tyr Gln Gly Thr His Ala Pro Tyr Thr
1 5

<210> 96
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH53C VL

<400> 96

Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Thr Leu Gly
1 5 10 15

Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val Tyr Asn
20 25 30

Asn Arg Tyr Thr Tyr Leu Glu Trp Phe Gln Gln Arg Pro Gly Gln Ser
35 40 45

Pro Arg Leu Leu Ile Tyr Gly Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Tyr Gln Gly
85 90 95

Thr His Ala Pro Tyr Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 97
<211> 5
<212> PRT
<213> Mus musculus

<400> 97

His Tyr Trp Met Asn
1 5

<210> 98
<211> 19
<212> PRT
<213> Mus musculus

<400> 98

Gln Phe Arg Asn Lys Pro Tyr Asn Tyr Glu Thr Tyr Tyr Ser Asp Ser
1 5 10 15

Val Lys Gly

<210> 99
<211> 7
<212> PRT
<213> Mus musculus

<400> 99

Ala Ser Tyr Gly Met Glu Tyr
1 5

<210> 100
<211> 118
<212> PRT
<213> Mus musculus

<400> 100

Gly Val Lys Leu Asp Glu Thr Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ala Met Lys Leu Ser Cys Val Thr Ser Gly Phe Thr Phe Gly His Tyr
20 25 30

Trp Met Asn Trp Val Arg Gln Ser Pro Glu Lys Gly Leu Glu Trp Val
35 40 45

Ala Gln Phe Arg Asn Lys Pro Tyr Asn Tyr Glu Thr Tyr Tyr Ser Asp
50 55 60

Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser Lys Ser Ser
65 70 75 80

Val Tyr Leu Gln Met Asn Asn Leu Arg Val Glu Asp Thr Gly Ile Tyr
85 90 95

Tyr Cys Thr Gly Ala Ser Tyr Gly Met Glu Tyr Leu Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser
115

<210> 101
<211> 16
<212> PRT
<213> Mus musculus

<400> 101

Arg Ser Ser Gln Ser Leu Val His Ser Asn Gly Asn Thr Tyr Leu Arg
1 5 10 15

<210> 102
<211> 7
<212> PRT
<213> Mus musculus

<400> 102

Lys Val Ser Asn Arg Val Ser
1 5

<210> 103
<211> 9
<212> PRT
<213> Mus musculus

<400> 103

Ser Gln Ser Thr His Val Pro Trp Thr
1 5

<210> 104
<211> 120
<212> PRT
<213> Mus musculus

<400> 104

Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Leu Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Arg Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Val Leu Ile Tyr Lys Val Ser Asn Arg Val Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Asn Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Phe Cys Ser Gln Ser
85 90 95

Thr His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg Thr Val Ala Ala Pro Ser Val
115 120

<210> 105
<211> 5
<212> PRT

<213> Mus musculus

<400> 105

His Tyr Trp Met Asn
1 5

<210> 106
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-fluorescein antibody VH53C HVR-H2

<400> 106

Gln Phe Arg Asn Cys Pro Tyr Asn Tyr Glu Thr Tyr Tyr Ser Asp Ser
1 5 10 15

Val Lys Gly

<210> 107
<211> 7
<212> PRT
<213> Mus musculus

<400> 107

Ala Ser Tyr Gly Met Glu Tyr
1 5

<210> 108
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-fluorescein antibody VH53C VH

<400> 108

Gly Val Lys Leu Asp Glu Thr Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ala Met Lys Leu Ser Cys Val Thr Ser Gly Phe Thr Phe Gly His Tyr
20 25 30

Trp Met Asn Trp Val Arg Gln Ser Pro Glu Lys Gly Leu Glu Trp Val
35 40 45

Ala Gln Phe Arg Asn Cys Pro Tyr Asn Tyr Glu Thr Tyr Tyr Ser Asp
50 55 60

Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser Lys Ser Ser
65 70 75 80

Val Tyr Leu Gln Met Asn Asn Leu Arg Val Glu Asp Thr Gly Ile Tyr

85 90 95

Tyr Cys Thr Gly Ala Ser Tyr Gly Met Glu Tyr Leu Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser
115

