Figure 1

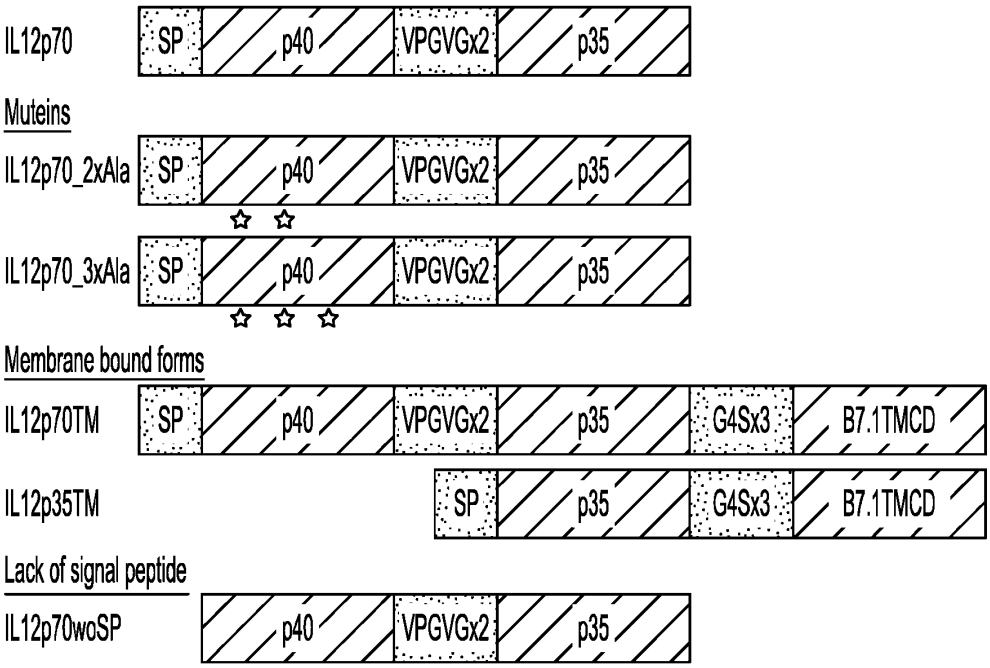

IL12p70
SP
p40
VPGVGx2
p35
Muteins
IL12p70_2xAla
IL12p70_3xAla
Membrane bound forms
IL12p70TM
G4Sx3
B7.1TMCD
IL12p35TM
Lack of signal peptide
IL12p70woSP

