

# SEQUENCE LISTING

<110> Roche Diagnostics GmbH  
F. Hoffmann-La Roche AG

<120> Mutant DNA Polymerases With Improved  
Pyrophosphorolysis Activated Polymerization (PAP) Ability

<130> 24305 WO

<140> US Not yet assigned  
<141> Not yet assigned

<150> US 60/990,847  
<151> 2007-11-28

<160> 59

<170> FastSEQ for Windows Version 4.0

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activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<223> Xaa = any amino acid

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activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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sps17 (Sps17)

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family A (HspA)

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<212> PRT

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<223> chimeric CS-family thermostable DNA polymerase CS5  
with Thermus sp. Z05 N-terminal 5'-nuclease domain  
and Thermotoga maritima C-terminal 3'-5'  
exonuclease and polymerase domains

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Asp	Ala	Leu	Pro	Lys	Met	Val	Asn	Pro	Lys	Thr	Gly	Arg	Ile	His	Ala		
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<223> chimeric CS-family thermostable DNA polymerase CS6  
with *Thermus* sp. Z05 N-terminal 5'-nuclease domain  
and *Thermotoga maritima* C-terminal 3'-5'  
exonuclease and polymerase domains

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Asp	Ala	Leu	Pro	Lys	Met	Val	Asn	Pro	Lys	Thr	Gly	Arg	Ile	His	Ala		
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Ser	Phe	Asn	Gln	Thr	Gly	Thr	Ala	Thr	Gly	Arg	Leu	Ser	Ser	Ser	Asp		
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<210> 23

<211> 2682

<212> DNA

<213> Artificial Sequence

<220>

<223> chimeric CS-family thermostable DNA polymerase CS6  
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and *Thermotoga maritima* C-terminal 3'-5'  
exonuclease and polymerase domains

<400> 23

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<210> 24

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> unmodified form of motif in region from 3/A  
subdomain of family A type DNA-dependent DNA  
polymerase

<220>

<221> MOD\_RES

<222> (2)...(15)

<223> Xaa = any amino acid

<400> 24

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<210> 25

<211> 17

<212> PRT

<213> Artificial Sequence

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subdomain of family A type DNA-dependent DNA  
polymerase

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<223> Xaa = any amino acid

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<222> (11)...(11)

<223> Xaa = any amino acid except Thr or Ala

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 <223> Xaa = any amino acid  
  
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<210> 26  
 <211> 22  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> synthetic KAB77 primer for pyrophosphorolysis  
 activated polymerization (PAP-PCR) model system  
 using M13mp18 template

<220>  
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 <222> (22)...(22)  
 <223> n = 2'-phosphate-deoxyadenosine

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<210> 27  
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<220>  
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 activated polymerization (PAP-PCR) model system  
 using M13mp18 template

<220>  
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 <222> (24)...(24)  
 <223> n = 2'-phosphate-deoxyadenosine

<400> 27  
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<210> 28  
 <211> 15  
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<220>  
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 thermostable DNA polymerase from CS5

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 1 5 10 15

<210> 29

<211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> region from 3/A subdomain of chimeric CS-family  
 thermostable DNA polymerase from CS6  
  
 <400> 29  
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 1 5 10 15  
  
 <210> 30  
 <211> 16  
 <212> PRT  
 <213> Artificial Sequence  
  
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 of family A type DNA-dependent DNA polymerase  
  
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 <223> Xaa = Gly or absent  
  
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 <222> (9)...(17)  
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 1 5 10 15  
  
 <210> 31  
 <211> 20  
 <212> DNA  
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 <223> synthetic error-prone PCR amplification  
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 <400> 31  
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 <210> 32  
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<213> Artificial Sequence

<220>

<223> synthetic error-prone PCR amplification  
reverse primer

<400> 32

acatccactt cgagcggcac tga

23

<210> 33

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> synthetic M13mp18 single-stranded DNA  
template oligonucleotide primer

<400> 33

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30

<210> 34

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> synthetic pre-annealed oligo duplex  
substrate primer strand

