

SEQUENCE LISTING

<110> Fit Biotech Oy

<120> Genetic Adjuvant

<130> PD53981PC00

<150> US61/071,898

<151> 2008-05-23

<160> 7

<170> PatentIn version 3.3

<210> 1

<211> 2432

<212> PRT

<213> Virus

<400> 1

Met Ala Ala Lys Val His Val Asp Ile Glu Ala Asp Ser Pro Phe Ile
1 5 10 15

Lys Ser Leu Gln Lys Ala Phe Pro Ser Phe Glu Val Glu Ser Leu Gln
20 25 30

Val Thr Pro Asn Asp His Ala Asn Ala Arg Ala Phe Ser His Leu Ala
35 40 45

Thr Lys Leu Ile Glu Gln Glu Thr Asp Lys Asp Thr Leu Ile Leu Asp
50 55 60

Ile Gly Ser Ala Pro Ser Arg Arg Met Met Ser Thr His Lys Tyr His
65 70 75 80

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

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

Ile Ala Gly Lys Ile Thr Asp Leu Gln Thr Val Met Ala Thr Pro Asp
115 120 125

Ala Glu Ser Pro Thr Phe Cys Leu His Thr Asp Val Thr Cys Arg Thr
130 135 140

Ala Ala Glu Val Ala Val Tyr Gln Asp Val Tyr Ala Val His Ala Pro
145 150 155 160

Thr Ser Leu Tyr His Gln Ala Met Lys Gly Val Arg Thr Ala Tyr Trp
165 170 175

Ile Gly Phe Asp Thr Thr Pro Phe Met Phe Asp Ala Leu Ala Gly Ala
180 185 190

Tyr Pro Thr Tyr Ala Thr Asn Trp Ala Asp Glu Gln Val Leu Gln Ala
195 200 205

Arg Asn Ile Gly Leu Cys Ala Ala Ser Leu Thr Glu Gly Arg Leu Gly
210 215 220

Lys Leu Ser Ile Leu Arg Lys Lys Gln Leu Lys Pro Cys Asp Thr Val
225 230 235 240

Met Phe Ser Val Gly Ser Thr Leu Tyr Thr Glu Ser Arg Lys Leu Leu
245 250 255

Arg Ser Trp His Leu Pro Ser Val Phe His Leu Lys Gly Lys Gln Ser
260 265 270

Phe Thr Cys Arg Cys Asp Thr Ile Val Ser Cys Glu Gly Tyr Val Val
275 280 285

Lys Lys Ile Thr Met Cys Pro Gly Leu Tyr Gly Lys Thr Val Gly Tyr
290 295 300

Ala Val Thr Tyr His Ala Glu Gly Phe Leu Val Cys Lys Thr Thr Asp
305 310 315 320

Thr Val Lys Gly Glu Arg Val Ser Phe Pro Val Cys Thr Tyr Val Pro
325 330 335

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

Pro Glu Asp Ala Gln Lys Leu Leu Val Gly Leu Asn Gln Arg Ile Val
355 360 365

Val Asn Gly Arg Thr Gln Arg Asn Thr Asn Thr Met Lys Asn Tyr Leu
370 375 380

Leu Pro Ile Val Ala Val Ala Phe Ser Lys Trp Ala Arg Glu Tyr Lys
385 390 395 400

Ala Asp Leu Asp Asp Glu Lys Pro Leu Gly Val Arg Glu Arg Ser Leu
405 410 415

Thr Cys Cys Cys Leu Trp Ala Phe Lys Thr Arg Lys Met His Thr Met
420 425 430

Tyr Lys Lys Pro Asp Thr Gln Thr Ile Val Lys Val Pro Ser Glu Phe
435 440 445

Asn Ser Phe Val Ile Pro Ser Leu Trp Ser Thr Gly Leu Ala Ile Pro
450 455 460

Val Arg Ser Arg Ile Lys Met Leu Leu Ala Lys Lys Thr Lys Arg Glu
465 470 475 480

Leu Ile Pro Val Leu Asp Ala Ser Ser Ala Arg Asp Ala Glu Gln Glu
485 490 495

Glu Lys Glu Arg Leu Glu Ala Glu Leu Thr Arg Glu Ala Leu Pro Pro
500 505 510

Leu Val Pro Ile Ala Pro Ala Glu Thr Gly Val Val Asp Val Asp Val
515 520 525

Glu Glu Leu Glu Tyr His Ala Gly Ala Gly Val Val Glu Thr Pro Arg
530 535 540

Ser Ala Leu Lys Val Thr Ala Gln Pro Asn Asp Val Leu Leu Gly Asn
545 550 555 560

Tyr Val Val Leu Ser Pro Gln Thr Val Leu Lys Ser Ser Lys Leu Ala
565 570 575

Pro Val His Pro Leu Ala Glu Gln Val Lys Ile Ile Thr His Asn Gly
580 585 590

Arg Ala Gly Arg Tyr Gln Val Asp Gly Tyr Asp Gly Arg Val Leu Leu
595 600 605

Pro Cys Gly Ser Ala Ile Pro Val Pro Glu Phe Gln Ala Leu Ser Glu
610 615 620

Ser Ala Thr Met Val Tyr Asn Glu Arg Glu Phe Val Asn Arg Lys Leu
625 630 635 640

Tyr His Ile Ala Val His Gly Pro Ser Leu Asn Thr Asp Glu Glu Asn
645 650 655

Tyr Glu Lys Val Arg Ala Glu Arg Thr Asp Ala Glu Tyr Val Phe Asp
660 665 670

Val Asp Lys Lys Cys Cys Val Lys Arg Glu Glu Ala Ser Gly Leu Val
675 680 685

Leu Val Gly Glu Leu Thr Asn Pro Pro Phe His Glu Phe Ala Tyr Glu
690 695 700

Gly Leu Lys Ile Arg Pro Ser Ala Pro Tyr Lys Thr Thr Val Val Gly
705 710 715 720

Val Phe Gly Val Pro Gly Ser Gly Lys Ser Ala Ile Ile Lys Ser Leu
725 730 735

Val Thr Lys His Asp Leu Val Thr Ser Gly Lys Lys Glu Asn Cys Gln
740 745 750

Glu Ile Val Asn Asp Val Lys Lys His Arg Gly Leu Asp Ile Gln Ala
755 760 765

Lys Thr Val Asp Ser Ile Leu Leu Asn Gly Cys Arg Arg Ala Val Asp
770 775 780

Ile Leu Tyr Val Asp Glu Ala Phe Ala Cys His Ser Gly Thr Leu Leu
785 790 795 800

Ala Leu Ile Ala Leu Val Lys Pro Arg Ser Lys Val Val Leu Cys Gly
805 810 815