<210> 109
<211> 16
<212> PRT
<213> Mus musculus

<400> 109

Arg Ser Ser Gln Ser Leu Val His Ser Asn Gly Asn Thr Tyr Leu Arg
1 5 10 15

<210> 110
<211> 7
<212> PRT
<213> Mus musculus

<400> 110

Lys Val Ser Asn Arg Val Ser
1 5

<210> 111
<211> 9
<212> PRT
<213> Mus musculus

<400> 111

Ser Gln Ser Thr His Val Pro Trp Thr
1 5

<210> 112
<211> 112
<212> PRT
<213> Mus musculus

<400> 112

Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Leu Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Arg Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Val Leu Ile Tyr Lys Val Ser Asn Arg Val Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile

65 70 75 80

Asn Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Phe Cys Ser Gln Ser
85 90 95

Thr His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 113
<211> 5
<212> PRT
<213> Mus musculus

<400> 113

His Tyr Trp Met Asn
1 5

<210> 114
<211> 19
<212> PRT
<213> Mus musculus

<400> 114

Gln Phe Arg Asn Lys Pro Tyr Asn Tyr Glu Thr Tyr Tyr Ser Asp Ser
1 5 10 15

Val Lys Gly

<210> 115
<211> 7
<212> PRT
<213> Mus musculus

<400> 115

Ala Ser Tyr Gly Met Glu Tyr
1 5

<210> 116
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-fluorescein antibody VH28C VH

<400> 116

Gly Val Lys Leu Asp Glu Thr Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ala Met Lys Leu Ser Cys Val Thr Ser Gly Phe Cys Phe Gly His Tyr
20 25 30

Trp Met Asn Trp Val Arg Gln Ser Pro Glu Lys Gly Leu Glu Trp Val
35 40 45

```
Ala Gln Phe Arg Asn Lys Pro Tyr Asn Tyr Glu Thr Tyr Tyr Ser Asp
    50                  55                  60

Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser Lys Ser Ser
65                  70                  75                  80

Val Tyr Leu Gln Met Asn Asn Leu Arg Val Glu Asp Thr Gly Ile Tyr
                85                  90                  95

Tyr Cys Thr Gly Ala Ser Tyr Gly Met Glu Tyr Leu Gly Gln Gly Thr
            100                 105                 110

Ser Val Thr Val Ser Ser
        115
```

<210> 117
<211> 16
<212> PRT
<213> Mus musculus

<400> 117

```
Arg Ser Ser Gln Ser Leu Val His Ser Asn Gly Asn Thr Tyr Leu Arg
1               5                   10                  15
```

<210> 118
<211> 7
<212> PRT
<213> Mus musculus

<400> 118

```
Lys Val Ser Asn Arg Val Ser
1               5
```

<210> 119
<211> 9
<212> PRT
<213> Mus musculus

<400> 119

```
Ser Gln Ser Thr His Val Pro Trp Thr
1               5
```

<210> 120
<211> 112
<212> PRT
<213> Mus musculus

<400> 120

```
Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Leu Val His Ser
            20                  25                  30
```

Asn Gly Asn Thr Tyr Leu Arg Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Val Leu Ile Tyr Lys Val Ser Asn Arg Val Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Asn Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Phe Cys Ser Gln Ser
85 90 95

Thr His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 121
<211> 5
<212> PRT
<213> Mus musculus

<400> 121

Asp Tyr Ala Met Ser
1 5

<210> 122
<211> 17
<212> PRT
<213> Mus musculus

<400> 122

Ser Ile Asn Ile Gly Ala Thr Tyr Ala Tyr Tyr Pro Asp Ser Val Lys
1 5 10 15

Gly

<210> 123
<211> 16
<212> PRT
<213> Mus musculus

<400> 123

Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met Ala Tyr
1 5 10 15

<210> 124
<211> 125
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-digoxigenin antibody VH28C VH

