SEQUENCE LISTING

<110> AliveGen USA

<120> NOVEL HYBRID ACTRIIB LIGAND TRAP PROTEINS FOR TREATING MUSCLE WASTING AND BONE DISEASE

<130> CACAG1.0004

<160> 118

<170> PatentIn version 3.5

<210> 1
<211> 110
<212> PRT
<213> Homo sapiens

<400> 1

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 2
<211> 110
<212> PRT
<213> Homo sapiens

<400> 2

```
Glu Thr Gln Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1               5                  10                  15

Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
        35                  40                  45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80

Glu Gly Asn Met Cys Asn Glu Lys Phe Ser Tyr Phe Pro Glu Met Glu
                85                  90                  95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110
```

<210> 3
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 3

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                  10                  15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45
```

```
Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  4
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  4

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
```

100 105 110

<210> 5
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 5

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 6
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 6

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg

1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 7
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 7

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

```
Asp Cys Val Glu Lys Lys Asp Ser Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  8
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  8

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  9
```

<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 9

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 10
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 10

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
```

20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Glu Lys Lys Asp Ser Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 11
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 11

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

```
Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 12
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 12

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 13
<211> 110
<212> PRT
<213> Artificial

SEQUENCE LISTING

<220>
<223> Hybrid Human ActRIIB ECD

<400> 13

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 14
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 14

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu

```
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 15
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 15

```
Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15

Thr Asn Gln Thr Gly Val Glu Pro Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95
```

```
Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  16
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  16

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  17
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  17
```

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15

Thr Asn Gln Thr Gly Val Glu Pro Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 18
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 18

```
Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15

Thr Asn Gln Thr Gly Val Glu Pro Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
```

50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 19
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 19

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 20
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 20

```
Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 21
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 21

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15
```

```
Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 22
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 22

```
Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

Glu Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
```

65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 23
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 23

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Phe Ala Thr Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 24
<211> 110
<212> PRT

<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 24

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 25
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 25

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30
```

```
Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  26
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  26

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
```

85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 27
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 27

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 28
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 28

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Lys Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 29
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 29

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

```
Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
    50                  55                  60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 30
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 30

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
```

100 105 110

<210> 31
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 31

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 32
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 32

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg

1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 33
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 33

Glu Thr Arg Glu Cys Ile Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Val Glu Pro Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

```
Glu Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  34
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  34

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Leu
        35                  40                  45


Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  35
```

<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 35

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 36
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 36

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg

20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 37
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 37

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
50 55 60

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

```
Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 38
<211> 330
<212> PRT
<213> Homo sapiens

<400> 38

```
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> 39
<211> 208
<212> PRT
<213> Homo sapiens

<400> 39

```
Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
1               5                  10                  15

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            20                  25                  30

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

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

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
65                  70                  75                  80

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

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            100                 105                 110

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

Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser
    130                 135                 140

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
145                 150                 155                 160

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                165                 170                 175

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            180                 185                 190

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
```

195 200 205

<210> 40
<211> 326
<212> PRT
<213> Homo sapiens

<400> 40

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 Asn Phe Gly Thr Gln Thr
65 70 75 80

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

Thr Val Glu Arg Lys Cys Cys Val Glu Cys Pro Pro Cys Pro Ala Pro
100 105 110

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

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

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

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

```
Ser Thr Phe Arg Val Val Ser Val Leu Thr Val Val His Gln Asp Trp
            180                 185                 190

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

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

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

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

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

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

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

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

Ser Leu Ser Pro Gly Lys
                325
```

<210> 41
<211> 207
<212> PRT
<213> Homo sapiens

<400> 41

```
Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
1               5                   10                  15
```

```
Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            20                  25                  30

Glu Val Gln Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        35                  40                  45

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

Ser Val Leu Thr Val Val His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
65                  70                  75                  80

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

Ile Ser Lys Thr Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            100                 105                 110

Pro Pro Ser Arg Glu Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys
        115                 120                 125

Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser
    130                 135                 140

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Met Leu Asp
145                 150                 155                 160

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                165                 170                 175

Arg Trp Gln Gln Gly Asn Val Phe Cys Ser Val Met His Glu Ala Leu
            180                 185                 190

His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        195                 200                 205
```