<220>

<221> modified\_base

<222> (22)...(22)

<223> n = 2'-phosphate-deoxyadenosine

<400> 34

cgctgtgtct gtacaccgtt cn

22

<210> 35

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> synthetic pre-annealed oligo duplex  
substrate template strand

<220>

<221> modified\_base

<222> (29)...(39)

<223> n = 7-deaza-deoxyguanosine

<220>

<221> modified\_base

<222> (42)...(42)

<223> g modified by 3'-phosphate

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42

<210> 36

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<223> Xaa = Leu, Ile or Tyr

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<223> Xaa = any amino acid

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<223> Xaa = Asn, Ser or Gly

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<223> Xaa = any amino acid except Thr

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<221> MOD\_RES

<222> (13)...(13)

<223> Xaa = any amino acid

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<222> (14)...(14)

<223> Xaa = Leu or Ile

<220>

<221> MOD\_RES

<222> (15)...(15)

<223> Xaa = Pro or Leu



<400> 36

Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa  
1 5 10 15

<210> 37

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<223> Xaa = Val, Ile, Leu, Ala or Thr

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<222> (12)...(12)

<223> Xaa = any amino acid

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<221> MOD\_RES

<222> (13)...(13)

<223> Xaa = Pro, Ala, Gly, Lys, Thr or Ser

<220>

<221> MOD\_RES

<222> (14)...(15)

<223> Xaa = any amino acid

<400> 37

Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa  
1 5 10 15

<210> 38  
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<212> PRT  
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activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<220>  
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<223> Xaa = Gly, Ala, Leu, Met, Phe, Trp, Lys, Gln, Glu,  
Ser, Pro, Val, Ile, Cys, Tyr, His, Arg, Asn or Asp

<220>  
<221> MOD\_RES  
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<223> Xaa = any amino acid

<400> 38  
Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa  
1 5 10 15

<210> 39  
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<212> PRT  
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activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>  
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<400> 39  
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1 5 10 15

<210> 40  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
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from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<223> Xaa = Arg or Leu

<220>

<221> MOD\_RES

<222> (2)...(2)

<223> Xaa = any amino acid

<220>

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<222> (3)...(3)

<223> Xaa = Leu, Ile or Tyr

<220>

<221> MOD\_RES

<222> (4)...(4)

<223> Xaa = any amino acid

<220>

<221> MOD\_RES

<222> (6)...(6)

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<221> MOD\_RES

<222> (8)...(8)

<223> Xaa = Gly or absent

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<221> MOD\_RES

<222> (9)...(9)

<223> Xaa = Lys, Arg or Gln

<220>

<221> MOD\_RES

<222> (10)...(10)

<223> Xaa = Asn, Ser or Gly

<220>

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<222> (11)...(11)

<223> Xaa = any amino acid except Thr or Ala

<220>

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<223> Xaa = Tyr or Glu

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<220>  
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<400> 40  
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1 5 10 15  
Xaa

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

<220>  
<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<220>  
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<223> Xaa = Thr, Met, Asp, Ser, Gly, Ala, Gln or Leu

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<223> Xaa = Val, Ile, Leu, Ala, Thr or Gly

<220>

<221> MOD\_RES

<222> (14)...(14)

<223> Xaa = any amino acid

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<221> MOD\_RES

<222> (15)...(15)

<223> Xaa = Pro, Ala, Gly, Lys, Thr or Ser

<220>

<221> MOD\_RES

<222> (16)...(17)

<223> Xaa = any amino acid

<400> 41

Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

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Xaa

<210> 42

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>

<221> MOD\_RES

<222> (1)...(10)

<223> Xaa = any amino acid

<220>

<221> MOD\_RES

<222> (11)...(11)

<223> Xaa = Gly, Leu, Met, Phe, Trp, Lys, Gln, Glu, Ser,  
Pro, Val, Ile, Cys, Tyr, His, Arg, Asn or Asp

<220>

<221> MOD\_RES

<222> (12)...(17)