Asp Pro Lys Gln Cys Gly Phe Phe Asn Met Met Gln Leu Lys Val Asn
820 825 830

Phe Asn His Asn Ile Cys Thr Glu Val Cys His Lys Ser Ile Ser Arg
835 840 845

Arg Cys Thr Arg Pro Val Thr Ala Ile Val Ser Thr Leu His Tyr Gly
850 855 860

Gly Lys Met Arg Thr Thr Asn Pro Cys Asn Lys Pro Ile Ile Ile Asp
865 870 875 880

Thr Thr Gly Gln Thr Lys Pro Lys Pro Gly Asp Ile Val Leu Thr Cys
885 890 895

Phe Arg Gly Trp Val Lys Gln Leu Gln Leu Asp Tyr Arg Gly His Glu
900 905 910

Val Met Thr Ala Ala Ala Ser Gln Gly Leu Thr Arg Lys Gly Val Tyr
915 920 925

Ala Val Arg Gln Lys Val Asn Glu Asn Pro Leu Tyr Ala Pro Ala Ser
930 935 940

Glu His Val Asn Val Leu Leu Thr Arg Thr Glu Asp Arg Leu Val Trp
945 950 955 960

Lys Thr Leu Ala Gly Asp Pro Trp Ile Lys Val Leu Ser Asn Ile Pro
965 970 975

Gln Gly Asn Phe Thr Ala Thr Leu Glu Glu Trp Gln Glu Glu His Asp
980 985 990

Lys Ile Met Lys Val Ile Glu Gly Pro Ala Ala Pro Val Asp Ala Phe
995 1000 1005

Gln Asn Lys Ala Asn Val Cys Trp Ala Lys Ser Leu Val Pro Val
1010 1015 1020

Leu Asp Thr Ala Gly Ile Arg Leu Thr Ala Glu Glu Trp Ser Thr
1025 1030 1035

Ile Ile Thr Ala Phe Lys Glu Asp Arg Ala Tyr Ser Pro Val Val
1040 1045 1050

Ala Leu Asn Glu Ile Cys Thr Lys Tyr Tyr Gly Val Asp Leu Asp
1055 1060 1065

Ser Gly Leu Phe Ser Ala Pro Lys Val Ser Leu Tyr Tyr Glu Asn
1070 1075 1080

Asn His Trp Asp Asn Arg Pro Gly Gly Arg Met Tyr Gly Phe Asn
1085 1090 1095

Ala Ala Thr Ala Ala Arg Leu Glu Ala Arg His Thr Phe Leu Lys
1100 1105 1110

Gly Gln Trp His Thr Gly Lys Gln Ala Val Ile Ala Glu Arg Lys
1115 1120 1125

Ile Gln Pro Leu Ser Val Leu Asp Asn Val Ile Pro Ile Asn Arg
1130 1135 1140

Arg Leu Pro His Ala Leu Val Ala Glu Tyr Lys Thr Val Lys Gly
1145 1150 1155

Ser Arg Val Glu Trp Leu Val Asn Lys Val Arg Gly Tyr His Val
1160 1165 1170

Leu Leu Val Ser Glu Tyr Asn Leu Ala Leu Pro Arg Arg Arg Val
1175 1180 1185

Thr Trp Leu Ser Pro Leu Asn Val Thr Gly Ala Asp Arg Cys Tyr
1190 1195 1200

Asp Leu Ser Leu Gly Leu Pro Ala Asp Ala Gly Arg Phe Asp Leu
1205 1210 1215

Val Phe Val Asn Ile His Thr Glu Phe Arg Ile His His Tyr Gln
1220 1225 1230

Gln Cys Val Asp His Ala Met Lys Leu Gln Met Leu Gly Gly Asp
1235 1240 1245

Ala Leu Arg Leu Leu Lys Pro Gly Gly Ser Leu Leu Met Arg Ala
1250 1255 1260

Tyr Gly Tyr Ala Asp Lys Ile Ser Glu Ala Val Val Ser Ser Leu
1265 1270 1275

Ser Arg Lys Phe Ser Ser Ala Arg Val Leu Arg Pro Asp Cys Val
1280 1285 1290

Thr Ser Asn Thr Glu Val Phe Leu Leu Phe Ser Asn Phe Asp Asn
1295 1300 1305

Gly Lys Arg Pro Ser Thr Leu His Gln Met Asn Thr Lys Leu Ser
1310 1315 1320

Ala Val Tyr Ala Gly Glu Ala Met His Thr Ala Gly Cys Ala Pro
1325 1330 1335

Ser Tyr Arg Val Lys Arg Ala Asp Ile Ala Thr Cys Thr Glu Ala
1340 1345 1350

Ala Val Val Asn Ala Ala Asn Ala Arg Gly Thr Val Gly Asp Gly
1355 1360 1365

Val Cys Arg Ala Val Ala Lys Lys Trp Pro Ser Ala Phe Lys Gly
1370 1375 1380

Glu Ala Thr Pro Val Gly Thr Ile Lys Thr Val Met Cys Gly Ser
1385 1390 1395

Tyr Pro Val Ile His Ala Val Ala Pro Asn Phe Ser Ala Thr Thr
1400 1405 1410

Glu Ala Glu Gly Asp Arg Glu Leu Ala Ala Val Tyr Arg Ala Val
1415 1420 1425

Ala Ala Glu Val Asn Arg Leu Ser Leu Ser Ser Val Ala Ile Pro
1430 1435 1440

Leu Leu Ser Thr Gly Val Phe Ser Gly Gly Arg Asp Arg Leu Gln
1445 1450 1455

Gln Ser Leu Asn His Leu Phe Thr Ala Met Asp Ala Thr Asp Ala
1460 1465 1470

Asp Val Thr Ile Tyr Cys Arg Asp Lys Ser Trp Glu Lys Lys Ile
1475 1480 1485

Gln Glu Ala Ile Asp Met Arg Thr Ala Val Glu Leu Leu Asn Asp
1490 1495 1500

Asp Val Glu Leu Thr Thr Asp Leu Val Arg Val His Pro Asp Ser
1505 1510 1515

Ser Leu Val Gly Arg Lys Gly Tyr Ser Thr Thr Asp Gly Ser Leu
1520 1525 1530

Tyr Ser Tyr Phe Glu Gly Thr Lys Phe Asn Gln Ala Ala Ile Asp
1535 1540 1545

Met Ala Glu Ile Leu Thr Leu Trp Pro Arg Leu Gln Glu Ala Asn
1550 1555 1560

Glu Gln Ile Cys Leu Tyr Ala Leu Gly Glu Thr Met Asp Asn Ile
1565 1570 1575

Arg Ser Lys Cys Pro Val Asn Asp Ser Asp Ser Ser Thr Pro Pro
1580 1585 1590

Arg Thr Val Pro Cys Leu Cys Arg Tyr Ala Met Thr Ala Glu Arg
1595 1600 1605

Ile Ala Arg Leu Arg Ser His Gln Val Lys Ser Met Val Val Cys
1610 1615 1620

Ser Ser Phe Pro Leu Pro Lys Tyr His Val Asp Gly Val Gln Lys
1625 1630 1635

Val Lys Cys Glu Lys Val Leu Leu Phe Asp Pro Thr Val Pro Ser