<210> 42
<211> 327
<212> PRT

SEQUENCE LISTING

<213> Homo sapiens

<400> 42

```
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

<210> 43
<211> 217
<212> PRT
<213> Homo sapiens

<400> 43

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

Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val
20 25 30

Val Val Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr

35 40 45

Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu
50 55 60

Gln Phe Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His
65 70 75 80

Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys
85 90 95

Gly Leu Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln
100 105 110

Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met
115 120 125

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

Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn
145 150 155 160

Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu
165 170 175

Tyr Ser Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val
180 185 190

Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln
195 200 205

Lys Ser Leu Ser Leu Ser Leu Gly Lys
210 215

<210> 44
<211> 5
<212> PRT
<213> Artificial

<220>
<223> Peptide linker

<400> 44

Gly Gly Gly Gly Ser
1 5

<210> 45
<211> 512
<212> PRT
<213> Homo sapiens

<400> 45

Met Thr Ala Pro Trp Val Ala Leu Ala Leu Leu Trp Gly Ser Leu Cys
1 5 10 15

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

Asn Ala Asn Trp Glu Leu Glu Arg Thr Asn Gln Ser Gly Leu Glu Arg
35 40 45

Cys Glu Gly Glu Gln Asp Lys Arg Leu His Cys Tyr Ala Ser Trp Arg
50 55 60

Asn Ser Ser Gly Thr Ile Glu Leu Val Lys Lys Gly Cys Trp Leu Asp
65 70 75 80

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

Pro Gln Val Tyr Phe Cys Cys Cys Glu Gly Asn Phe Cys Asn Glu Arg
100 105 110

Phe Thr His Leu Pro Glu Ala Gly Gly Pro Glu Val Thr Tyr Glu Pro
115 120 125

Pro Pro Thr Ala Pro Thr Leu Leu Thr Val Leu Ala Tyr Ser Leu Leu
130 135 140

```
Pro Ile Gly Gly Leu Ser Leu Ile Val Leu Leu Ala Phe Trp Met Tyr
145                 150                 155                 160

Arg His Arg Lys Pro Pro Tyr Gly His Val Asp Ile His Glu Asp Pro
                165                 170                 175

Gly Pro Pro Pro Pro Ser Pro Leu Val Gly Leu Lys Pro Leu Gln Leu
            180                 185                 190

Leu Glu Ile Lys Ala Arg Gly Arg Phe Gly Cys Val Trp Lys Ala Gln
        195                 200                 205

Leu Met Asn Asp Phe Val Ala Val Lys Ile Phe Pro Leu Gln Asp Lys
    210                 215                 220

Gln Ser Trp Gln Ser Glu Arg Glu Ile Phe Ser Thr Pro Gly Met Lys
225                 230                 235                 240

His Glu Asn Leu Leu Gln Phe Ile Ala Ala Glu Lys Arg Gly Ser Asn
                245                 250                 255

Leu Glu Val Glu Leu Trp Leu Ile Thr Ala Phe His Asp Lys Gly Ser
            260                 265                 270

Leu Thr Asp Tyr Leu Lys Gly Asn Ile Ile Thr Trp Asn Glu Leu Cys
        275                 280                 285

His Val Ala Glu Thr Met Ser Arg Gly Leu Ser Tyr Leu His Glu Asp
    290                 295                 300

Val Pro Trp Cys Arg Gly Glu Gly His Lys Pro Ser Ile Ala His Arg
305                 310                 315                 320

Asp Phe Lys Ser Lys Asn Val Leu Leu Lys Ser Asp Leu Thr Ala Val
                325                 330                 335

Leu Ala Asp Phe Gly Leu Ala Val Arg Phe Glu Pro Gly Lys Pro Pro
            340                 345                 350
```

```
Gly Asp Thr His Gly Gln Val Gly Thr Arg Arg Tyr Met Ala Pro Glu
        355                 360                 365

Val Leu Glu Gly Ala Ile Asn Phe Gln Arg Asp Ala Phe Leu Arg Ile
    370                 375                 380

Asp Met Tyr Ala Met Gly Leu Val Leu Trp Glu Leu Val Ser Arg Cys
385                 390                 395                 400

Lys Ala Ala Asp Gly Pro Val Asp Glu Tyr Met Leu Pro Phe Glu Glu
                405                 410                 415

Glu Ile Gly Gln His Pro Ser Leu Glu Glu Leu Gln Glu Val Val Val
            420                 425                 430

His Lys Lys Met Arg Pro Thr Ile Lys Asp His Trp Leu Lys His Pro
        435                 440                 445

Gly Leu Ala Gln Leu Cys Val Thr Ile Glu Glu Cys Trp Asp His Asp
    450                 455                 460

Ala Glu Ala Arg Leu Ser Ala Gly Cys Val Glu Glu Arg Val Ser Leu
465                 470                 475                 480

Ile Arg Arg Ser Val Asn Gly Thr Thr Ser Asp Cys Leu Val Ser Leu
                485                 490                 495