Figure 2

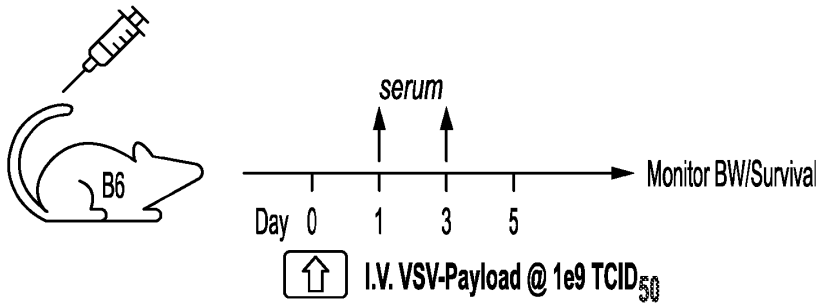


Figure 3

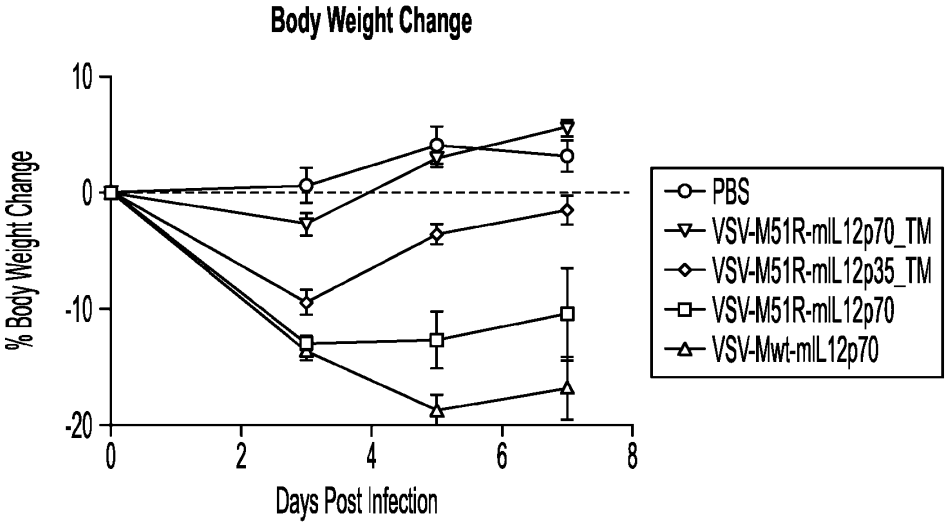


Figure 4A

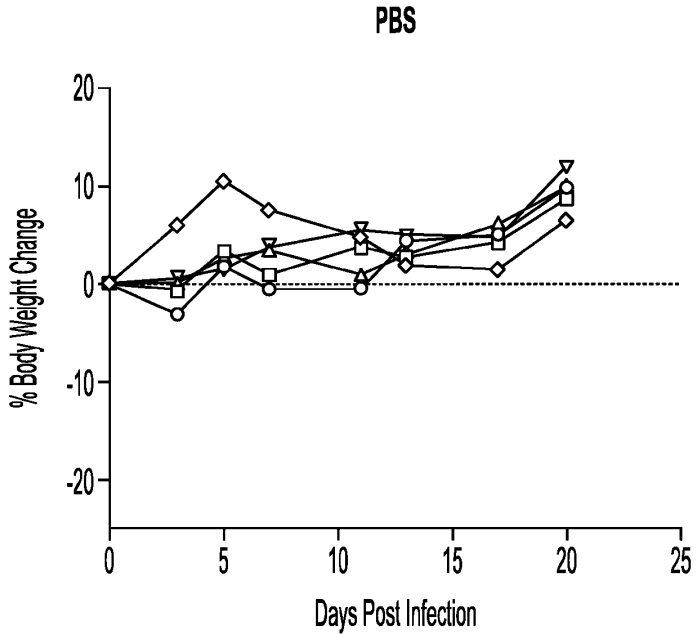

PBS
% Body Weight Change
20
10
0
-10
-20
0
5
10
15
20
25
Days Post Infection

Figure 4B

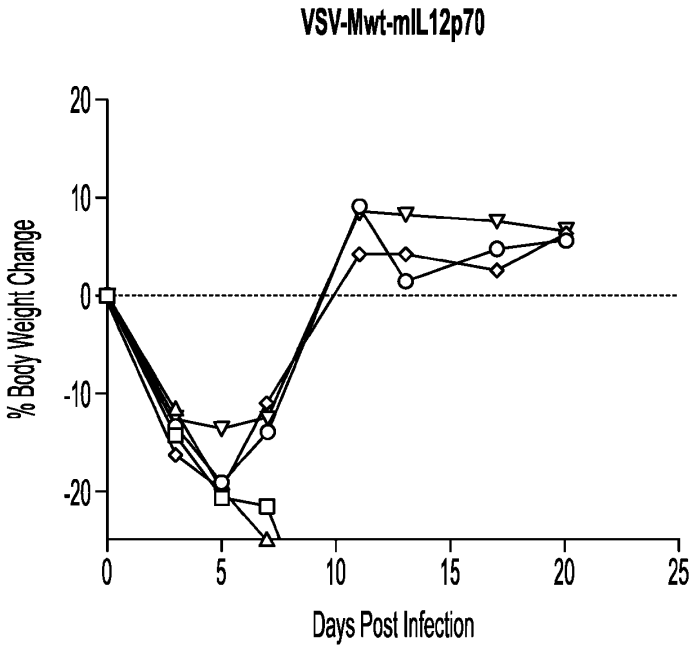

VSV-Mwt-mIL12p70
% Body Weight Change
20
10
0
-10
-20
0
5
10
15
20
25
Days Post Infection

Figure 4C