1640 1645 1650

Val Val Ser Pro Arg Lys Tyr Ala Ala Ser Thr Thr Asp His Ser
1655 1660 1665

Asp Arg Ser Leu Arg Gly Phe Asp Leu Asp Trp Thr Thr Asp Ser
1670 1675 1680

Ser Ser Thr Ala Ser Asp Thr Met Ser Leu Pro Ser Leu Gln Ser
1685 1690 1695

Cys Asp Ile Asp Ser Ile Tyr Glu Pro Met Ala Pro Ile Val Val
1700 1705 1710

Thr Ala Asp Val His Pro Glu Pro Ala Gly Ile Ala Asp Leu Ala
1715 1720 1725

Ala Asp Val His Pro Glu Pro Ala Asp His Val Asp Leu Glu Asn
1730 1735 1740

Pro Ile Pro Pro Pro Arg Pro Lys Arg Ala Ala Tyr Leu Ala Ser
1745 1750 1755

Arg Ala Ala Glu Arg Pro Val Pro Ala Pro Arg Lys Pro Thr Pro
1760 1765 1770

Ala Pro Arg Thr Ala Phe Arg Asn Lys Leu Pro Leu Thr Phe Gly
1775 1780 1785

Asp Phe Asp Glu His Glu Val Asp Ala Leu Ala Ser Gly Ile Thr
1790 1795 1800

Phe Gly Asp Phe Asp Asp Val Leu Arg Leu Gly Arg Ala Gly Ala
1805 1810 1815

Tyr Ile Phe Ser Ser Asp Thr Gly Ser Gly His Leu Gln Gln Lys
1820 1825 1830

Ser Val Arg Gln His Asn Leu Gln Cys Ala Gln Leu Asp Ala Val
1835 1840 1845

Glu Glu Glu Lys Met Tyr Pro Pro Lys Leu Asp Thr Glu Arg Glu
1850 1855 1860

Lys Leu Leu Leu Lys Met Gln Met His Pro Ser Glu Ala Asn
1865 1870 1875

Lys Ser Arg Tyr Gln Ser Arg Lys Val Glu Asn Met Lys Ala Thr
1880 1885 1890

Val Val Asp Arg Leu Thr Ser Gly Ala Arg Leu Tyr Thr Gly Ala
1895 1900 1905

Asp Val Gly Arg Ile Pro Thr Tyr Ala Val Arg Tyr Pro Arg Pro
1910 1915 1920

Val Tyr Ser Pro Thr Val Ile Glu Arg Phe Ser Ser Pro Asp Val
1925 1930 1935

Ala Ile Ala Ala Cys Asn Glu Tyr Leu Ser Arg Asn Tyr Pro Thr
1940 1945 1950

Val Ala Ser Tyr Gln Ile Thr Asp Glu Tyr Asp Ala Tyr Leu Asp
1955 1960 1965

Met Val Asp Gly Ser Asp Ser Cys Leu Asp Arg Ala Thr Phe Cys
1970 1975 1980

Pro Ala Lys Leu Arg Cys Tyr Pro Lys His His Ala Tyr His Gln
1985 1990 1995

Pro Thr Val Arg Ser Ala Val Pro Ser Pro Phe Gln Asn Thr Leu
2000 2005 2010

Gln Asn Val Leu Ala Ala Ala Thr Lys Arg Asn Cys Asn Val Thr
2015 2020 2025

Gln Met Arg Glu Leu Pro Thr Met Asp Ser Ala Val Phe Asn Val
2030 2035 2040

Glu Cys Phe Lys Arg Tyr Ala Cys Ser Gly Glu Tyr Trp Glu Glu
2045 2050 2055

Tyr Ala Lys Gln Pro Ile Arg Ile Thr Thr Glu Asn Ile Thr Thr
2060 2065 2070

Tyr Val Thr Lys Leu Lys Gly Pro Lys Ala Ala Ala Leu Phe Ala
2075 2080 2085

Lys Thr His Asn Leu Val Pro Leu Gln Glu Val Pro Met Asp Arg
2090 2095 2100

Phe Thr Val Asp Met Lys Arg Asp Val Lys Val Thr Pro Gly Thr
2105 2110 2115

Lys His Thr Glu Glu Arg Pro Lys Val Gln Val Ile Gln Ala Ala
2120 2125 2130

Glu Pro Leu Ala Thr Ala Tyr Leu Cys Gly Ile His Arg Glu Leu
2135 2140 2145

Val Arg Arg Leu Asn Ala Val Leu Arg Pro Asn Val His Thr Leu
2150 2155 2160

Phe Asp Met Ser Ala Glu Asp Phe Asp Ala Ile Ile Ala Ser His
2165 2170 2175

Phe His Pro Gly Asp Pro Val Leu Glu Thr Asp Ile Ala Ser Phe
2180 2185 2190

Asp Lys Ser Gln Asp Asp Ser Leu Ala Leu Thr Gly Leu Met Ile
2195 2200 2205

Leu Glu Asp Leu Gly Val Asp Gln Tyr Leu Leu Asp Leu Ile Glu
2210 2215 2220

Ala Ala Phe Gly Glu Ile Ser Ser Cys His Leu Pro Thr Gly Thr
2225 2230 2235

Arg Phe Lys Phe Gly Ala Met Met Lys Ser Gly Met Phe Leu Thr
2240 2245 2250

Leu Phe Ile Asn Thr Val Leu Asn Ile Thr Ile Ala Ser Arg Val
2255 2260 2265

Leu Glu Gln Arg Leu Thr Asp Ser Ala Cys Ala Ala Phe Ile Gly
2270 2275 2280

Asp Asp Asn Ile Val His Gly Val Ile Ser Asp Lys Leu Met Ala
2285 2290 2295

Glu Arg Cys Ala Ser Trp Val Asn Met Glu Val Lys Ile Ile Asp
2300 2305 2310

Ala Val Met Gly Glu Lys Pro Pro Tyr Phe Cys Gly Gly Phe Ile
2315 2320 2325

Val Phe Asp Ser Val Thr Gln Thr Ala Cys Arg Val Ser Asp Pro
2330 2335 2340

Leu Lys Arg Leu Phe Lys Leu Gly Lys Pro Leu Thr Ala Glu Asp
2345 2350 2355

Lys Gln Asp Glu Asp Arg Arg Arg Ala Leu Ser Asp Glu Val Ser
2360 2365 2370

Lys Trp Phe Arg Thr Gly Leu Gly Ala Glu Leu Glu Val Ala Leu
2375 2380 2385

Thr Ser Arg Tyr Glu Val Glu Gly Cys Lys Ser Ile Leu Ile Ala
2390 2395 2400

Met Ala Thr Leu Ala Arg Asp Ile Lys Ala Phe Lys Lys Leu Arg
2405 2410 2415

Gly Pro Val Ile His Leu Tyr Gly Gly Pro Arg Leu Val Arg
2420 2425 2430

<210> 2

<211> 2432

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of the SFV replicase with the RDR mutation in
positions 1185-1187