Val Thr Ser Val Thr Asn Val Asp Leu Pro Pro Lys Glu Ser Ser Ile
            500                 505                 510
```

<210> 46
<211> 116
<212> PRT
<213> Homo sapiens

<400> 46

```
Ser Gly Arg Gly Glu Ala Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala
1               5                   10                  15

Asn Trp Glu Leu Glu Arg Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu
```

20 25 30

Gly Glu Gln Asp Lys Arg Leu His Cys Tyr Ala Ser Trp Arg Asn Ser
35 40 45

Ser Gly Thr Ile Glu Leu Val Lys Lys Gly Cys Trp Leu Asp Asp Phe
50 55 60

Asn Cys Tyr Asp Arg Gln Glu Cys Val Ala Thr Glu Glu Asn Pro Gln
65 70 75 80

Val Tyr Phe Cys Cys Cys Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr
85 90 95

His Leu Pro Glu Ala Gly Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro
100 105 110

Thr Ala Pro Thr
115

<210> 47
<211> 513
<212> PRT
<213> Homo sapiens

<400> 47

Met Gly Ala Ala Thr Lys Leu Ala Phe Ala Val Phe Leu Ile Ser Cys
1 5 10 15

Ser Ser Gly Ala Ile Leu Gly Arg Ser Glu Thr Gln Glu Cys Ile Tyr
20 25 30

Tyr Asn Ala Asn Trp Glu Lys Asp Lys Thr Asn Arg Ser Gly Ile Glu
35 40 45

Pro Cys Tyr Gly Asp Lys Asp Lys Arg Arg His Cys Phe Ala Thr Trp
50 55 60

Lys Asn Ile Ser Gly Ser Ile Glu Ile Val Lys Gln Gly Cys Trp Leu
65 70 75 80

```
Asp Asp Ile Asn Cys Tyr Asp Arg Asn Asp Cys Ile Glu Lys Lys Asp
                85                  90                  95

Ser Pro Glu Val Phe Phe Cys Cys Cys Glu Gly Asn Met Cys Asn Glu
            100                 105                 110

Arg Phe Phe Tyr Phe Pro Glu Met Glu Val Thr Gln Pro Thr Ser Asn
        115                 120                 125

Pro Val Thr Pro Lys Pro Pro Leu Phe Asn Thr Leu Leu Tyr Ser Leu
    130                 135                 140

Val Pro Ile Met Gly Ile Ala Val Ile Val Leu Phe Ser Phe Trp Met
145                 150                 155                 160

Tyr Arg His His Lys Leu Ala Tyr Pro Pro Val Leu Val Pro Thr Gln
                165                 170                 175

Asp Pro Gly Pro Pro Pro Pro Ser Pro Leu Met Gly Leu Lys Pro Leu
            180                 185                 190

Gln Leu Leu Glu Ile Lys Ala Arg Gly Arg Phe Gly Cys Val Trp Lys
        195                 200                 205

Ala Gln Leu Leu Asn Glu Tyr Val Ala Val Lys Ile Phe Pro Ile Gln
    210                 215                 220

Asp Lys Gln Ser Trp Gln Asn Glu Tyr Glu Ile Tyr Ser Leu Pro Gly
225                 230                 235                 240

Met Lys His Asp Asn Ile Leu Gln Phe Ile Gly Ala Glu Lys Arg Gly
                245                 250                 255

Thr Ser Ile Asp Val Asp Leu Trp Leu Ile Thr Ala Phe His Glu Lys
            260                 265                 270

Gly Ser Leu Thr Asp Phe Leu Lys Ala Asn Val Val Ser Trp Asn Glu
        275                 280                 285
```

```
Leu Cys His Ile Ala Gln Thr Met Ala Arg Gly Leu Ala Tyr Leu His
    290                 295                 300

Glu Asp Ile Pro Gly Leu Lys Asp Gly His Lys Pro Ala Ile Ser His
305                 310                 315                 320

Arg Asp Ile Lys Ser Lys Asn Val Leu Leu Lys Asn Asn Leu Thr Ala
                325                 330                 335

Cys Ile Ala Asp Phe Gly Leu Ala Leu Lys Phe Glu Ala Gly Lys Ser
            340                 345                 350

Ala Gly Asp Thr His Gly Gln Val Gly Thr Arg Arg Tyr Met Ala Pro
        355                 360                 365

Glu Val Leu Glu Gly Ala Ile Asn Phe Gln Arg Asp Ala Phe Leu Arg
    370                 375                 380

Ile Asp Met Tyr Ala Met Gly Leu Val Leu Trp Glu Leu Ala Ser Arg
385                 390                 395                 400