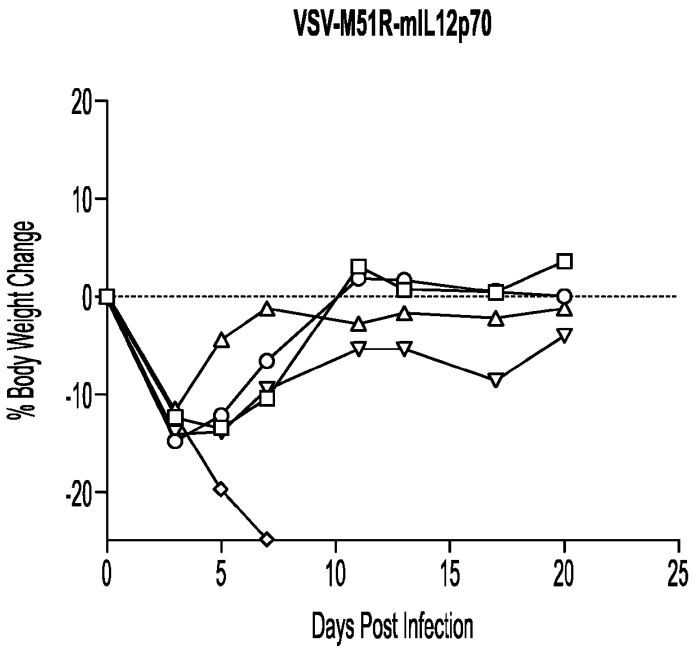

VSV-M51R-mIL12p70
% Body Weight Change
20
10
0
-10
-20
0
5
10
15
20
25
Days Post Infection

Figure 4D

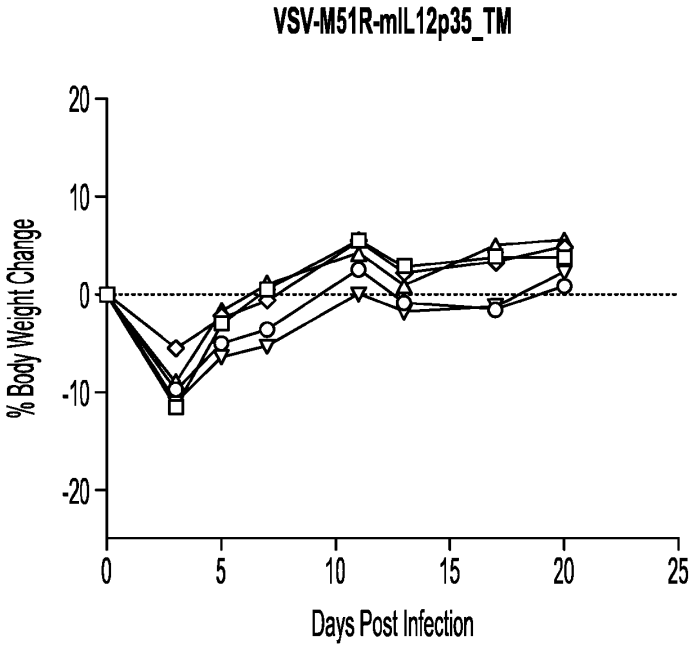

VSV-M51R-mIL12p35_TM
% Body Weight Change
20
10
0
-10
-20
0
5
10
15
20
25
Days Post Infection

Figure 4E

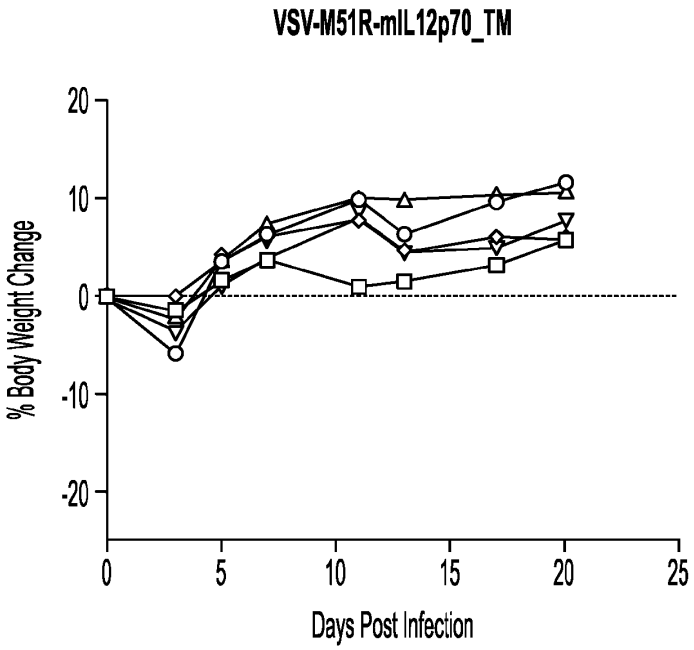

VSV-M51R-mIL12p70_TM
% Body Weight Change
20
10
0
-10
-20
0
5
10
15
20
25
Days Post Infection