<223> Xaa = any amino acid

<400> 42

Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

1

5

10

15

Xaa

<210> 43

<211> 17

& .  
<212> PRT  
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<220>  
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activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

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<221> MOD\_RES  
<222> (1)...(17)  
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1 5 10 15  
Xaa

<210> 44  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> unmodified motif region from 3/A subdomain of  
family A type DNA-dependent DNA polymerase

<220>  
<221> MOD\_RES  
<222> (2)...(2)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
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<223> Xaa = Leu, Ile or Tyr

<220>  
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<223> Xaa = any amino acid

<220>  
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<223> Xaa = Lys, Arg or Gln

<220>  
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<223> Xaa = Asn, Ser or Gly

<220>  
<221> MOD\_RES  
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<223> Xaa = any amino acid

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<223> Xaa = Asp or Glu

<220>

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<223> Xaa = any amino acid

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<221> MOD\_RES

<222> (14)...(14)

<223> Xaa = Leu or Ile

<220>

<221> MOD\_RES

<222> (15)...(15)

<223> Xaa = Pro or Leu

<400> 44

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1				5				10						15

<210> 45

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>

<221> MOD\_RES

<222> (2)...(2)

<223> Xaa = Glu, Gln, Gly, Lys or Thr

<220>

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<222> (3)...(3)

<223> Xaa = any amino acid

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<222> (4)...(4)

<223> Xaa = Thr, Met, Asp, Ser, Gly, Ala, Gln or Leu

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<223> Xaa = any amino acid

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<223> Xaa = any amino acid except Thr

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<223> Xaa = Val, Ile, Leu, Ala or Thr

<220>  
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<223> Xaa = any amino acid

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<220>  
<221> MOD\_RES  
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<400> 45  
Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Thr Tyr Xaa Xaa Xaa Xaa Xaa  
1 5 10 15

<210> 46  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>  
<221> MOD\_RES  
<222> (2)...(8)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
<222> (9)...(9)  
<223> Xaa = Gly, Ala, Leu, Met, Phe, Trp, Lys, Gln, Glu,  
Ser, Pro, Val, Ile, Cys, Tyr, His, Arg, Asn or Asp

<220>  
<221> MOD\_RES  
<222> (11)...(15)  
<223> Xaa = any amino acid

<400> 46  
Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa  
1 5 10 15

<210> 47  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase



<220>  
 <221> MOD\_RES  
 <222> (2)...(15)  
 <223> Xaa = any amino acid  
  
 <400> 47  
 Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Ser Tyr Xaa Xaa Xaa Xaa Xaa  
 1 5 10 15

<210> 48  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> unmodified motif region from 3/A subdomain of  
 family A type DNA-dependent DNA polymerase

<220>  
 <221> MOD\_RES  
 <222> (1)...(1)  
 <223> Xaa = Arg or Leu

<220>  
 <221> MOD\_RES  
 <222> (2)...(2)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (3)...(3)  
 <223> Xaa = Leu, Ile or Tyr

<220>  
 <221> MOD\_RES  
 <222> (4)...(4)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (6)...(6)  
 <223> Xaa = Arg or Leu

<220>  
 <221> MOD\_RES  
 <222> (7)...(7)  
 <223> Xaa = Ile or absent

<220>  
 <221> MOD\_RES  
 <222> (8)...(8)  
 <223> Xaa = Gly or absent

<220>  
 <221> MOD\_RES  
 <222> (9)...(9)  
 <223> Xaa = Lys, Arg or Gln

<220>  
 <221> MOD\_RES

<222> (10)...(10)  
<223> Xaa = Asn, Ser or Gly

<220>  
<221> MOD\_RES  
<222> (11)...(11)  
<223> Xaa = Thr or Ala

<220>  
<221> MOD\_RES  
<222> (12)...(12)  
<223> Xaa = Tyr or Glu

<220>  
<221> MOD\_RES  
<222> (13)...(13)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
<222> (14)...(14)  
<223> Xaa = Asp or Glu

<220>  
<221> MOD\_RES  
<222> (15)...(15)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
<222> (16)...(16)  
<223> Xaa = Leu, Ile or Ala