Cys Thr Ala Ser Asp Gly Pro Val Asp Glu Tyr Met Leu Pro Phe Glu
                405                 410                 415

Glu Glu Ile Gly Gln His Pro Ser Leu Glu Asp Met Gln Glu Val Val
            420                 425                 430

Val His Lys Lys Lys Arg Pro Val Leu Arg Glu Cys Trp Gln Lys His
        435                 440                 445

Ser Gly Met Ala Met Leu Cys Glu Thr Ile Glu Glu Cys Trp Asp His
    450                 455                 460

Asp Ala Glu Ala Arg Leu Ser Ala Gly Cys Val Glu Glu Arg Ile Ile
465                 470                 475                 480

Gln Met Gln Lys Leu Thr Asn Ile Ile Thr Thr Glu Asp Ile Val Thr
                485                 490                 495
```

Val Val Thr Met Val Thr Asn Val Asp Phe Pro Pro Lys Glu Ser Ser
500 505 510

Leu

<210> 48
<211> 116
<212> PRT
<213> Homo sapiens

<400> 48

Ala Ile Leu Gly Arg Ser Glu Thr Gln Glu Cys Leu Phe Phe Asn Ala
1 5 10 15

Asn Trp Glu Lys Asp Arg Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr
20 25 30

Gly Asp Lys Asp Lys Arg Arg His Cys Phe Ala Thr Trp Lys Asn Ile
35 40 45

Ser Gly Ser Ile Glu Ile Val Lys Gln Gly Cys Trp Leu Asp Asp Ile
50 55 60

Asn Cys Tyr Asp Arg Thr Asp Cys Val Glu Lys Lys Asp Ser Pro Glu
65 70 75 80

Val Tyr Phe Cys Cys Cys Glu Gly Asn Met Cys Asn Glu Lys Phe Ser
85 90 95

Tyr Phe Pro Glu Met Glu Val Thr Gln Pro Thr Ser Asn Pro Val Thr
100 105 110

Pro Lys Pro Pro
115

<210> 49
<211> 18
<212> PRT

<213> Artificial

<220>
<223> ActRIIB signal peptide

<400> 49

Met Thr Ala Pro Trp Val Ala Leu Ala Leu Leu Trp Gly Ser Leu Cys
1 5 10 15

Ala Gly

<210> 50
<211> 22
<212> PRT
<213> Artificial

<220>
<223> Immunoglobulin light chain signal peptide

<400> 50

Met Asp Met Arg Val Pro Ala Gln Leu Leu Gly Leu Leu Leu Leu Trp
1 5 10 15

Leu Arg Gly Ala Arg Cys
20

<210> 51
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 51

Glu Thr Gln Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Ser Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu

```
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110

<210>  52
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  52

Glu Thr Gln Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15

Thr Asn Gln Ser Gly Val Glu Pro Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95
```

```
Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  53
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  53

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Val Glu Pro Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  54
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  54
```

```
Glu Thr Gln Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15

Thr Asn Gln Ser Gly Val Glu Pro Cys Tyr Gly Glu Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 55
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 55

```
Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15

Thr Asn Gln Ser Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
```

50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 56
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 56

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 57
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 57

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 58
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 58

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

```
Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
        35                  40                  45


Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  59
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  59

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
        35                  40                  45


Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
```

65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 60
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 60

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 61
<211> 110
<212> PRT

<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 61

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
        35                  40                  45


Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 62
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 62

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30
```

```
Leu His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
        35                  40                  45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 63
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 63

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30

Leu His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
        35                  40                  45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
```

85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 64
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 64

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 65
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 65

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 66
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 66

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

```
Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  67
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  67

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
```

100 105 110

<210> 68
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 68

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 69
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 69

Glu Thr Gln Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg

1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 70
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 70

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Val Glu Pro Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

```
Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  71
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  71

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Val Glu Pro Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  72
```

<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 72

Glu Thr Arg Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Ser Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 73
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 73

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg

20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 74
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 74

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

```
Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  75
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  75

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  76
<211>  110
<212>  PRT
<213>  Artificial
```

<220>
<223> Hybrid Human ActRIIB ECD

<400> 76

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1   5   10   15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20   25   30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Leu
        35   40   45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50   55   60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65   70   75   80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85   90   95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100   105   110

<210> 77
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 77

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1   5   10   15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20   25   30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Ile

35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 78
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 78

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

```
Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  79
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  79

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95


Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110


<210>  80
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  80
```

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Glu Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  81
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  81

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
```

50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 82
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 82

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Glu Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 83
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 83