<400> 2

Met Ala Ala Lys Val His Val Asp Ile Glu Ala Asp Ser Pro Phe Ile
1 5 10 15

Lys Ser Leu Gln Lys Ala Phe Pro Ser Phe Glu Val Glu Ser Leu Gln
20 25 30

Val Thr Pro Asn Asp His Ala Asn Ala Arg Ala Phe Ser His Leu Ala
35 40 45

Thr Lys Leu Ile Glu Gln Glu Thr Asp Lys Asp Thr Leu Ile Leu Asp
50 55 60

Ile Gly Ser Ala Pro Ser Arg Arg Met Met Ser Thr His Lys Tyr His
65 70 75 80

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

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

Ile Ala Gly Lys Ile Thr Asp Leu Gln Thr Val Met Ala Thr Pro Asp
115 120 125

Ala Glu Ser Pro Thr Phe Cys Leu His Thr Asp Val Thr Cys Arg Thr
130 135 140

Ala Ala Glu Val Ala Val Tyr Gln Asp Val Tyr Ala Val His Ala Pro
145 150 155 160

Thr Ser Leu Tyr His Gln Ala Met Lys Gly Val Arg Thr Ala Tyr Trp
165 170 175

Ile Gly Phe Asp Thr Thr Pro Phe Met Phe Asp Ala Leu Ala Gly Ala
180 185 190

Tyr Pro Thr Tyr Ala Thr Asn Trp Ala Asp Glu Gln Val Leu Gln Ala
195 200 205

Arg Asn Ile Gly Leu Cys Ala Ala Ser Leu Thr Glu Gly Arg Leu Gly
210 215 220

Lys Leu Ser Ile Leu Arg Lys Lys Gln Leu Lys Pro Cys Asp Thr Val
225 230 235 240

Met Phe Ser Val Gly Ser Thr Leu Tyr Thr Glu Ser Arg Lys Leu Leu
245 250 255

Arg Ser Trp His Leu Pro Ser Val Phe His Leu Lys Gly Lys Gln Ser
260 265 270

Phe Thr Cys Arg Cys Asp Thr Ile Val Ser Cys Glu Gly Tyr Val Val
275 280 285

Lys Lys Ile Thr Met Cys Pro Gly Leu Tyr Gly Lys Thr Val Gly Tyr
290 295 300

Ala Val Thr Tyr His Ala Glu Gly Phe Leu Val Cys Lys Thr Thr Asp
305 310 315 320

Thr Val Lys Gly Glu Arg Val Ser Phe Pro Val Cys Thr Tyr Val Pro
325 330 335

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

Pro Glu Asp Ala Gln Lys Leu Leu Val Gly Leu Asn Gln Arg Ile Val
355 360 365

Val Asn Gly Arg Thr Gln Arg Asn Thr Asn Thr Met Lys Asn Tyr Leu
370 375 380

Leu Pro Ile Val Ala Val Ala Phe Ser Lys Trp Ala Arg Glu Tyr Lys
385 390 395 400

Ala Asp Leu Asp Asp Glu Lys Pro Leu Gly Val Arg Glu Arg Ser Leu
405 410 415

Thr Cys Cys Cys Leu Trp Ala Phe Lys Thr Arg Lys Met His Thr Met
420 425 430

Tyr Lys Lys Pro Asp Thr Gln Thr Ile Val Lys Val Pro Ser Glu Phe
435 440 445

Asn Ser Phe Val Ile Pro Ser Leu Trp Ser Thr Gly Leu Ala Ile. Pro
450 455 460

Val Arg Ser Arg Ile Lys Met Leu Leu Ala Lys Lys Thr Lys Arg Glu
465 470 475 480

Leu Ile Pro Val Leu Asp Ala Ser Ser Ala Arg Asp Ala Glu Gln Glu
485 490 495

Glu Lys Glu Arg Leu Glu Ala Glu Leu Thr Arg Glu Ala Leu Pro Pro
500 505 510

Leu Val Pro Ile Ala Pro Ala Glu Thr Gly Val Val Asp Val Asp Val
515 520 525

Glu Glu Leu Glu Tyr His Ala Gly Ala Gly Val Val Glu Thr Pro Arg
530 535 540

Ser Ala Leu Lys Val Thr Ala Gln Pro Asn Asp Val Leu Leu Gly Asn
545 550 555 560

Tyr Val Val Leu Ser Pro Gln Thr Val Leu Lys Ser Ser Lys Leu Ala
565 570 575

Pro Val His Pro Leu Ala Glu Gln Val Lys Ile Ile Thr His Asn Gly
580 585 590

Arg Ala Gly Arg Tyr Gln Val Asp Gly Tyr Asp Gly Arg Val Leu Leu
595 600 605

Pro Cys Gly Ser Ala Ile Pro Val Pro Glu Phe Gln Ala Leu Ser Glu
610 615 620

Ser Ala Thr Met Val Tyr Asn Glu Arg Glu Phe Val Asn Arg Lys Leu
625 630 635 640

Tyr His Ile Ala Val His Gly Pro Ser Leu Asn Thr Asp Glu Glu Asn
645 650 655

Tyr Glu Lys Val Arg Ala Glu Arg Thr Asp Ala Glu Tyr Val Phe Asp
660 665 670

Val Asp Lys Lys Cys Cys Val Lys Arg Glu Glu Ala Ser Gly Leu Val
675 680 685

Leu Val Gly Glu Leu Thr Asn Pro Pro Phe His Glu Phe Ala Tyr Glu
690 695 700

Gly Leu Lys Ile Arg Pro Ser Ala Pro Tyr Lys Thr Thr Val Val Gly
705 710 715 720

Val Phe Gly Val Pro Gly Ser Gly Lys Ser Ala Ile Ile Lys Ser Leu
725 730 735

Val Thr Lys His Asp Leu Val Thr Ser Gly Lys Lys Glu Asn Cys Gln
740 745 750

Glu Ile Val Asn Asp Val Lys Lys His Arg Gly Leu Asp Ile Gln Ala
755 760 765

Lys Thr Val Asp Ser Ile Leu Leu Asn Gly Cys Arg Arg Ala Val Asp
770 775 780

Ile Leu Tyr Val Asp Glu Ala Phe Ala Cys His Ser Gly Thr Leu Leu
785 790 795 800

Ala Leu Ile Ala Leu Val Lys Pro Arg Ser Lys Val Val Leu Cys Gly
805 810 815

Asp Pro Lys Gln Cys Gly Phe Phe Asn Met Met Gln Leu Lys Val Asn
820 825 830

Phe Asn His Asn Ile Cys Thr Glu Val Cys His Lys Ser Ile Ser Arg
835 840 845

Arg Cys Thr Arg Pro Val Thr Ala Ile Val Ser Thr Leu His Tyr Gly
850 855 860