Figure 5

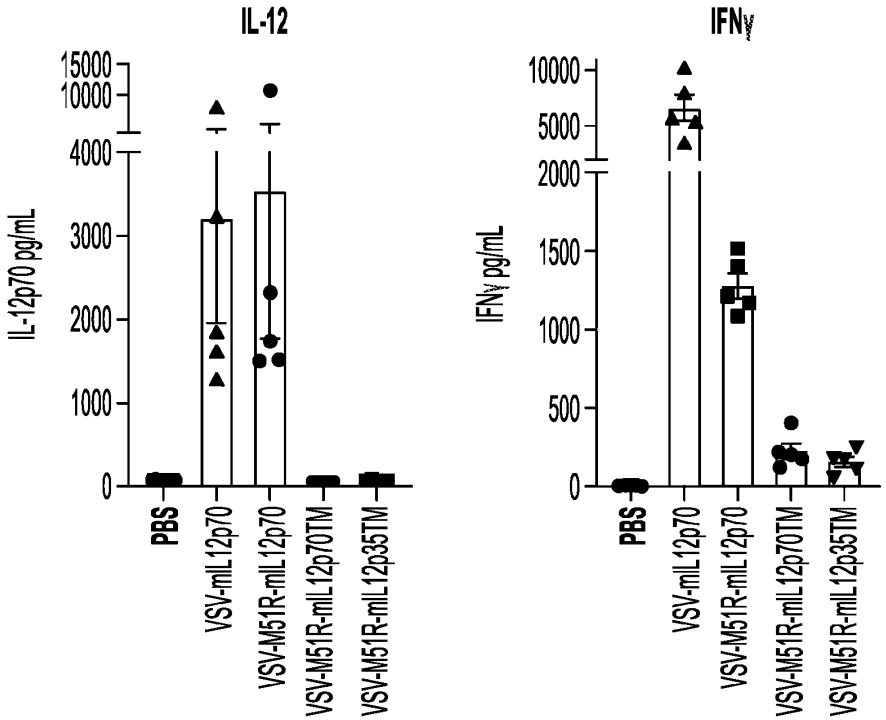


Figure 6

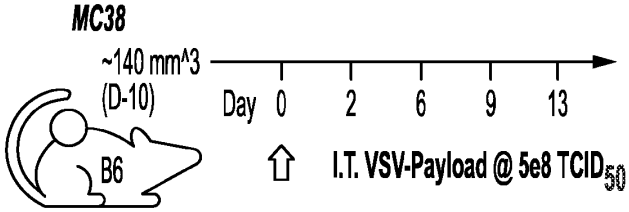


Figure 7

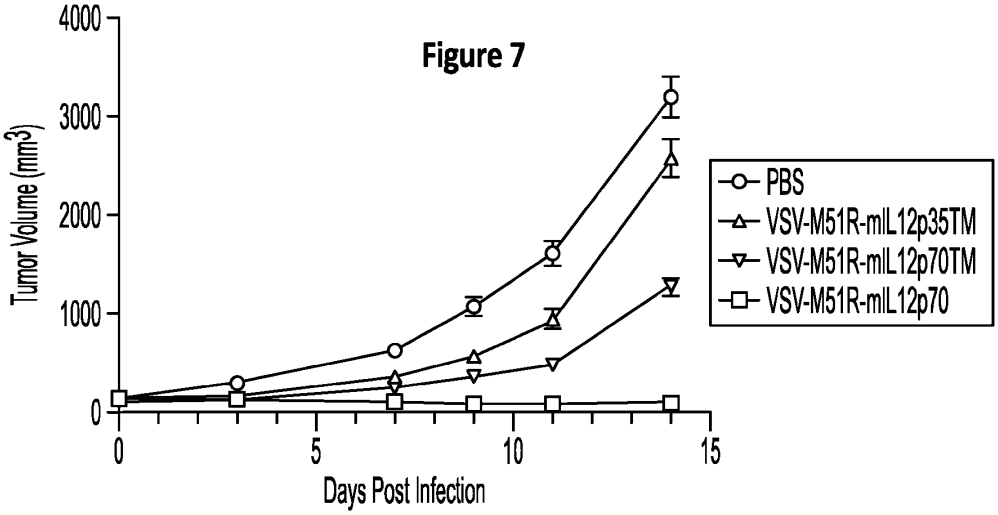


Figure 8

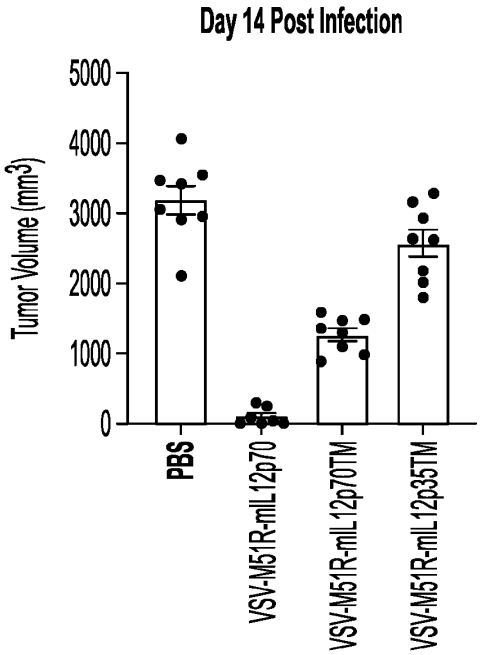


Figure 9

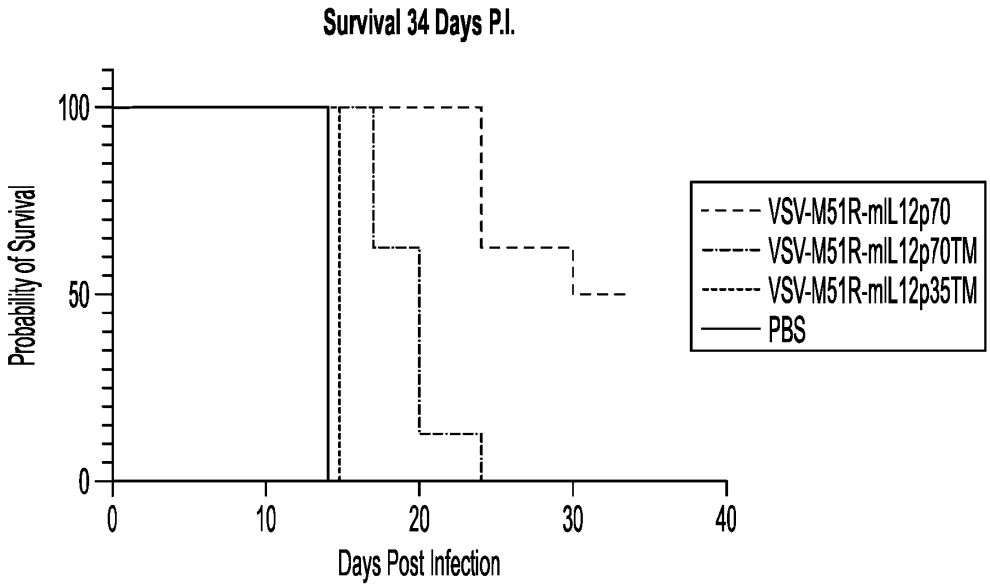

Survival 34 Days P.I.
Probability of Survival
100
50
0
0
10
20
30
40
Days Post Infection
VSV-M51R-mIL12p70
VSV-M51R-mIL12p70TM
VSV-M51R-mIL12p35TM
PBS

Figure 10

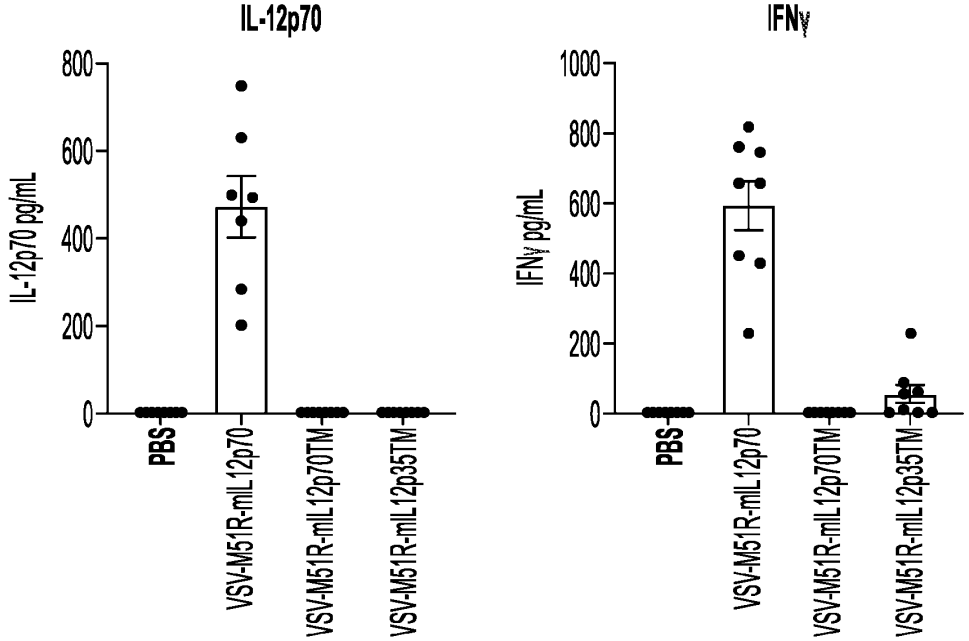

IL-12p70
IL-12p70 pg/mL
800
600
400
200
0
PBS
VSV-M51R-mIL12p70
VSV-M51R-mIL12p70TM
VSV-M51R-mIL12p35TM
IFNγ
IFNγ pg/mL
1000
800
600
400
200
0
PBS
VSV-M51R-mIL12p70
VSV-M51R-mIL12p70TM
VSV-M51R-mIL12p35TM