<400> 124

```
Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1               5                   10                  15

Ser Leu Lys Leu Ser Cys Ala Val Ser Gly Phe Cys Phe Ser Asp Tyr
            20                  25                  30

Ala Met Ser Trp Ile Arg Gln Thr Pro Glu Asn Arg Leu Glu Trp Val
        35                  40                  45

Ala Ser Ile Asn Ile Gly Ala Thr Tyr Ala Tyr Tyr Pro Asp Ser Val
    50                  55                  60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Thr Leu Phe
65                  70                  75                  80

Leu Gln Met Ser Ser Leu Gly Ser Glu Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
            100                 105                 110

Ala Tyr Trp Gly Pro Gly Thr Ser Val Thr Val Ser Ser
        115                 120                 125
```

<210> 125
<211> 11
<212> PRT
<213> Mus musculus

<400> 125

```
Arg Ala Ser Gln Asp Ile Lys Asn Tyr Leu Asn
1               5                   10
```

<210> 126
<211> 7
<212> PRT
<213> Mus musculus

<400> 126

```
Tyr Ser Ser Thr Leu Leu Ser
1               5
```

<210> 127
<211> 9
<212> PRT
<213> Mus musculus

<400> 127

```
Gln Gln Ser Ile Thr Leu Pro Pro Thr
1               5
```

<210> 128
<211> 107

<212> PRT
<213> Mus musculus

<400> 128

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

Asp Arg Val Thr Ile Ser Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Gly Thr Val Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Arg Gly Ser Gly Thr Asp Phe Ser Leu Thr Ile Thr Asn Leu Glu Arg
65 70 75 80

Glu Asp Ile Ala Thr Tyr Phe Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 129
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C HVR-H1

<400> 129

Asp Tyr Ala Met Ser
1 5

<210> 130
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C HVR-H2

<400> 130

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

Gly

<210> 131
<211> 16
<212> PRT

<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C HVR-H3

<400> 131

Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met Ala Tyr
1 5 10 15

<210> 132
<211> 125
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C VH

<400> 132

Gln Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Cys Phe Ser Asp Tyr
20 25 30

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

Ser Ser Ile Asn Ile Gly Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
100 105 110

Ala Tyr Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser
115 120 125

<210> 133
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C HVR-L1

<400> 133

Arg Ala Ser Gln Asp Ile Lys Asn Tyr Leu Asn
1 5 10

<210> 134

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

<220>
<223> humanized anti-digoxigenin antibody VH28C HVR-L2

<400> 134

Tyr Ser Ser Thr Leu Leu Ser
1 5

<210> 135
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C HVR-L3

<400> 135

Gln Gln Ser Ile Thr Leu Pro Pro Thr
1 5

<210> 136
<211> 108
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-digoxigenin antibody VH28C VL

<400> 136

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys Arg
100 105

<210> 137
<211> 5
<212> PRT

<213> Mus musculus

<400> 137

Asp Thr Phe Phe Gln
1 5

<210> 138
<211> 17
<212> PRT
<213> Mus musculus

<400> 138

Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Asp Pro Lys Phe Gln
1 5 10 15

Gly

<210> 139
<211> 11
<212> PRT
<213> Mus musculus

<400> 139

Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr
1 5 10

<210> 140
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-biotin antibody VH28C VH

<400> 140

Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Thr Ser Ser Gly Phe Cys Asn Lys Asp Thr
20 25 30

Phe Phe Gln Trp Val Lys Gln Arg Pro Glu Glu Cys Leu Glu Trp Ile
35 40 45

Gly Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Asp Pro Lys Phe
50 55 60

Gln Gly Lys Ala Thr Ile Thr Val Asp Thr Ser Ser Asn Thr Ala Tyr
65 70 75 80

Leu Gln Leu Asn Ser Leu Thr Ser Glu Asp Thr Ala Leu Tyr Tyr Cys
85 90 95

Thr Arg Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr Trp Gly Gln
100 105 110