Gly Lys Met Arg Thr Thr Asn Pro Cys Asn Lys Pro Ile Ile Ile Asp
865 870 875 880

Thr Thr Gly Gln Thr Lys Pro Lys Pro Gly Asp Ile Val Leu Thr Cys
885 890 895

Phe Arg Gly Trp Val Lys Gln Leu Gln Leu Asp Tyr Arg Gly His Glu
900 905 910

Val Met Thr Ala Ala Ala Ser Gln Gly Leu Thr Arg Lys Gly Val Tyr
915 920 925

Ala Val Arg Gln Lys Val Asn Glu Asn Pro Leu Tyr Ala Pro Ala Ser
930 935 940

Glu His Val Asn Val Leu Leu Thr Arg Thr Glu Asp Arg Leu Val Trp
945 950 955 960

Lys Thr Leu Ala Gly Asp Pro Trp Ile Lys Val Leu Ser Asn Ile Pro
965 970 975

Gln Gly Asn Phe Thr Ala Thr Leu Glu Glu Trp Gln Glu Glu His Asp
980 985 990

Lys Ile Met Lys Val Ile Glu Gly Pro Ala Ala Pro Val Asp Ala Phe
995 1000 1005

Gln Asn Lys Ala Asn Val Cys Trp Ala Lys Ser Leu Val Pro Val
1010 1015 1020

Leu Asp Thr Ala Gly Ile Arg Leu Thr Ala Glu Glu Trp Ser Thr
1025 1030 1035

Ile Ile Thr Ala Phe Lys Glu Asp Arg Ala Tyr Ser Pro Val Val
1040 1045 1050

Ala Leu Asn Glu Ile Cys Thr Lys Tyr Tyr Gly Val Asp Leu Asp
1055 1060 1065

Ser Gly Leu Phe Ser Ala Pro Lys Val Ser Leu Tyr Tyr Glu Asn
1070 1075 1080

Asn His Trp Asp Asn Arg Pro Gly Gly Arg Met Tyr Gly Phe Asn
1085 1090 1095

Ala Ala Thr Ala Ala Arg Leu Glu Ala Arg His Thr Phe Leu Lys
1100 1105 1110

Gly Gln Trp His Thr Gly Lys Gln Ala Val Ile Ala Glu Arg Lys
1115 1120 1125

Ile Gln Pro Leu Ser Val Leu Asp Asn Val Ile Pro Ile Asn Arg
1130 1135 1140

Arg Leu Pro His Ala Leu Val Ala Glu Tyr Lys Thr Val Lys Gly
1145 1150 1155

Ser Arg Val Glu Trp Leu Val Asn Lys Val Arg Gly Tyr His Val
1160 1165 1170

Leu Leu Val Ser Glu Tyr Asn Leu Ala Leu Pro Arg Asp Arg Val
 1175 1180 1185

Thr Trp Leu Ser Pro Leu Asn Val Thr Gly Ala Asp Arg Cys Tyr
 1190 1195 1200

Asp Leu Ser Leu Gly Leu Pro Ala Asp Ala Gly Arg Phe Asp Leu
 1205 1210 1215

Val Phe Val Asn Ile His Thr Glu Phe Arg Ile His His Tyr Gln
 1220 1225 1230

Gln Cys Val Asp His Ala Met Lys Leu Gln Met Leu Gly Gly Asp
 1235 1240 1245

Ala Leu Arg Leu Leu Lys Pro Gly Gly Ser Leu Leu Met Arg Ala
 1250 1255 1260

Tyr Gly Tyr Ala Asp Lys Ile Ser Glu Ala Val Val Ser Ser Leu
 1265 1270 1275

Ser Arg Lys Phe Ser Ser Ala Arg Val Leu Arg Pro Asp Cys Val
 1280 1285 1290

Thr Ser Asn Thr Glu Val Phe Leu Leu Phe Ser Asn Phe Asp Asn
 1295 1300 1305

Gly Lys Arg Pro Ser Thr Leu His Gln Met Asn Thr Lys Leu Ser
 1310 1315 1320

Ala Val Tyr Ala Gly Glu Ala Met His Thr Ala Gly Cys Ala Pro
 1325 1330 1335

Ser Tyr Arg Val Lys Arg Ala Asp Ile Ala Thr Cys Thr Glu Ala
 1340 1345 1350

Ala Val Val Asn Ala Ala Asn Ala Arg Gly Thr Val Gly Asp Gly
1355 1360 1365

Val Cys Arg Ala Val Ala Lys Lys Trp Pro Ser Ala Phe Lys Gly
1370 1375 1380

Glu Ala Thr Pro Val Gly Thr Ile Lys Thr Val Met Cys Gly Ser
1385 1390 1395

Tyr Pro Val Ile His Ala Val Ala Pro Asn Phe Ser Ala Thr Thr
1400 1405 1410

Glu Ala Glu Gly Asp Arg Glu Leu Ala Ala Val Tyr Arg Ala Val
1415 1420 1425

Ala Ala Glu Val Asn Arg Leu Ser Leu Ser Ser Val Ala Ile Pro
1430 1435 1440

Leu Leu Ser Thr Gly Val Phe Ser Gly Gly Arg Asp Arg Leu Gln
1445 1450 1455

Gln Ser Leu Asn His Leu Phe Thr Ala Met Asp Ala Thr Asp Ala
1460 1465 1470

Asp Val Thr Ile Tyr Cys Arg Asp Lys Ser Trp Glu Lys Lys Ile
1475 1480 1485

Gln Glu Ala Ile Asp Met Arg Thr Ala Val Glu Leu Leu Asn Asp
1490 1495 1500

Asp Val Glu Leu Thr Thr Asp Leu Val Arg Val His Pro Asp Ser
1505 1510 1515

Ser Leu Val Gly Arg Lys Gly Tyr Ser Thr Thr Asp Gly Ser Leu
1520 1525 1530

Tyr Ser Tyr Phe Glu Gly Thr Lys Phe Asn Gln Ala Ala Ile Asp
1535 1540 1545

Met Ala Glu Ile Leu Thr Leu Trp Pro Arg Leu Gln Glu Ala Asn
1550 1555 1560

Glu Gln Ile Cys Leu Tyr Ala Leu Gly Glu Thr Met Asp Asn Ile
1565 1570 1575

Arg Ser Lys Cys Pro Val Asn Asp Ser Asp Ser Ser Thr Pro Pro
1580 1585 1590

Arg Thr Val Pro Cys Leu Cys Arg Tyr Ala Met Thr Ala Glu Arg
1595 1600 1605

Ile Ala Arg Leu Arg Ser His Gln Val Lys Ser Met Val Val Cys
1610 1615 1620

Ser Ser Phe Pro Leu Pro Lys Tyr His Val Asp Gly Val Gln Lys
1625 1630 1635

Val Lys Cys Glu Lys Val Leu Leu Phe Asp Pro Thr Val Pro Ser
1640 1645 1650

Val Val Ser Pro Arg Lys Tyr Ala Ala Ser Thr Thr Asp His Ser
1655 1660 1665

Asp Arg Ser Leu Arg Gly Phe Asp Leu Asp Trp Thr Thr Asp Ser
1670 1675 1680