Figure 11

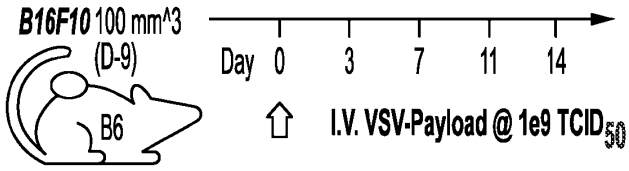


Figure 12

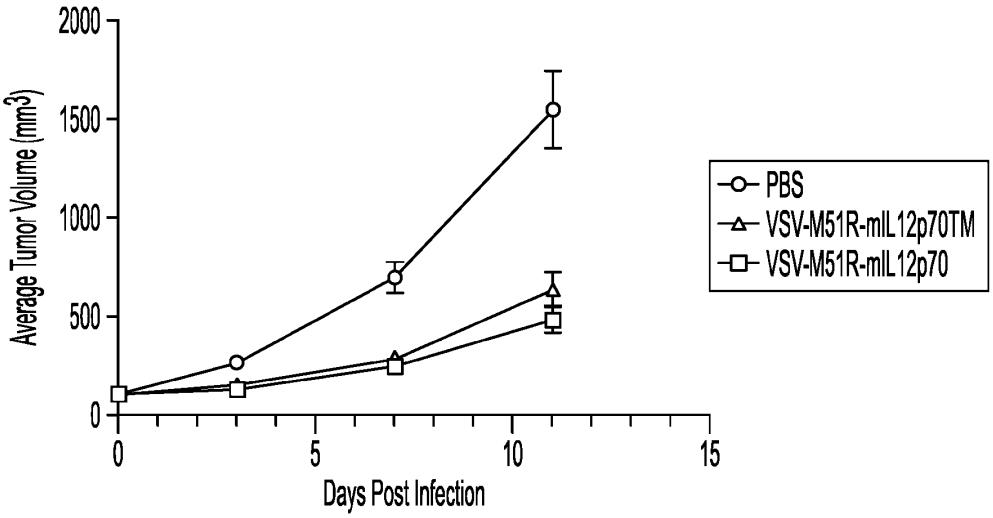


Figure 13

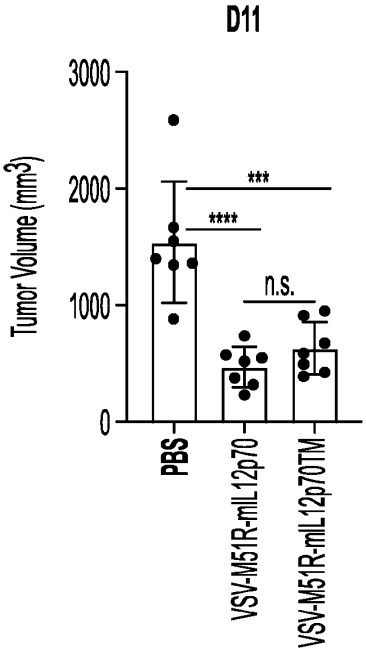

D11
Tumor Volume (mm3)
3000
2000
1000
0
***
****
n.s.
PBS
VSV-M51R-mIL12p70
VSV-M51R-mIL12p70TM

Figure 14

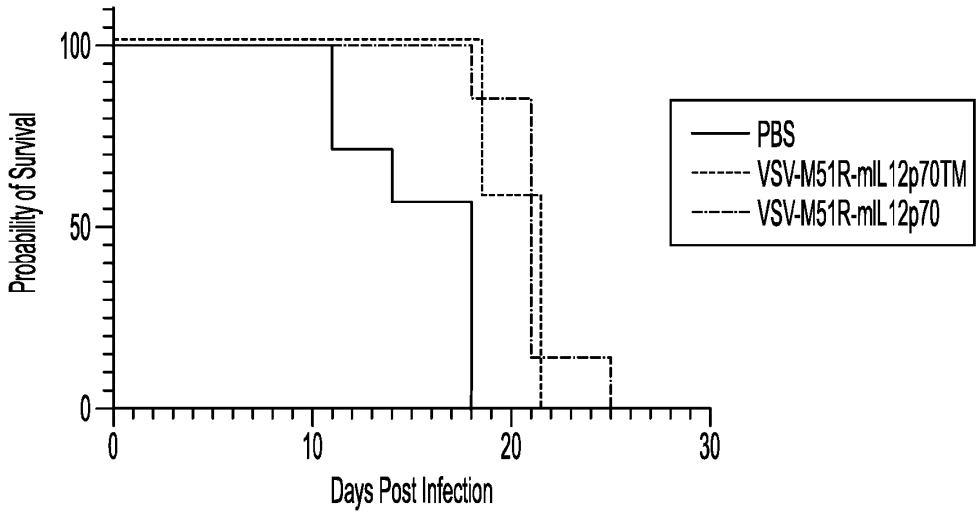


Figure 15

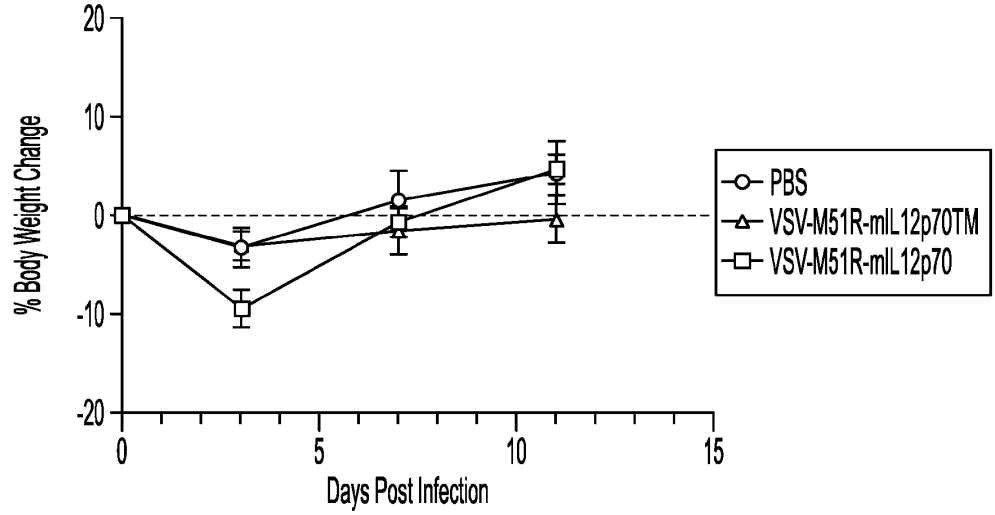


Figure 16

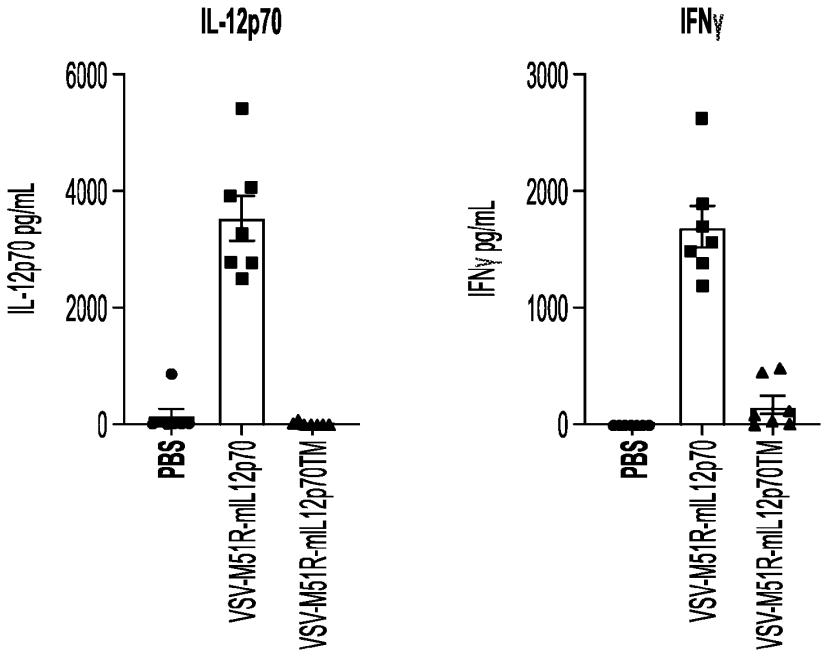

IL-12p70
IL-12p70 pg/mL
6000
4000
2000
0
PBS
VSV-M51R-mIL12p70
VSV-M51R-mIL12p70TM
IFNγ
IFNγ pg/mL
3000
2000
1000
0
PBS
VSV-M51R-mIL12p70
VSV-M51R-mIL12p70TM