Gly Thr Leu Val Thr Val Ser Ala
115 120

<210> 141
<211> 11
<212> PRT
<213> Mus musculus

<400> 141

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 142
<211> 7
<212> PRT
<213> Mus musculus

<400> 142

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 143
<211> 9
<212> PRT
<213> Mus musculus

<400> 143

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 144
<211> 107
<212> PRT
<213> Mus musculus

<400> 144

Asp Ile Gln Met Thr Gln Ser Pro Ala Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Glu Thr Val Thr Ile Thr Cys Arg Ala Ser Gly Asn Ile His Asn Tyr
20 25 30

Leu Ser Trp Phe Gln Gln Lys Gln Gly Lys Ser Pro Gln Leu Leu Val
35 40 45

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

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

eolf-seql

Glu Asp Phe Gly Thr Tyr Tyr Cys Gln His Phe Trp Ser Ser Ile Tyr
85 90 95

Thr Phe Gly Cys Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 145
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C HVR-H1

<400> 145

Asp Thr Phe Phe Gln
1 5

<210> 146
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C HVR-H2

<400> 146

Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Ala Gln Lys Phe Gln
1 5 10 15

Gly

<210> 147
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C HVR-H3

<400> 147

Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr
1 5 10

<210> 148
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C VH

<400> 148

Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ser
1 5 10 15

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Ser Val Lys Val Ser Cys Lys Ser Ser Gly Phe Cys Asn Lys Asp Thr
20 25 30

Phe Phe Gln Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
35 40 45

Gly Arg Ile Asp Pro Ala Asn Gly Phe Thr Lys Tyr Ala Gln Lys Phe
50 55 60

Gln Gly Arg Val Thr Ile Thr Ala Asp Thr Ser Thr Ser Thr Ala Tyr
65 70 75 80

Met Glu Leu Ser Ser Leu Arg Ser Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Trp Asp Thr Tyr Gly Ala Ala Trp Phe Ala Tyr Trp Gly Gln
100 105 110

Gly Thr Leu Val Thr Val Ser Ser
115 120

<210> 149
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C HVR-L1

<400> 149

Arg Ala Ser Gly Asn Ile His Asn Tyr Leu Ser
1 5 10

<210> 150
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C HVR-L2

<400> 150

Ser Ala Lys Thr Leu Ala Asp
1 5

<210> 151
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C HVR-L3

<400> 151

Gln His Phe Trp Ser Ser Ile Tyr Thr
1 5

<210> 152
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-biotin antibody VH28C VL

<400> 152

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gly Asn Ile His Asn Tyr
20 25 30

Leu Ser Trp Tyr Gln Gln Lys Pro Gly Lys Val Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Val Ala Thr Tyr Tyr Cys Gln His Phe Trp Ser Ser Ile Tyr
85 90 95

Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 153
<211> 6
<212> PRT
<213> Mus musculus

<400> 153

Ser Asp Tyr Ala Trp Asn
1 5

<210> 154
<211> 16
<212> PRT
<213> Mus musculus

<400> 154

Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 155
<211> 7
<212> PRT
<213> Mus musculus

<400> 155

Trp Val Asp Tyr Phe Asp Tyr
1 5

<210> 156
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> murine anti-theophylline antibody VH28C VH