Ser Ser Thr Ala Ser Asp Thr Met Ser Leu Pro Ser Leu Gln Ser
1685 1690 1695

Cys Asp Ile Asp Ser Ile Tyr Glu Pro Met Ala Pro Ile Val Val
1700 1705 1710

Thr Ala Asp Val His Pro Glu Pro Ala Gly Ile Ala Asp Leu Ala
 1715 1720 1725

Ala Asp Val His Pro Glu Pro Ala Asp His Val Asp Leu Glu Asn
 1730 1735 1740

Pro Ile Pro Pro Pro Arg Pro Lys Arg Ala Ala Tyr Leu Ala Ser
 1745 1750 1755

Arg Ala Ala Glu Arg Pro Val Pro Ala Pro Arg Lys Pro Thr Pro
 1760 1765 1770

Ala Pro Arg Thr Ala Phe Arg Asn Lys Leu Pro Leu Thr Phe Gly
 1775 1780 1785

Asp Phe Asp Glu His Glu Val Asp Ala Leu Ala Ser Gly Ile Thr
 1790 1795 1800

Phe Gly Asp Phe Asp Asp Val Leu Arg Leu Gly Arg Ala Gly Ala
 1805 1810 1815

Tyr Ile Phe Ser Ser Asp Thr Gly Ser Gly His Leu Gln Gln Lys
 1820 1825 1830

Ser Val Arg Gln His Asn Leu Gln Cys Ala Gln Leu Asp Ala Val
 1835 1840 1845

Glu Glu Glu Lys Met Tyr Pro Pro Lys Leu Asp Thr Glu Arg Glu
 1850 1855 1860

Lys Leu Leu Leu Leu Lys Met Gln Met His Pro Ser Glu Ala Asn
 1865 1870 1875

Lys Ser Arg Tyr Gln Ser Arg Lys Val Glu Asn Met Lys Ala Thr
 1880 1885 1890

Val Val Asp Arg Leu Thr Ser Gly Ala Arg Leu Tyr Thr Gly Ala
1895 1900 1905

Asp Val Gly Arg Ile Pro Thr Tyr Ala Val Arg Tyr Pro Arg Pro
1910 1915 1920

Val Tyr Ser Pro Thr Val Ile Glu Arg Phe Ser Ser Pro Asp Val
1925 1930 1935

Ala Ile Ala Ala Cys Asn Glu Tyr Leu Ser Arg Asn Tyr Pro Thr
1940 1945 1950

Val Ala Ser Tyr Gln Ile Thr Asp Glu Tyr Asp Ala Tyr Leu Asp
1955 1960 1965

Met Val Asp Gly Ser Asp Ser Cys Leu Asp Arg Ala Thr Phe Cys
1970 1975 1980

Pro Ala Lys Leu Arg Cys Tyr Pro Lys His His Ala Tyr His Gln
1985 1990 1995

Pro Thr Val Arg Ser Ala Val Pro Ser Pro Phe Gln Asn Thr Leu
2000 2005 2010

Gln Asn Val Leu Ala Ala Ala Thr Lys Arg Asn Cys Asn Val Thr
2015 2020 2025

Gln Met Arg Glu Leu Pro Thr Met Asp Ser Ala Val Phe Asn Val
2030 2035 2040

Glu Cys Phe Lys Arg Tyr Ala Cys Ser Gly Glu Tyr Trp Glu Glu
2045 2050 2055

Tyr Ala Lys Gln Pro Ile Arg Ile Thr Thr Glu Asn Ile Thr Thr
2060 2065 2070

Tyr Val Thr Lys Leu Lys Gly Pro Lys Ala Ala Ala Leu Phe Ala
2075 2080 2085

Lys Thr His Asn Leu Val Pro Leu Gln Glu Val Pro Met Asp Arg
2090 2095 2100

Phe Thr Val Asp Met Lys Arg Asp Val Lys Val Thr Pro Gly Thr
2105 2110 2115

Lys His Thr Glu Glu Arg Pro Lys Val Gln Val Ile Gln Ala Ala
2120 2125 2130

Glu Pro Leu Ala Thr Ala Tyr Leu Cys Gly Ile His Arg Glu Leu
2135 2140 2145

Val Arg Arg Leu Asn Ala Val Leu Arg Pro Asn Val His Thr Leu
2150 2155 2160

Phe Asp Met Ser Ala Glu Asp Phe Asp Ala Ile Ile Ala Ser His
2165 2170 2175

Phe His Pro Gly Asp Pro Val Leu Glu Thr Asp Ile Ala Ser Phe
2180 2185 2190

Asp Lys Ser Gln Asp Asp Ser Leu Ala Leu Thr Gly Leu Met Ile
2195 2200 2205

Leu Glu Asp Leu Gly Val Asp Gln Tyr Leu Leu Asp Leu Ile Glu
2210 2215 2220

Ala Ala Phe Gly Glu Ile Ser Ser Cys His Leu Pro Thr Gly Thr
2225 2230 2235

Arg Phe Lys Phe Gly Ala Met Met Lys Ser Gly Met Phe Leu Thr
2240 2245 2250

Leu Phe Ile Asn Thr Val Leu Asn Ile Thr Ile Ala Ser Arg Val
2255 2260 2265

Leu Glu Gln Arg Leu Thr Asp Ser Ala Cys Ala Ala Phe Ile Gly
2270 2275 2280

Asp Asp Asn Ile Val His Gly Val Ile Ser Asp Lys Leu Met Ala
2285 2290 2295

Glu Arg Cys Ala Ser Trp Val Asn Met Glu Val Lys Ile Ile Asp
2300 2305 2310

Ala Val Met Gly Glu Lys Pro Pro Tyr Phe Cys Gly Gly Phe Ile
2315 2320 2325

Val Phe Asp Ser Val Thr Gln Thr Ala Cys Arg Val Ser Asp Pro
2330 2335 2340

Leu Lys Arg Leu Phe Lys Leu Gly Lys Pro Leu Thr Ala Glu Asp
2345 2350 2355

Lys Gln Asp Glu Asp Arg Arg Arg Ala Leu Ser Asp Glu Val Ser
2360 2365 2370

Lys Trp Phe Arg Thr Gly Leu Gly Ala Glu Leu Glu Val Ala Leu
2375 2380 2385

Thr Ser Arg Tyr Glu Val Glu Gly Cys Lys Ser Ile Leu Ile Ala
2390 2395 2400

Met Ala Thr Leu Ala Arg Asp Ile Lys Ala Phe Lys Lys Leu Arg
2405 2410 2415

Gly Pro Val Ile His Leu Tyr Gly Gly Pro Arg Leu Val Arg
2420 2425 2430

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<211> 2432

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of the SFV replicase with the AAA mutation in positions 1185-1187

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Lys Ser Leu Gln Lys Ala Phe Pro Ser Phe Glu Val Glu Ser Leu Gln
20 25 30