Figure 17A

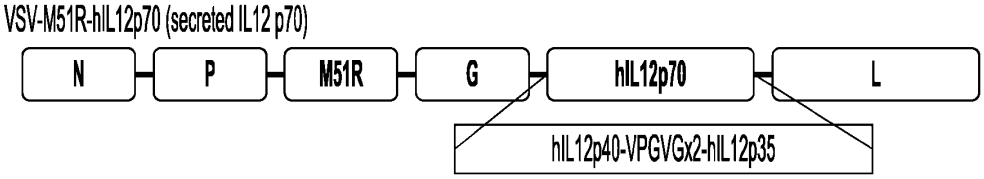


Figure 17B

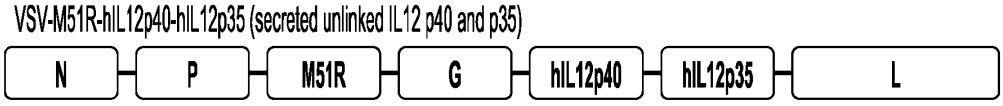


Figure 17C

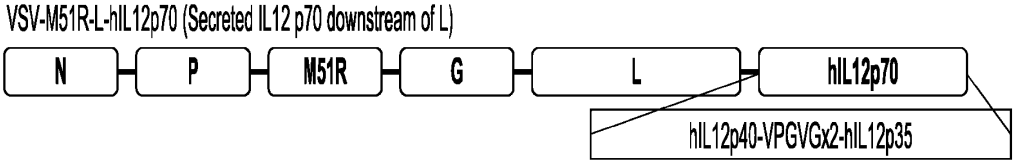


Figure 17D

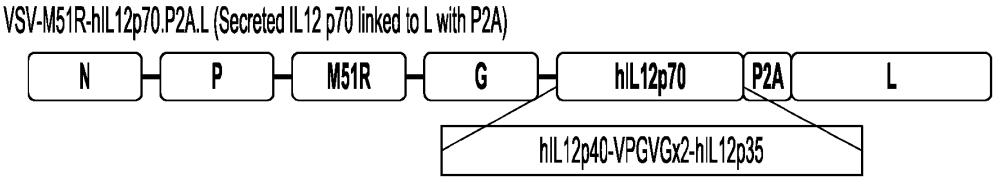


Figure 17E

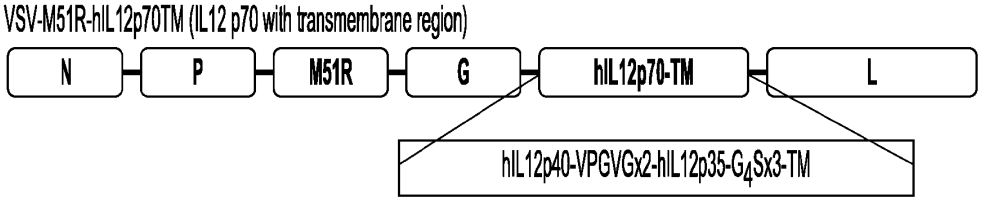


Figure 17F

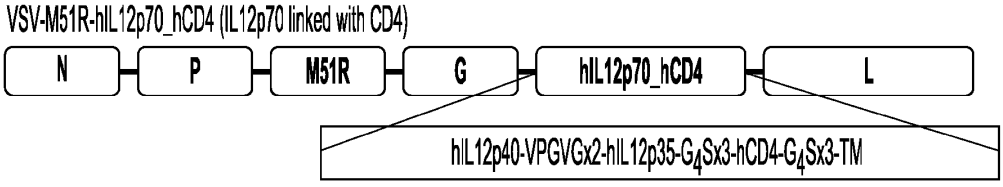


Figure 17G

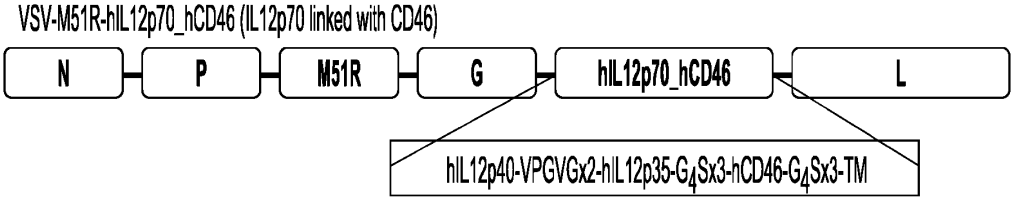


Figure 17H

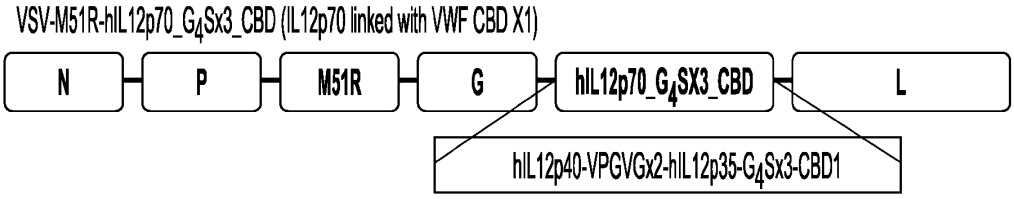


Figure 17I

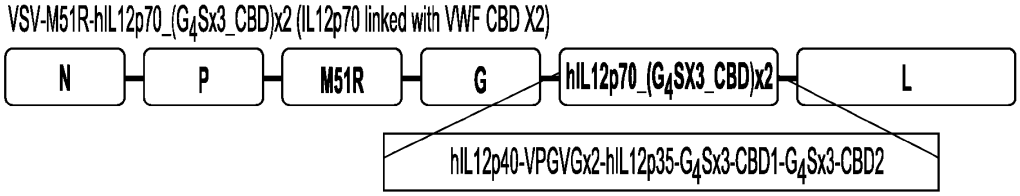


Figure 17J

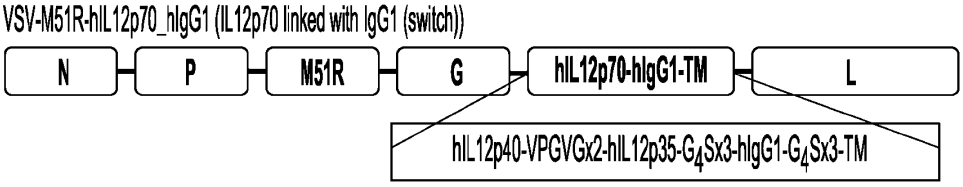


Figure 17K

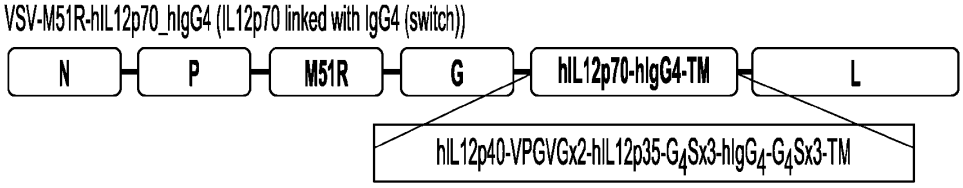


Figure 18A

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 18B

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 18C

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 18D

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct ggagtaggggtacctggagtgggcagaaacctccccgtggccactccagacccaggaatgttccca tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact ctagaatttacccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggattttataaaa actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg atgagctatctgaatgcttcctaa**GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCA ACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACT AACAGCAATC

Figure 18E

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC

Figure 18F

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA

Figure 18G

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA

Figure 18H

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC

(SEQ ID NO: 112)

Figure 18I

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCS**VPGVGVPGVG***RNLPVATPDPGMFPCLH
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 18J

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMW
DSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIR
GWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTN
ICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSL
LNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDR
GIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLAR
IVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPS
IIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLK
GKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKS
YEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHN
NTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKK
SRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETK
RWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSL
YEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLK
EMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATI
YLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIV
RSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAP
CNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISW
FVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATT
DTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPP
DVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSL
FPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSL
TRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDF
IGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHAC
KFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHY
KIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETL
GGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYV
HRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEP
NPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSH

Figure 18K

VSV - M51R - hIL12p70 (secreted human IL12 p70)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)* / **VSV-L (bold underline)**

AAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEK
DIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQ
VRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD

(SEQ ID NO: 113)

Figure 19A

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 19B

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 19C

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 19D

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagttaaGGC GCGCCTATGAAAAAAACTAACAGATATC*atgtgtccagcgcgcagcctcctccttgtggctaccct ggtcctcctggaccacctcagtttggccagaaacctccccgtggccactccagacccaggaatgtt cccatgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagaca aactctagaattttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaac cagcacagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagaga gacctctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtg ccttagtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagct tctgatggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgat gcaggccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggattttta taaaactaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatag agtgatgagctatctgaatgcttcctaa*GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAA ATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAA AACTAACAGCAATC