<220>  
<221> MOD\_RES  
<222> (17)...(17)  
<223> Xaa = Pro, Leu or Trp

<400> 48  
Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
1 5 10 15  
Xaa

<210> 49  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>  
<221> MOD\_RES  
<222> (1)...(1)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
<222> (2)...(2)  
<223> Xaa = Glu, Gln, Gly, Lys, Thr or Met

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<220>
<221> MOD_RES
<222> (3)...(3)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (4)...(4)
<223> Xaa = Thr, Met, Asp, Ser, Gly, Ala, Gln or Leu

<220>
<221> MOD_RES
<222> (6)...(12)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (13)...(13)
<223> Xaa = Val, Ile, Leu, Ala, Thr or Gly

<220>
<221> MOD_RES
<222> (14)...(14)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (15)...(15)
<223> Xaa = Pro, Ala, Gly, Lys, Thr or Ser

<220>
<221> MOD_RES
<222> (16)...(17)
<223> Xaa = any amino acid

<400> 49
Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1          5          10          15
Xaa

<210> 50
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> modified motif having improved pyrophosphorolysis
      activated polymerization (PAP) ability in region
      from 3/A subdomain of family A type DNA-dependent
      DNA polymerase

<220>
<221> MOD_RES
<222> (1)...(10)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (11)...(11)
<223> Xaa = Gly, Leu, Met, Phe, Trp, Lys, Gln, Glu, Ser,
      Pro, Val, Ile, Cys, Tyr, His, Arg, Asn or Asp

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<220>  
 <221> MOD\_RES  
 <222> (12)...(17)  
 <223> Xaa = any amino acid

<400> 50  
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 1 5 10 15  
 Xaa

<210> 51  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> modified motif having improved pyrophosphorolysis  
 activated polymerization (PAP) ability in region  
 from 3/A subdomain of family A type DNA-dependent  
 DNA polymerase

<220>  
 <221> MOD\_RES  
 <222> (1)...(17)  
 <223> Xaa = any amino acid

<400> 51  
 Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Ser Xaa Xaa Xaa Xaa Xaa  
 1 5 10 15  
 Xaa

<210> 52  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> modified motif having improved pyrophosphorolysis  
 activated polymerization (PAP) ability in region  
 from 3/A subdomain of family A type DNA-dependent  
 DNA polymerase

<220>  
 <221> MOD\_RES  
 <222> (2)...(2)  
 <223> Xaa = Glu, Gln, Gly, Lys or Thr

<220>  
 <221> MOD\_RES  
 <222> (3)...(8)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (9)...(9)  
 <223> Xaa = any amino acid except Thr

<220>  
 <221> MOD\_RES  
 <222> (11)...(15)

<223> Xaa = any amino acid

<400> 52

Arg	Xaa	Xaa	Xaa	Lys	Leu	Xaa	Xaa	Xaa	Tyr	Xaa	Xaa	Xaa	Xaa	Xaa
1				5					10					15

<210> 53

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>

<221> MOD\_RES

<222> (2)...(3)

<223> Xaa = any amino acid

<220>

<221> MOD\_RES

<222> (4)...(4)

<223> Xaa = Thr, Met, Asp, Ser, Gly, Ala, Gln or Leu

<220>

<221> MOD\_RES

<222> (7)...(15)

<223> Xaa = any amino acid

<400> 53

Arg	Xaa	Xaa	Xaa	Lys	Leu	Xaa	Xaa	Xaa	Tyr	Xaa	Xaa	Xaa	Xaa	Xaa
1				5					10					15

<210> 54

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> modified motif having improved pyrophosphorolysis  
activated polymerization (PAP) ability in region  
from 3/A subdomain of family A type DNA-dependent  
DNA polymerase

<220>

<221> MOD\_RES

<222> (2)...(8)

<223> Xaa = any amino acid

<220>

<221> MOD\_RES

<222> (9)...(9)

<223> Xaa = any amino acid except Thr

<220>

<221> MOD\_RES

<222> (11)...(11)