<400> 156

Asp Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1 5 10 15

Ser Leu Ser Leu Thr Cys Ala Val Thr Gly Tyr Cys Ile Thr Ser Asp
20 25 30

Tyr Ala Trp Asn Trp Ile Arg Gln Phe Pro Gly Asn Arg Leu Glu Trp
35 40 45

Met Gly Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu
50 55 60

Lys Ser Arg Ile Ser Ile Thr Arg Asp Thr Phe Lys Asn Gln Phe Phe
65 70 75 80

Leu Gln Phe Asn Ser Val Thr Thr Glu Asp Thr Ala Thr Tyr Tyr Cys
85 90 95

Ala Arg Trp Val Asp Tyr Phe Asp Tyr Trp Gly Gln Gly Thr Thr Leu
100 105 110

Thr Val Ser Ser
115

<210> 157
<211> 16
<212> PRT
<213> Mus musculus

<400> 157

Arg Ser Ser Gln Ser Ile Val Tyr Asn Asn Arg Tyr Thr Tyr Leu Glu
1 5 10 15

<210> 158
<211> 7
<212> PRT
<213> Mus musculus

<400> 158

Gly Val Ser Asn Arg Phe Ser
1 5

<210> 159
<211> 9
<212> PRT
<213> Mus musculus

<400> 159

Tyr Gln Gly Thr His Ala Pro Tyr Thr
1 5

<210> 160
<211> 112
<212> PRT
<213> Mus musculus

<400> 160

Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val Tyr Asn
20 25 30

Asn Arg Tyr Thr Tyr Leu Glu Trp Phe Val Gln Lys Pro Gly Gln Ser
35 40 45

Leu Lys Leu Leu Ile Tyr Gly Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Met Gly Val Tyr Tyr Cys Tyr Gln Gly
85 90 95

Thr His Ala Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 161
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C HVR-H1

<400> 161

Ser Asp Tyr Ala Trp Asn
1 5

<210> 162
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C HVR-H2

<400> 162

Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu Lys Ser
1 5 10 15

<210> 163
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C HVR-H3

<400> 163

Trp Val Asp Tyr Phe Asp Tyr
1 5

<210> 164
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C VH

<400> 164

Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1 5 10 15

Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Tyr Cys Ile Thr Ser Asp
20 25 30

Tyr Ala Trp Asn Trp Ile Arg Gln His Pro Gly Lys Gly Leu Glu Trp
35 40 45

Ile Gly Tyr Ile Arg Tyr Ser Gly His Thr Gly Tyr Asn Pro Ser Leu
50 55 60

Lys Ser Arg Val Thr Ile Ser Arg Asp Thr Ser Lys Asn Gln Phe Ser
65 70 75 80

Leu Lys Leu Ser Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Trp Val Asp Tyr Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser
115

<210> 165
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C HVR-L1

<400> 165

Arg Ser Ser Gln Ser Ile Val Tyr Asn Asn Arg Tyr Thr Tyr Leu Glu
1 5 10 15

<210> 166
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C HVR-L2

<400> 166

Gly Val Ser Asn Arg Phe Ser
1 5

<210> 167
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C HVR-L3

<400> 167

Tyr Gln Gly Thr His Ala Pro Tyr Thr
1 5

<210> 168
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-theophylline antibody VH28C VL

<400> 168

Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Thr Leu Gly
1 5 10 15

Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val Tyr Asn
20 25 30

Asn Arg Tyr Thr Tyr Leu Glu Trp Phe Gln Gln Arg Pro Gly Gln Ser
35 40 45

Pro Arg Leu Leu Ile Tyr Gly Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Tyr Gln Gly

85 90 95

Thr His Ala Pro Tyr Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 169
<211> 330
<212> PRT
<213> Homo sapiens

<400> 169

Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys
1 5 10 15

Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
20 25 30

Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
35 40 45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
50 55 60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr
65 70 75 80

Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys
85 90 95

Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys
100 105 110

Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro
115 120 125

Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys
130 135 140

Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp
145 150 155 160

Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu
165 170 175

Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu
180 185 190

His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn
195 200 205

Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
210 215 220

```
Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu
225                 230                 235                 240

Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr
                245                 250                 255

Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn
            260                 265                 270

Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe
        275                 280                 285

Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn
    290                 295                 300

Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr
305                 310                 315                 320

Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
                325                 330
```

<210> 170
<211> 330
<212> PRT
<213> Homo sapiens

<400> 170

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Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys
1               5                   10                  15

Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
            20                  25                  30

Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
        35                  40                  45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
    50                  55                  60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr
65                  70                  75                  80

Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys
                85                  90                  95

Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys
            100                 105                 110

Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro
        115                 120                 125
```