Val Thr Pro Asn Asp His Ala Asn Ala Arg Ala Phe Ser His Leu Ala
35 40 45

Thr Lys Leu Ile Glu Gln Glu Thr Asp Lys Asp Thr Leu Ile Leu Asp
50 55 60

Ile Gly Ser Ala Pro Ser Arg Arg Met Met Ser Thr His Lys Tyr His
65 70 75 80

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

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

Ile Ala Gly Lys Ile Thr Asp Leu Gln Thr Val Met Ala Thr Pro Asp
115 120 125

Ala Glu Ser Pro Thr Phe Cys Leu His Thr Asp Val Thr Cys Arg Thr
130 135 140

Ala Ala Glu Val Ala Val Tyr Gln Asp Val Tyr Ala Val His Ala Pro
145 150 155 160

Thr Ser Leu Tyr His Gln Ala Met Lys Gly Val Arg Thr Ala Tyr Trp
 165 170 175

Ile Gly Phe Asp Thr Thr Pro Phe Met Phe Asp Ala Leu Ala Gly Ala
 180 185 190

Tyr Pro Thr Tyr Ala Thr Asn Trp Ala Asp Glu Gln Val Leu Gln Ala
 195 200 205

Arg Asn Ile Gly Leu Cys Ala Ala Ser Leu Thr Glu Gly Arg Leu Gly
 210 215 220

Lys Leu Ser Ile Leu Arg Lys Lys Gln Leu Lys Pro Cys Asp Thr Val
225 230 235 240

Met Phe Ser Val Gly Ser Thr Leu Tyr Thr Glu Ser Arg Lys Leu Leu
 245 250 255

Arg Ser Trp His Leu Pro Ser Val Phe His Leu Lys Gly Lys Gln Ser
 260 265 270

Phe Thr Cys Arg Cys Asp Thr Ile Val Ser Cys Glu Gly Tyr Val Val
 275 280 285

Lys Lys Ile Thr Met Cys Pro Gly Leu Tyr Gly Lys Thr Val Gly Tyr
 290 295 300

Ala Val Thr Tyr His Ala Glu Gly Phe Leu Val Cys Lys Thr Thr Asp
305 310 315 320

Thr Val Lys Gly Glu Arg Val Ser Phe Pro Val Cys Thr Tyr Val Pro
 325 330 335

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

Pro Glu Asp Ala Gln Lys Leu Leu Val Gly Leu Asn Gln Arg Ile Val
355 360 365

Val Asn Gly Arg Thr Gln Arg Asn Thr Asn Thr Met Lys Asn Tyr Leu
370 375 380

Leu Pro Ile Val Ala Val Ala Phe Ser Lys Trp Ala Arg Glu Tyr Lys
385 390 395 400

Ala Asp Leu Asp Asp Glu Lys Pro Leu Gly Val Arg Glu Arg Ser Leu
405 410 415

Thr Cys Cys Cys Leu Trp Ala Phe Lys Thr Arg Lys Met His Thr Met
420 425 430

Tyr Lys Lys Pro Asp Thr Gln Thr Ile Val Lys Val Pro Ser Glu Phe
435 440 445

Asn Ser Phe Val Ile Pro Ser Leu Trp Ser Thr Gly Leu Ala Ile Pro
450 455 460

Val Arg Ser Arg Ile Lys Met Leu Leu Ala Lys Lys Thr Lys Arg Glu
465 470 475 480

Leu Ile Pro Val Leu Asp Ala Ser Ser Ala Arg Asp Ala Glu Gln Glu
485 490 495

Glu Lys Glu Arg Leu Glu Ala Glu Leu Thr Arg Glu Ala Leu Pro Pro
500 505 510

Leu Val Pro Ile Ala Pro Ala Glu Thr Gly Val Val Asp Val Asp Val
515 520 525

Glu Glu Leu Glu Tyr His Ala Gly Ala Gly Val Val Glu Thr Pro Arg
530 535 540

Ser Ala Leu Lys Val Thr Ala Gln Pro Asn Asp Val Leu Leu Gly Asn
545 550 555 560

Tyr Val Val Leu Ser Pro Gln Thr Val Leu Lys Ser Ser Lys Leu Ala
565 570 575

Pro Val His Pro Leu Ala Glu Gln Val Lys Ile Ile Thr His Asn Gly
580 585 590

Arg Ala Gly Arg Tyr Gln Val Asp Gly Tyr Asp Gly Arg Val Leu Leu
595 600 605

Pro Cys Gly Ser Ala Ile Pro Val Pro Glu Phe Gln Ala Leu Ser Glu
610 615 620

Ser Ala Thr Met Val Tyr Asn Glu Arg Glu Phe Val Asn Arg Lys Leu
625 630 635 640

Tyr His Ile Ala Val His Gly Pro Ser Leu Asn Thr Asp Glu Glu Asn
645 650 655

Tyr Glu Lys Val Arg Ala Glu Arg Thr Asp Ala Glu Tyr Val Phe Asp
660 665 670

Val Asp Lys Lys Cys Cys Val Lys Arg Glu Glu Ala Ser Gly Leu Val
675 680 685

Leu Val Gly Glu Leu Thr Asn Pro Pro Phe His Glu Phe Ala Tyr Glu
690 695 700

Gly Leu Lys Ile Arg Pro Ser Ala Pro Tyr Lys Thr Thr Val Val Gly
705 710 715 720

Val Phe Gly Val Pro Gly Ser Gly Lys Ser Ala Ile Ile Lys Ser Leu
725 730 735

Val Thr Lys His Asp Leu Val Thr Ser Gly Lys Lys Glu Asn Cys Gln
740 745 750

Glu Ile Val Asn Asp Val Lys Lys His Arg Gly Leu Asp Ile Gln Ala
755 760 765

Lys Thr Val Asp Ser Ile Leu Leu Asn Gly Cys Arg Arg Ala Val Asp
770 775 780

Ile Leu Tyr Val Asp Glu Ala Phe Ala Cys His Ser Gly Thr Leu Leu
785 790 795 800

Ala Leu Ile Ala Leu Val Lys Pro Arg Ser Lys Val Val Leu Cys Gly
805 810 815

Asp Pro Lys Gln Cys Gly Phe Phe Asn Met Met Gln Leu Lys Val Asn
820 825 830

Phe Asn His Asn Ile Cys Thr Glu Val Cys His Lys Ser Ile Ser Arg
835 840 845

Arg Cys Thr Arg Pro Val Thr Ala Ile Val Ser Thr Leu His Tyr Gly
850 855 860

Gly Lys Met Arg Thr Thr Asn Pro Cys Asn Lys Pro Ile Ile Ile Asp
865 870 875 880

Thr Thr Gly Gln Thr Lys Pro Lys Pro Gly Asp Ile Val Leu Thr Cys
885 890 895

Phe Arg Gly Trp Val Lys Gln Leu Gln Leu Asp Tyr Arg Gly His Glu
900 905 910

Val Met Thr Ala Ala Ala Ser Gln Gly Leu Thr Arg Lys Gly Val Tyr
915 920 925

Ala Val Arg Gln Lys Val Asn Glu Asn Pro Leu Tyr Ala Pro Ala Ser
930 935 940

Glu His Val Asn Val Leu Leu Thr Arg Thr Glu Asp Arg Leu Val Trp
945 950 955 960

Lys Thr Leu Ala Gly Asp Pro Trp Ile Lys Val Leu Ser Asn Ile Pro
965 970 975

Gln Gly Asn Phe Thr Ala Thr Leu Glu Glu Trp Gln Glu Glu His Asp
980 985 990

Lys Ile Met Lys Val Ile Glu Gly Pro Ala Ala Pro Val Asp Ala Phe
995 1000 1005

Gln Asn Lys Ala Asn Val Cys Trp Ala Lys Ser Leu Val Pro Val
1010 1015 1020

Leu Asp Thr Ala Gly Ile Arg Leu Thr Ala Glu Glu Trp Ser Thr
1025 1030 1035

Ile Ile Thr Ala Phe Lys Glu Asp Arg Ala Tyr Ser Pro Val Val
1040 1045 1050

Ala Leu Asn Glu Ile Cys Thr Lys Tyr Tyr Gly Val Asp Leu Asp
1055 1060 1065

Ser Gly Leu Phe Ser Ala Pro Lys Val Ser Leu Tyr Tyr Glu Asn
1070 1075 1080

Asn His Trp Asp Asn Arg Pro Gly Gly Arg Met Tyr Gly Phe Asn
1085 1090 1095

Ala Ala Thr Ala Ala Arg Leu Glu Ala Arg His Thr Phe Leu Lys
1100 1105 1110

Gly Gln Trp His Thr Gly Lys Gln Ala Val Ile Ala Glu Arg Lys
1115 1120 1125

Ile Gln Pro Leu Ser Val Leu Asp Asn Val Ile Pro Ile Asn Arg
1130 1135 1140

Arg Leu Pro His Ala Leu Val Ala Glu Tyr Lys Thr Val Lys Gly
1145 1150 1155

Ser Arg Val Glu Trp Leu Val Asn Lys Val Arg Gly Tyr His Val
1160 1165 1170

Leu Leu Val Ser Glu Tyr Asn Leu Ala Leu Pro Ala Ala Ala Val
1175 1180 1185

Thr Trp Leu Ser Pro Leu Asn Val Thr Gly Ala Asp Arg Cys Tyr
1190 1195 1200

Asp Leu Ser Leu Gly Leu Pro Ala Asp Ala Gly Arg Phe Asp Leu
1205 1210 1215

Val Phe Val Asn Ile His Thr Glu Phe Arg Ile His His Tyr Gln
1220 1225 1230

Gln Cys Val Asp His Ala Met Lys Leu Gln Met Leu Gly Gly Asp
1235 1240 1245

Ala Leu Arg Leu Leu Lys Pro Gly Gly Ser Leu Leu Met Arg Ala
1250 1255 1260

Tyr Gly Tyr Ala Asp Lys Ile Ser Glu Ala Val Val Ser Ser Leu
1265 1270 1275

Ser Arg Lys Phe Ser Ser Ala Arg Val Leu Arg Pro Asp Cys Val