Figure 19E

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC

Figure 19F

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA

Figure 19G

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA

Figure 19H

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC

(SEQ ID NO: 114)

Figure 19I

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCSMCPARSLLLVATLVLLDHLSLARNLPV
ATPDPGMFPCLHHSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKN
ESCLNSRETSFITNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNM
LAVIDELMQALNFNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 19J

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMW
DSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIR
GWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTN
ICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSL
LNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDR
GIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLAR
IVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPS
IIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLK
GKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKS
YEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHN
NTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKK
SRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETK
RWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSL
YEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLK
EMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATI
YLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIV
RSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAP
CNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISW
FVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATT
DTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPP
DVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSL
FPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSL
TRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDF
IGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHAC
KFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHY
KIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETL
GGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYV
HRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEP
NPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSH
AAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEK

Figure 19K

VSV - M51R - hIL12p40 - hIL12p35 (secreted unlinked IL12 p40 and p35, human)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*** / *hIL12p35 (italics underline)* / **VSV-L (bold underline)**

DIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQ
VRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD

(SEQ ID NO: 115)

Figure 20A

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)** -*hIL12p35 (italics underline)*

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 20B

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 20C

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)** -*hIL12p35 (italics underline)*

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTG
ATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCA
ATC

Figure 20D

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC

Figure 20E

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA

Figure 20F

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA

Figure 20G

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAATCCTG
CTAGGTATGAAAAAAACTAACAGATATCAGGCGCGCCTGCCACC***atgtgtcaccagcagttggtca***
tctcttggttttccctggtttttctggcatctcccctcgtggccatatgggaactgaagaaagatg
tttatgtcgtagaattggattggtatccggatgcccctggagaaatggtggtcctcacctgtgaca
cccctgaagaagatggtatcacctggaccttggaccagagcagtgaggtcttaggctctggcaaaa
ccctgaccatccaagtcaaagagtttggagatgctggccagtacacctgtcacaaaggaggcgagg
ttctaagccattcgctcctgctgcttcacaaaaaggaagatggaatttggtccactgatattttaa
aggaccagaaagaacccaaaaataagacctttctaagatgcgaggccaagaattattctggacgtt
tcacctgctggtggctgacgacaatcagtactgatttgacattcagtgtcaaaagcagcagaggct
cttctgacccccaaggggtgacgtgcggagctgctacactctctgcagagagagtcagaggggaca
acaaggagtatgagtactcagtggagtgccaggaggacagtgcctgcccagctgctgaggagagtc
tgcccattgaggtcatggtggatgccgttcacaagctcaagtatgaaaactacaccagcagcttct
tcatcagggacatcatcaaacctgacccacccaagaacttgcagctgaagccattaaagaattctc
ggcaggtggaggtcagctgggagtaccctgacacctggagtactccacattcctacttctccctga
cattctgcgttcaggtccagggcaagagcaagagagaaaagaaagatagagtcttcacggacaaga
cctcagccacggtcatctgccgcaaaaatgccagcattagcgtgcgggcccaggaccgctactata
gctcatcttggagcgaatgggcatctgtgccctgcagtgttcctggagtaggggtacctggagtggg
gc