```
Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys
    130                 135                 140

Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp
145                 150                 155                 160

Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu
                165                 170                 175

Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu
            180                 185                 190

His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn
        195                 200                 205

Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
    210                 215                 220

Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Glu Glu
225                 230                 235                 240

Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr
                245                 250                 255

Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn
            260                 265                 270

Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe
        275                 280                 285

Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn
    290                 295                 300

Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr
305                 310                 315                 320

Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
                325                 330
```

<210> 171
<211> 330
<212> PRT
<213> Homo sapiens

<400> 171

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Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys
1               5                   10                  15

Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
            20                  25                  30
```

```
Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
        35                  40                  45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
    50                  55                  60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr
65                  70                  75                  80

Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys
                85                  90                  95

Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys
            100                 105                 110

Pro Ala Pro Glu Ala Ala Gly Gly Pro Ser Val Phe Leu Phe Pro Pro
        115                 120                 125

Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys
    130                 135                 140

Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp
145                 150                 155                 160

Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu
                165                 170                 175

Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu
            180                 185                 190

His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn
        195                 200                 205

Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
    210                 215                 220

Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu
225                 230                 235                 240

Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr
                245                 250                 255

Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn
            260                 265                 270

Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe
        275                 280                 285

Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn
    290                 295                 300
```

Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr
305 310 315 320

Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
325 330

<210> 172
<211> 330
<212> PRT
<213> Homo sapiens

<400> 172

Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys
1 5 10 15

Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
20 25 30

Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
35 40 45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
50 55 60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr
65 70 75 80

Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys
85 90 95

Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys
100 105 110

Pro Ala Pro Glu Ala Ala Gly Gly Pro Ser Val Phe Leu Phe Pro Pro
115 120 125

Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys
130 135 140

Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp
145 150 155 160

Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu
165 170 175

Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu
180 185 190

His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn
195 200 205

Lys Ala Leu Gly Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly

210 215 220

Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu
225 230 235 240

Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr
245 250 255

Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn
260 265 270

Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe
275 280 285

Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn
290 295 300

Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr
305 310 315 320

Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
325 330

<210> 173
<211> 327
<212> PRT
<213> Homo sapiens

<400> 173

Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Cys Ser Arg
1 5 10 15

Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
20 25 30

Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
35 40 45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
50 55 60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Lys Thr
65 70 75 80

Tyr Thr Cys Asn Val Asp His Lys Pro Ser Asn Thr Lys Val Asp Lys
85 90 95

Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys Pro Ser Cys Pro Ala Pro
100 105 110

Glu Phe Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys
115 120 125

```
Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val
    130                 135                 140

Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr Val Asp
145                 150                 155                 160

Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Phe
                165                 170                 175

Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp
            180                 185                 190

Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Gly Leu
        195                 200                 205

Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg
    210                 215                 220

Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met Thr Lys
225                 230                 235                 240

Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
                245                 250                 255

Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
            260                 265                 270

Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
        275                 280                 285

Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val Phe Ser
    290                 295                 300

Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
305                 310                 315                 320

Leu Ser Leu Ser Leu Gly Lys
                325
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<210> 174
<211> 327
<212> PRT
<213> Homo sapiens

<400> 174

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Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Cys Ser Arg
1               5                   10                  15

Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
            20                  25                  30
```

```
Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
        35                  40                  45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
    50                  55                  60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Lys Thr
65                  70                  75                  80

Tyr Thr Cys Asn Val Asp His Lys Pro Ser Asn Thr Lys Val Asp Lys
                85                  90                  95

Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro Ala Pro
            100                 105                 110

Glu Phe Glu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys
        115                 120                 125

Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val
    130                 135                 140

Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr Val Asp
145                 150                 155                 160

Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Phe
                165                 170                 175

Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp
            180                 185                 190

Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Gly Leu
        195                 200                 205

Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg
    210                 215                 220

Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met Thr Lys
225                 230                 235                 240

Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
                245                 250                 255

Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
            260                 265                 270

Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
        275                 280                 285

Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val Phe Ser
    290                 295                 300
```

Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
305 310 315 320

Leu Ser Leu Ser Leu Gly Lys
325

<210> 175
<211> 327
<212> PRT
<213> Homo sapiens

<400> 175

Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Cys Ser Arg
1 5 10 15

Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
20 25 30

Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
35 40 45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
50 55 60

Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Lys Thr
65 70 75 80

Tyr Thr Cys Asn Val Asp His Lys Pro Ser Asn Thr Lys Val Asp Lys
85 90 95

Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro Ala Pro
100 105 110

Glu Phe Glu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys
115 120 125

Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val
130 135 140

Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr Val Asp
145 150 155 160

Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Phe
165 170 175

Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp
180 185 190

Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Gly Leu
195 200 205

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Gly Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg
210 215 220

Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met Thr Lys
225 230 235 240

Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
245 250 255

Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
260 265 270

Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
275 280 285

Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val Phe Ser
290 295 300

Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
305 310 315 320

Leu Ser Leu Ser Leu Gly Lys
325

<210> 176
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> haptenylated polypeptide 01 - Ac IK Pqa R(Pbf)H(Trt)Y(tBu)LN(Trt)W(Boc)VT(But)R(Pbf)Q(Trt)-MeArg(Mtr)-Y(tBu)

<220>
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<222> (3)..(3)
<223> X=PQA

<220>
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<222> (14)..(14)
<223> X=Me-ARG

<400> 176

Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
1 5 10 15

<210> 177
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> haptenylated polypeptide 02

<220>
<221> MISC_FEATURE
<222> (2)..(2)
<223> -PEG3-dig

<220>
<221> MISC_FEATURE
<222> (3)..(3)
<223> X=PQA

<220>
<221> MISC_FEATURE
<222> (14)..(14)
<223> X=Me-ARG

<400> 177

Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
1 5 10 15

<210> 178
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> haptenylated polypeptide 03

<220>
<221> MISC_FEATURE
<222> (2)..(2)
<223> -PEG3-Cys-4Abu-NH2

<220>
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<222> (3)..(3)
<223> X=PQA

<220>
<221> MISC_FEATURE
<222> (14)..(14)
<223> X=Me-ARG

<400> 178

Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
1 5 10 15

<210> 179
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> haptenylated polypeptide 04

<220>
<221> MISC_FEATURE
<222> (2)..(2)
<223> -PEG3-Cys-4Abu-dig

<220>
<221> MISC_FEATURE
<222> (3)..(3)

<223> X=PQA

<220>
<221> MISC_FEATURE
<222> (14)..(24)
<223> X=Me-ARG

<400> 179

Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
1 5 10 15

<210> 180
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> haptenylated polypeptide 05

<220>
<221> MISC_FEATURE
<222> (2)..(2)
<223> -PEG3-Cys-4Abu-NH2

<220>
<221> MISC_FEATURE
<222> (3)..(3)
<223> X=PQA

<220>
<221> MISC_FEATURE
<222> (14)..(14)
<223> X=Me-ARG

<400> 180

Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
1 5 10 15

<210> 181
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> haptenylated polypeptide 06 -
PEG2-IK(ivDde)-Pqa-R(Pbf)H(Trt)Y(tBu)LN(Trt)W(Boc)VT(tBu)R(Pbf)Q(
Trt)-MeArg(Mtr)-Y(tBu)

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Xaa Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
1 5 10 15

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Ile Lys Xaa Arg His Tyr Leu Asn Trp Val Thr Arg Gln Xaa Tyr
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<210> 189
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<400> 189

Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Asp Ile Lys Asn Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Tyr Ser Ser Thr Leu Leu Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Ser Ile Thr Leu Pro Pro
85 90 95

Thr Phe Gly Cys Gly Thr Lys Val Glu Ile Lys
100 105

<210> 190
<211> 125

<212> PRT
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<220>
<223> anti-digoxigenin scdsFv VH

<400> 190

Gln Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asp Tyr
20 25 30

Ala Met Ser Trp Ile Arg Gln Ala Pro Gly Lys Cys Leu Glu Trp Val
35 40 45

Ser Ser Ile Asn Ile Cys Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Pro Gly Ser Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met
100 105 110

