<110> HANMI SCIENCE CO., LTD.

<120> Novel oxyntomodulin derivatives and Pharmaceutical Composition for treating obesity comprising the same

<130> OPA12062

<150> KR 10-2011-0056472
<151> 2011-06-10

<160> 50

<170> KopatentIn 2.0

<210> 1
<211> 37
<212> PRT
<213> Homo sapiens

<220>
<223> oxyntomodulin

<400> 1
His Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Ser
1 5 10 15

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

Arg Asn Asn Ile Ala
35

<210> 2
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> This "H" refers a derivative of histidine, Xaa = 4-imidazoacetyl.

<400> 2
HisXaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Leu Met Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

<210> 3
<211> 39
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> This "H" refers a derivative of histidine, Xaa = 4-imidazoacetyl.

<400> 3
HisXaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

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

Ser Gly Ala Pro Pro Pro Ser
35

<210> 4
<211> 39
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 4
~~His~~Xaa Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Leu Lys Asn Gly Gly Pro Ser
20 25 30

Ser Gly Ala Pro Pro Pro Ser
35

<210> 5
<211> 39
<212> PRT
<213> Artificial Sequence

<220>

<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 5
~~His~~Xaa Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Gln Met Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Leu Lys Asn Gly Gly Pro Ser
20 25 30

Ser Gly Ala Pro Pro Pro Ser
35

<210> 6
<211> 42
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 6
~~His~~Xaa Gly Glu Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Met Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Ala Ala His Ser Gln Gly Thr

20 25 30

Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp
35 40

<210> 7
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl-

<400> 7
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Leu Met Asn Thr Lys
20 25 30

<210> 8
<211> 29
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT

<222> (1)

<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 8

~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Leu Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Leu Met Asn Lys
20 25

<210> 9

<211> 37

<212> PRT

<213> Artificial Sequence

<220>

<223> oxyntomodulin derivative

<220>

<221> VARIANT

<222> (1)

<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<220>

<221> VARIANT

<222> (20)

<223> Xaa = ~~aminoisobutyric~~alpha-methyl-glutamic acid

<400> 9

~~His~~Xaa Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Xaa Leu Phe Ile Glu Trp Leu Met Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

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

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 10
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Gln Met Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Leu Met Asn Gly Gly Pro Ser
20 25 30

Ser Gly Ala Pro Pro Pro Ser Lys
35 40

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

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 11
~~His~~Xaa Gly Glu Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Met Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Ala Ala His Ser Gln Gly Thr
20 25 30

Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Lys
35 40

<210> 12
<211> 38
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 12
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Gly
1 5 10 15

Gly Gly His Gly Glu Gly Thr Phe Thr Ser Asp Leu Ser Lys Gln Met
20 25 30

Glu Glu Glu Ala Val Lys
35

<210> 13
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl-

<220>
<221> VARIANT
<222> (16)
<223> Xaa = ~~aminoisobutyric~~alpha-methyl-glutamic acid

<220>
<221> VARIANT
<222> (20)
<223> Xaa = ~~aminoisobutyric~~alpha-methyl-glutamic acid

<400> 13
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Xaa
1 5 10 15

Glu Ala Val Xaa Leu Phe Ile Glu Trp Leu Met Asn Thr Lys
20 25 30

<210> 14
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<220>
<221> VARIANT
<222> (20)
<223> Xaa = alpha-methyl-glutamic~~aminoisobutyric~~ acid

<220>
<221> VARIANT
<222> (24)
<223> Xaa = ~~aminoisobutyric~~alpha-methyl-glutamic acid

<400> 14
~~His~~Xaa Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Xaa Leu Phe Ile Xaa Trp Leu Met Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

<210> 15

<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<220>
<221> VARIANT
<222> (24)
<223> Xaa = ~~aminoisobutyric~~alpha-methyl-glutamic acid

<400> 15
~~His~~Xaa Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Xaa Trp Leu Met Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

<210> 16
<211> 34
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 16
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Leu Glu Gly
1 5 10 15

Gly Gly His Ser Gln Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Leu
20 25 30

Glu Lys

<210> 17
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 17
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Ile Arg Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

<210> 18
<211> 40
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<400> 18
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Ile Arg Asn Gly Gly Pro Ser
20 25 30

Ser Gly Ala Pro Pro Pro Ser Lys
35 40

<210> 19
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>

<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 19
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Lys Leu Phe Ile Glu Trp Ile Arg Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

<210> 20
<211> 40
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl~~.~~

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 20

HisXaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Glu
1 5 10 15

Glu Ala Val Lys Leu Phe Ile Glu Trp Ile Arg Asn Gly Gly Pro Ser
20 25 30

Ser Gly Ala Pro Pro Pro Ser Lys
35 40

<210> 21
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> This "H" refers a derivative of histidine, Xaa = 4-imidazoacetyl.