<223> Xaa = Val, Ile, Leu, Ala or Thr

<220>  
 <221> MOD\_RES  
 <222> (12)...(15)  
 <223> Xaa = any amino acid  
  
 <400> 54  
 Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa  
 1 5 10 15

<210> 55  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> modified motif having improved pyrophosphorolysis  
 activated polymerization (PAP) ability in region  
 from 3/A subdomain of family A type DNA-dependent  
 DNA polymerase

<220>  
 <221> MOD\_RES  
 <222> (2)...(8)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (9)...(9)  
 <223> Xaa = any amino acid except Thr

<220>  
 <221> MOD\_RES  
 <222> (11)...(12)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (13)...(13)  
 <223> Xaa = Pro, Ala, Gly, Lys, Thr or Ser

<220>  
 <221> MOD\_RES  
 <222> (14)...(15)  
 <223> Xaa = any amino acid

<400> 55  
 Arg Xaa Xaa Xaa Lys Leu Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa  
 1 5 10 15

<210> 56  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> modified motif having improved pyrophosphorolysis  
 activated polymerization (PAP) ability in region  
 from 3/A subdomain of family A type DNA-dependent  
 DNA polymerase

<220>

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<221> MOD_RES
<222> (1)...(1)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (2)...(2)
<223> Xaa = Glu, Gln, Gly, Lys, Thr or Met

<220>
<221> MOD_RES
<222> (3)...(10)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (11)...(11)
<223> Xaa = any amino acid except Thr or Ala

<220>
<221> MOD_RES
<222> (12)...(17)
<223> Xaa = any amino acid

<400> 56
Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 1             5             10             15
Xaa

<210> 57
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> modified motif having improved pyrophosphorolysis
      activated polymerization (PAP) ability in region
      from 3/A subdomain of family A type DNA-dependent
      DNA polymerase

<220>
<221> MOD_RES
<222> (1)...(3)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (4)...(4)
<223> Xaa = Thr, Met, Asp, Ser, Gly, Ala, Gln or Leu

<220>
<221> MOD_RES
<222> (6)...(10)
<223> Xaa = any amino acid

<220>
<221> MOD_RES
<222> (11)...(11)
<223> Xaa = any amino acid except Thr or Aal

<220>

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<221> MOD\_RES  
 <222> (12)...(17)  
 <223> Xaa = any amino acid

<400> 57  
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 1 5 10 15  
 Xaa

<210> 58  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> modified motif having improved pyrophosphorolysis  
 activated polymerization (PAP) ability in region  
 from 3/A subdomain of family A type DNA-dependent  
 DNA polymerase

<220>  
 <221> MOD\_RES  
 <222> (1)...(10)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (11)...(11)  
 <223> Xaa = any amino acid except Thr or Ala

<220>  
 <221> MOD\_RES  
 <222> (12)...(12)  
 <223> Xaa = any amino acid

<220>  
 <221> MOD\_RES  
 <222> (13)...(13)  
 <223> Xaa = Val, Ile, Leu, Ala, Thr or Gly

<220>  
 <221> MOD\_RES  
 <222> (14)...(17)  
 <223> Xaa = any amino acid

<400> 58  
 Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
 1 5 10 15  
 Xaa

<210> 59  
 <211> 17  
 <212> PRT  
 <213> Artificial Sequence

<220>  
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 activated polymerization (PAP) ability in region  
 from 3/A subdomain of family A type DNA-dependent  
 DNA polymerase

<220>



<221> MOD\_RES  
<222> (1)...(10)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
<222> (11)...(11)  
<223> Xaa = any amino acid except Thr or Ala

<220>  
<221> MOD\_RES  
<222> (12)...(14)  
<223> Xaa = any amino acid

<220>  
<221> MOD\_RES  
<222> (15)...(15)  
<223> Xaa = Pro, Ala, Gly, Lys, Thr or Ser

<220>  
<221> MOD\_RES  
<222> (16)...(17)  
<223> Xaa = any amino acid

<400> 59  
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1 5 10 15  
Xaa