Ala Tyr Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser
115 120 125

<210> 191
<211> 219
<212> PRT
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<220>
<223> anti-LeY antibody kappa light chain

<400> 191

Asp Val Leu Met Thr Gln Ser Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ile Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

```
Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

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

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
        115                 120                 125

Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
    130                 135                 140

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

Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser
                165                 170                 175

Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
            180                 185                 190

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
        195                 200                 205

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
    210                 215
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<210> 192
<211> 706
<212> PRT
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<220>
<223> anti-LeY antibody heavy chain_ds44-100scFvDig-Cys53

<400> 192

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Asp Val Lys Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1               5                   10                  15

Ser Leu Lys Leu Ser Cys Ala Thr Ser Gly Phe Thr Phe Ser Asp Tyr
            20                  25                  30

Tyr Met Tyr Trp Val Arg Gln Thr Pro Glu Lys Arg Leu Glu Trp Val
        35                  40                  45

Ala Tyr Ile Ser Asn Asp Asp Ser Ser Ala Ala Tyr Ser Asp Thr Val
    50                  55                  60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Arg Asn Thr Leu Tyr
65                  70                  75                  80
```

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```
Leu Gln Met Ser Arg Leu Lys Ser Glu Asp Thr Ala Ile Tyr Tyr Cys
                85                  90                  95

Ala Arg Gly Leu Ala Trp Gly Ala Trp Phe Ala Tyr Trp Gly Gln Gly
            100                 105                 110

Thr Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe
        115                 120                 125

Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu
    130                 135                 140

Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp
145                 150                 155                 160

Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu
                165                 170                 175

Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser
            180                 185                 190

Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
        195                 200                 205

Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys
    210                 215                 220

Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro
225                 230                 235                 240

Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser
                245                 250                 255

Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp
            260                 265                 270

Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn
        275                 280                 285

Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val
    290                 295                 300

Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu
305                 310                 315                 320

Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys
                325                 330                 335

Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr
            340                 345                 350
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Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr
        355                 360                 365

Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu
    370                 375                 380

Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu
385                 390                 395                 400

Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys
                405                 410                 415

Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu
            420                 425                 430

Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
        435                 440                 445

Lys Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gln Val Gln Leu Val
    450                 455                 460

Glu Ser Gly Gly Gly Leu Val Lys Pro Gly Gly Ser Leu Arg Leu Ser
465                 470                 475                 480

Cys Ala Ala Ser Gly Phe Thr Phe Ser Asp Tyr Ala Met Ser Trp Ile
                485                 490                 495

Arg Gln Ala Pro Gly Lys Cys Leu Glu Trp Val Ser Ser Ile Asn Ile
            500                 505                 510

Cys Ala Thr Tyr Ile Tyr Tyr Ala Asp Ser Val Lys Gly Arg Phe Thr
        515                 520                 525

Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr Leu Gln Met Asn Ser
    530                 535                 540

Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys Ala Arg Pro Gly Ser
545                 550                 555                 560

Pro Tyr Glu Tyr Asp Lys Ala Tyr Tyr Ser Met Ala Tyr Trp Gly Gln
                565                 570                 575

Gly Thr Thr Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly Gly
            580                 585                 590

Gly Ser Gly Gly Gly Gly Ser Asp Ile Gln Met Thr Gln Ser Pro Ser
        595                 600                 605

Ser Leu Ser Ala Ser Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala
    610                 615                 620
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```
Ser Gln Asp Ile Lys Asn Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
625                 630                 635                 640

Lys Ala Pro Lys Leu Leu Ile Tyr Tyr Ser Ser Thr Leu Leu Ser Gly
                645                 650                 655

Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu
            660                 665                 670

Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr Tyr Cys Gln
        675                 680                 685

Gln Ser Ile Thr Leu Pro Pro Thr Phe Gly Cys Gly Thr Lys Val Glu
    690                 695                 700

Ile Lys
705
```