<400> 21
HisXaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Gln Leu Glu Glu
1 5 10 15

Glu Ala Val Arg Leu Phe Ile Glu Trp Val Arg Asn Thr Lys Arg Asn
20 25 30

Arg Asn Asn Ile Ala
35

<210> 22
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = desamino-histidyl.

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 22
~~His~~Xaa Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Lys
20 25 30

<210> 23
<211> 29
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)

<223> Xaa = aminoisobutyric acid

<400> 23
His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Cys Trp Leu Met Asn Thr
20 25

<210> 24
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<400> 24
His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Cys
20 25 30

<210> 25
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 25
His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Cys
20 25 30

<210> 26
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<220>
<221> VARIANT
<222> (12), (16)

<223> amino acids at position 12 and position 16 form a ring

<400> 26
His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Cys
20 25 30

<210> 27
<211> 29
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative'

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 27
His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Gln Ala Ala Lys Glu Phe Ile Cys Trp Leu Met Asn Thr
20 25

<210> 28
<211> 29
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<400> 28
His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr
20 25

<210> 29
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (1)
<223> ~~This "H" refers a derivative of histidine,~~ Xaa = 4-imidazoacetyl.

<220>

<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 29
~~His~~Xaa Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Cys
20 25 30

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

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 30

His Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ala Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Cys
20 25 30

<210> 31
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> oxyntomodulin derivative

<220>
<221> VARIANT
<222> (2)
<223> Xaa = aminoisobutyric acid

<220>
<221> VARIANT
<222> (16), (20)
<223> amino acids at position 16 and position 20 form a ring

<400> 31

Tyr Xaa Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu
1 5 10 15

Lys Arg Ala Lys Glu Phe Val Gln Trp Leu Met Asn Thr Cys
20 25 30

<210> 32
<211> 8

<212> PRT
<213> Artificial Sequence

<220>
<223> group R2

<400> 32
Lys Arg Asn Arg Asn Asn Ile Ala
1 5

<210> 33
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> group R2

<400> 33
Gly Pro Ser Ser Gly Ala Pro Pro Pro Ser
1 5 10

<210> 34
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> group R2

<400> 34
Gly Pro Ser Ser Gly Ala Pro Pro Pro Ser Lys
1 5 10

<210> 35
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> group R2

<400> 35
His Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp
1 5 10 15

<210> 36
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> group R2

<400> 36
His Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp Lys
1 5 10 15

<210> 37
<211> 20
<212> PRT
<213> Artificial Sequence

<220>

<223> group R2

<400> 37
His Gly Glu Gly Thr Phe Thr Ser Asp Leu Ser Lys Gln Met Glu Glu
1 5 10 15

Glu Ala Val Lys
20

<210> 38
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 38
Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Ser Arg
1 5 10 15

Arg Ala Gln Asp Phe Val Gln Trp Leu Met Asn Thr
20 25

<210> 39
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 39

Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu Glu
1 5 10 15

Ala Val Arg Leu Phe Ile Glu Trp Leu Met Asn Thr
20 25

<210> 40
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 40
Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Lys Tyr Leu Asp Glu Arg
1 5 10 15

Arg Ala Gln Asp Phe Val Ala Trp Leu Lys Asn Thr
20 25

<210> 41
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 41
Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Glu Glu Glu
1 5 10 15

Ala Val Arg Leu Phe Ile Glu Trp Leu Lys Asn Gly

20 25

<210> 42
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 42
Gly Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Gln Met Glu Glu Glu
1 5 10 15

Ala Val Arg Leu Phe Ile Glu Trp Leu Lys Asn Gly
20 25

<210> 43
<211> 26
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 43
Gly Glu Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Met Glu Glu Glu
1 5 10 15

Ala Val Arg Leu Phe Ile Glu Trp Ala Ala
20 25

<210> 44

<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> group A or B

<400> 44
Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Gln Met Glu Glu Glu
1 5 10 15

Ala Val Arg Leu Phe Ile Glu Trp Leu Met Asn Gly
20 25

<210> 45
<211> 24
<212> PRT
<213> Artificial Sequence

<220>
<223> group B

<400> 45
Gly Glu Gly Thr Phe Thr Ser Asp Leu Ser Arg Gln Met Glu Glu Glu
1 5 10 15

Ala Val Arg Leu Phe Ile Glu Trp
20

<210> 46
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> group B

<400> 46
Ser Gln Gly Thr Phe Thr Ser Asp Tyr Ser Arg Tyr Leu Asp
1 5 10

<210> 47
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 47
cccggccccc gcggccgcta ttcgaaatac 30

<210> 48
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 48
gaacggtccg gaggacgtcg actcttaaga tag 33

<210> 49
<211> 34
<212> DNA

<213> Artificial Sequence

<220>
<223> primer

<400> 49
cagcgacacc gaccgtcccc ccgtacttaa ggcc 34

<210> 50
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 50
ctaaccgact ctcggggaag actgagctcg cc 32