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110
```

<210> 84
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 84

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15
```

```
Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  85
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  85

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
```

65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 86
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 86

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 87
<211> 110
<212> PRT

<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 87

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110
```

<210> 88
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 88

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30
```

```
Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  89
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  89

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


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


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
```

85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 90
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 90

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 91
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 91

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Glu Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 92
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 92

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

```
Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Lys Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  93
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  93

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
```

100 105 110

<210> 94
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 94

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Glu Asp Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 95
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 95

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg

1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 96
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 96

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

```
Glu Cys Val Ala Thr Glu Glu Asn Pro Glu Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  97
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  97

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Lys Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Glu Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  98
```

<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 98

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Lys Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Lys Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 99
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 99

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg

20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 100
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 100

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Lys Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Lys Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

```
Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  101
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  101

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Lys Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
        35                  40                  45


Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Glu Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  102
<211>  110
<212>  PRT
<213>  Artificial
```

<220>
<223> Hybrid Human ActRIIB ECD

<400> 102

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Lys Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 103
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 103

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Lys Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile

35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 104
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 104

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Gln Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Glu Glu Asn Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 105
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 105

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

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

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 106
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 106

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Thr
    50                  55                  60


Asp Cys Val Ala Thr Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  107
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  107

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
```

50 55 60

Glu Cys Val Ala Lys Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 108
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 108

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
20 25 30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Lys Glu Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 109
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 109

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110
```

<210> 110
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 110

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15
```

```
Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  111
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  111

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Ser Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
```

65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 112
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 112

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1 5 10 15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
20 25 30

Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
35 40 45

Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
50 55 60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 113
<211> 110
<212> PRT

<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 113

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110
```

<210> 114
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 114

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Glu Gln Asp Lys Arg
            20                  25                  30
```

```
Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
                85                  90                  95


Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
            100                 105                 110


<210>  115
<211>  110
<212>  PRT
<213>  Artificial

<220>
<223>  Hybrid Human ActRIIB ECD

<400>  115

Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                   10                  15


Thr Asn Gln Ser Gly Leu Glu Arg Cys Glu Gly Asp Gln Asp Lys Arg
            20                  25                  30


Leu His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Ile
        35                  40                  45


Val Lys Lys Gly Cys Trp Leu Asp Asp Phe Asn Cys Tyr Asp Arg Gln
    50                  55                  60


Glu Cys Val Ala Lys Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80


Glu Gly Asn Phe Cys Asn Glu Lys Phe Ser Tyr Phe Pro Gln Met Glu
```

85 90 95

Val Thr Gln Pro Thr Ser Asn Pro Val Thr Pro Lys Pro Pro
100 105 110

<210> 116
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 116

Glu Thr Gln Glu Cys Leu Phe Phe Asn Ala Asn Trp Glu Lys Asp Arg
1 5 10 15

Thr Asn Gln Thr Gly Val Glu Pro Cys Tyr Gly Asp Lys Asp Lys Arg
20 25 30

Arg His Cys Phe Ala Thr Trp Lys Asn Ile Ser Gly Ser Ile Glu Ile
35 40 45

Val Lys Gln Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Thr
50 55 60

Asp Cys Val Glu Lys Lys Asp Ser Pro Glu Val Tyr Phe Cys Cys Cys
65 70 75 80

Glu Gly Asn Met Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
85 90 95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
100 105 110

<210> 117
<211> 110
<212> PRT
<213> Artificial

<220>
<223> Hybrid Human ActRIIB ECD

<400> 117

```
Glu Thr Arg Glu Cys Ile Tyr Tyr Asn Ala Asn Trp Glu Leu Glu Arg
1               5                  10                  15

Thr Asn Gln Ser Gly Leu Glu Arg Cys Tyr Gly Asp Lys Asp Lys Arg
            20                  25                  30

Arg His Cys Tyr Ala Ser Trp Arg Asn Ser Ser Gly Thr Ile Glu Leu
        35                  40                  45

Val Lys Lys Gly Cys Trp Leu Asp Asp Ile Asn Cys Tyr Asp Arg Gln
    50                  55                  60

Glu Cys Val Ala Thr Lys Glu Asn Pro Gln Val Tyr Phe Cys Cys Cys
65                  70                  75                  80

Glu Gly Asn Phe Cys Asn Glu Arg Phe Thr His Leu Pro Glu Ala Gly
                85                  90                  95

Gly Pro Glu Val Thr Tyr Glu Pro Pro Pro Thr Ala Pro Thr
            100                 105                 110
```

<210> 118
<211> 12
<212> PRT
<213> Artificial

<220>
<223> Peptide linker

<400> 118

```
Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro
1               5                  10
```