1280 1285 1290

Thr Ser Asn Thr Glu Val Phe Leu Leu Phe Ser Asn Phe Asp Asn
1295 1300 1305

Gly Lys Arg Pro Ser Thr Leu His Gln Met Asn Thr Lys Leu Ser
1310 1315 1320

Ala Val Tyr Ala Gly Glu Ala Met His Thr Ala Gly Cys Ala Pro
1325 1330 1335

Ser Tyr Arg Val Lys Arg Ala Asp Ile Ala Thr Cys Thr Glu Ala
1340 1345 1350

Ala Val Val Asn Ala Ala Asn Ala Arg Gly Thr Val Gly Asp Gly
1355 1360 1365

Val Cys Arg Ala Val Ala Lys Lys Trp Pro Ser Ala Phe Lys Gly
1370 1375 1380

Glu Ala Thr Pro Val Gly Thr Ile Lys Thr Val Met Cys Gly Ser
1385 1390 1395

Tyr Pro Val Ile His Ala Val Ala Pro Asn Phe Ser Ala Thr Thr
1400 1405 1410

Glu Ala Glu Gly Asp Arg Glu Leu Ala Ala Val Tyr Arg Ala Val
1415 1420 1425

Ala Ala Glu Val Asn Arg Leu Ser Leu Ser Ser Val Ala Ile Pro
1430 1435 1440

Leu Leu Ser Thr Gly Val Phe Ser Gly Gly Arg Asp Arg Leu Gln
1445 1450 1455

Gln Ser Leu Asn His Leu Phe Thr Ala Met Asp Ala Thr Asp Ala
1460 1465 1470

Asp Val Thr Ile Tyr Cys Arg Asp Lys Ser Trp Glu Lys Lys Ile
1475 1480 1485

Gln Glu Ala Ile Asp Met Arg Thr Ala Val Glu Leu Leu Asn Asp
1490 1495 1500

Asp Val Glu Leu Thr Thr Asp Leu Val Arg Val His Pro Asp Ser
1505 1510 1515

Ser Leu Val Gly Arg Lys Gly Tyr Ser Thr Thr Asp Gly Ser Leu
1520 1525 1530

Tyr Ser Tyr Phe Glu Gly Thr Lys Phe Asn Gln Ala Ala Ile Asp
1535 1540 1545

Met Ala Glu Ile Leu Thr Leu Trp Pro Arg Leu Gln Glu Ala Asn
1550 1555 1560

Glu Gln Ile Cys Leu Tyr Ala Leu Gly Glu Thr Met Asp Asn Ile
1565 1570 1575

Arg Ser Lys Cys Pro Val Asn Asp Ser Asp Ser Ser Thr Pro Pro
1580 1585 1590

Arg Thr Val Pro Cys Leu Cys Arg Tyr Ala Met Thr Ala Glu Arg
1595 1600 1605

Ile Ala Arg Leu Arg Ser His Gln Val Lys Ser Met Val Val Cys
1610 1615 1620

Ser Ser Phe Pro Leu Pro Lys Tyr His Val Asp Gly Val Gln Lys
1625 1630 1635

Val Lys Cys Glu Lys Val Leu Leu Phe Asp Pro Thr Val Pro Ser
1640 1645 1650

Val Val Ser Pro Arg Lys Tyr Ala Ala Ser Thr Thr Asp His Ser
1655 1660 1665

Asp Arg Ser Leu Arg Gly Phe Asp Leu Asp Trp Thr Thr Asp Ser
1670 1675 1680

Ser Ser Thr Ala Ser Asp Thr Met Ser Leu Pro Ser Leu Gln Ser
1685 1690 1695

Cys Asp Ile Asp Ser Ile Tyr Glu Pro Met Ala Pro Ile Val Val
1700 1705 1710

Thr Ala Asp Val His Pro Glu Pro Ala Gly Ile Ala Asp Leu Ala
1715 1720 1725

Ala Asp Val His Pro Glu Pro Ala Asp His Val Asp Leu Glu Asn
1730 1735 1740

Pro Ile Pro Pro Pro Arg Pro Lys Arg Ala Ala Tyr Leu Ala Ser
1745 1750 1755

Arg Ala Ala Glu Arg Pro Val Pro Ala Pro Arg Lys Pro Thr Pro
1760 1765 1770

Ala Pro Arg Thr Ala Phe Arg Asn Lys Leu Pro Leu Thr Phe Gly
1775 1780 1785

Asp Phe Asp Glu His Glu Val Asp Ala Leu Ala Ser Gly Ile Thr
1790 1795 1800

Phe Gly Asp Phe Asp Asp Val Leu Arg Leu Gly Arg Ala Gly Ala
1805 1810 1815

Tyr Ile Phe Ser Ser Asp Thr Gly Ser Gly His Leu Gln Gln Lys
1820 1825 1830

Ser Val Arg Gln His Asn Leu Gln Cys Ala Gln Leu Asp Ala Val
1835 1840 1845

Glu Glu Glu Lys Met Tyr Pro Pro Lys Leu Asp Thr Glu Arg Glu
1850 1855 1860

Lys Leu Leu Leu Leu Lys Met Gln Met His Pro Ser Glu Ala Asn
1865 1870 1875

Lys Ser Arg Tyr Gln Ser Arg Lys Val Glu Asn Met Lys Ala Thr
1880 1885 1890

Val Val Asp Arg Leu Thr Ser Gly Ala Arg Leu Tyr Thr Gly Ala
1895 1900 1905

Asp Val Gly Arg Ile Pro Thr Tyr Ala Val Arg Tyr Pro Arg Pro
1910 1915 1920

Val Tyr Ser Pro Thr Val Ile Glu Arg Phe Ser Ser Pro Asp Val
1925 1930 1935

Ala Ile Ala Ala Cys Asn Glu Tyr Leu Ser Arg Asn Tyr Pro Thr
1940 1945 1950

Val Ala Ser Tyr Gln Ile Thr Asp Glu Tyr Asp Ala Tyr Leu Asp
1955 1960 1965

Met Val Asp Gly Ser Asp Ser Cys Leu Asp Arg Ala Thr Phe Cys
1970 1975 1980

Pro Ala Lys Leu Arg Cys Tyr Pro Lys His His Ala Tyr His Gln
1985 1990 1995

Pro Thr Val Arg Ser Ala Val Pro Ser Pro Phe Gln Asn Thr Leu
2000 2005 2010

Gln Asn Val Leu Ala Ala Ala Thr Lys Arg Asn Cys Asn Val Thr
2015 2020 2025

Gln Met Arg Glu Leu Pro Thr Met Asp Ser Ala Val Phe Asn Val
2030 2035 2040

Glu Cys Phe Lys Arg Tyr Ala Cys Ser Gly Glu Tyr Trp Glu Glu
2045 2050 2055

Tyr Ala Lys Gln Pro Ile Arg Ile Thr Thr Glu Asn Ile Thr Thr
2060 2065 2070

Tyr Val Thr Lys Leu Lys Gly Pro Lys Ala Ala Ala Leu Phe Ala
2075 2080 2085

Lys Thr His Asn Leu Val Pro Leu Gln Glu Val Pro Met Asp Arg
2090 2095 2100

Phe Thr Val Asp Met Lys Arg Asp Val Lys Val Thr Pro Gly Thr
2105 2110 2115

Lys His Thr Glu Glu Arg Pro Lys Val Gln Val Ile Gln Ala Ala
2120 2125 2130

Glu Pro Leu Ala Thr Ala Tyr Leu Cys Gly Ile His Arg Glu Leu
2135 2140 2145

Val Arg Arg Leu Asn Ala Val Leu Arg Pro Asn Val His Thr Leu
2150 2155 2160

Phe Asp Met Ser Ala Glu Asp Phe Asp Ala Ile Ile Ala Ser His
2165 2170 2175

Phe His Pro Gly Asp Pro Val Leu Glu Thr Asp Ile Ala Ser Phe
2180 2185 2190

Asp Lys Ser Gln Asp Asp Ser Leu Ala Leu Thr Gly Leu Met Ile
2195 2200 2205

Leu Glu Asp Leu Gly Val Asp Gln Tyr Leu Leu Asp Leu Ile Glu
2210 2215 2220

Ala Ala Phe Gly Glu Ile Ser Ser Cys His Leu Pro Thr Gly Thr
2225 2230 2235

Arg Phe Lys Phe Gly Ala Met Met Lys Ser Gly Met Phe Leu Thr
2240 2245 2250

Leu Phe Ile Asn Thr Val Leu Asn Ile Thr Ile Ala Ser Arg Val
2255 2260 2265

Leu Glu Gln Arg Leu Thr Asp Ser Ala Cys Ala Ala Phe Ile Gly
2270 2275 2280

Asp Asp Asn Ile Val His Gly Val Ile Ser Asp Lys Leu Met Ala
2285 2290 2295

Glu Arg Cys Ala Ser Trp Val Asn Met Glu Val Lys Ile Ile Asp
2300 2305 2310

Ala Val Met Gly Glu Lys Pro Pro Tyr Phe Cys Gly Gly Phe Ile
2315 2320 2325

Val Phe Asp Ser Val Thr Gln Thr Ala Cys Arg Val Ser Asp Pro
2330 2335 2340

Leu Lys Arg Leu Phe Lys Leu Gly Lys Pro Leu Thr Ala Glu Asp
2345 2350 2355

Lys Gln Asp Glu Asp Arg Arg Arg Ala Leu Ser Asp Glu Val Ser
2360 2365 2370

Lys Trp Phe Arg Thr Gly Leu Gly Ala Glu Leu Glu Val Ala Leu
2375 2380 2385

Thr Ser Arg Tyr Glu Val Glu Gly Cys Lys Ser Ile Leu Ile Ala
2390 2395 2400

Met Ala Thr Leu Ala Arg Asp Ile Lys Ala Phe Lys Lys Leu Arg
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Gly Pro Val Ile His Leu Tyr Gly Gly Pro Arg Leu Val Arg
2420 2425 2430

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<223> Nucleic acid sequence of resynthesized sequence of SFV replicase
with inserted heterologous intron which when expressed correspond
to SEQ ID NO:1

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