Figure 20H

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

agaaacctccccgtggccactccagacccaggaatgttcccatgccttcaccactcccaaaacctg
ctgagggccgtcagcaacatgctccagaaggccagacaaactctagaattttacccttgcacttct
gaagagattgatcatgaagatatcacaaaagataaaaccagcacagtggaggcctgtttaccattg
gaattaaccaagaatgagagttgcctaaattccagagagacctctttcataactaatgggagttgc
ctggcctccagaaagacctcttttatgatggccctgtgccttagtagtatttatgaagacttgaag
atgtaccaggtggagttcaagaccatgaatgcaaagcttctgatggatcctaagaggcagatcttt
ctagatcaaaacatgctggcagttattgatgagctgatgcaggccctgaatttcaacagtgagact
gtgccacaaaaatcctcccttgaagaaccggatttttataaaactaaaatcaagctctgcatactt
cttcatgctttcagaattcgggcagtgactattgatagagtgatgagctatctgaatgcttcctaa
AAAATCATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGG
TTTTTATTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCC
GGCTGGGCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCT
GCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCC
CTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGC
CGC

(SEQ ID NO: 116)

Figure 20I

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK

Figure 20J

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMW
DSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIR
GWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTN
ICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSL
LNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDR
GIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLAR
IVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPS
IIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLK
GKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKS
YEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHN
NTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKK
SRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETK
RWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSL
YEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLK
EMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATI
YLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIV
RSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAP
CNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISW
FVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATT
DTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPP
DVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSL
FPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSL
TRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDF
IGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHAC
KFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHY
KIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETL
GGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYV
HRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEP
NPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSH
AAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEK

Figure 20K

VSV -M51R -L-hIL12p70 (secreted human IL12 p70 downstream of L)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / **VSV-L (bold underline)** / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*

DIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQ
VRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD*MCH*
QQLVISWFSLVFLASPLVAIWELKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVL
GSGKTLTIQVKEFGDAGQYTCHKGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKN
YSGRFTCWWLTTISTDLTFSVKSSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPA
AEESLPIEVMVDAVHKLKYENYTSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHS
***YFSLTFCVQVQGKSKREKKDRVFTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCS*VPGVG**
VPGVG*RNLPVATPDPGMFPCLHHSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVE*
ACLPLELTKNESCLNSRETSFITNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDP
KRQIFLDQNMLAVIDELMQALNFNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSY
LNAS

(SEQ ID NO: 117)

Figure 21A

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 21B

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)-****hIL12p35 (italics underline)-GSG-P2A (italics heavy dash underline)-***VSV-L (bold underline)*

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 21C

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)-****hIL12p35 (italics underline)-GSG-P2A (italics heavy dash underline)-***VSV-L (bold underline)*

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 21D

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

***atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact ctagaatttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg atgagctatctgaatgcttcc*GGAAGCGGAGCTACTAACTTCAGCCTGCTGAAGCAGGCTGGAGAC GTGGAGGAGAACCCTGGACCA**

Figure 21E

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT

Figure 21F

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT

Figure 21G

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT

Figure 21H

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC

(SEQ ID NO: 118)

Figure 21I

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCSVPGVGVPGVG

Figure 21J

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

RNLPVATPDPGMFPCLHHSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPL
ELTKNESCLNSRETSFITNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIF
LDQNMLAVIDELMQALNFNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNASG
*SGATNFSLLKQAGDVEENPGP***MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPL**
ISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYS
FLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEV
ELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQ
TVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVP
QFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQ
VTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFG
DKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWK
EFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMA
DDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTH
EFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNT
AVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSA
DYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYN
YFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDP
VTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEV
KKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQN
SRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGT
TVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPW
ERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSR
MSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIAC
KSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRC
IGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANA
VYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEK
GKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWED
IHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPP
RIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLL

Figure 21K

VSV-M51R-hIL12p70.P2A.L (secreted human IL12 p70 linked to L with P2A)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GSG-P2A (italics heavy dash underline)*-**VSV-L (bold underline)**

ELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVM
DMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFS
SSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIP
DPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDG
IAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTR
ISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKED
RSILMLKSDLHEENSWRD

(SEQ ID NO: 119)

Figure 22A

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 22B

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 22C

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 22D

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact ctagaatttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc tctttcataactaatgggagttgcctggcctccagaaagacctctttatgatggccctgtgcctt agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg atgagctatctgaatgcttcc*GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCC ctgctcccatcctgggccattaccttaatctcagtaaatggaatttttgtgatatgctgcctgacc tactgctttgccccaagatgcagagagagaaggaggaatgagagattgagaagggaaagtgtacgc cctgtataa*GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATG CTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC

Figure 22E

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT

Figure 22F

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA

Figure 22G

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 22H

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 120)

Figure 22I

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCS**VPGVGVPGVG***RNLPVATPDPGMFPCLH
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
*FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS*GGGGSGGGGSGGGGSLLP
*SWAITLISVNGIFVICCLTYCFAPRCRERRRNERLRRESVRPV***MEVHDFETDEFNDFNEDDYATRE**
FLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTS

Figure 22J

VSV-M51R-hIL12p70TM (IL12 p70 with transmembrane region)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-TM (italics heavy dash underline)* / **VSV-L (bold underline)**

QMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILA
YLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKK
LDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIK
MVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYG
SFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHD
HPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNP
NTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREY
FVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLS
NGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGL
RQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMT
AIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSV
STNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLD
PSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLV
EDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRF
LSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMW
TCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSS
RGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEE
WTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQ
ITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQI
YPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLM
RASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPT
SNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKD
KNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRG
TITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGS
GGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDP
RTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESE
KNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQE
FARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAI
ISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAV
SVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLK
WSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD

(SEQ ID NO: 121)

Figure 23A

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 23B

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)-****hIL12p35 (italics underline)-GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 23C

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)***-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 23D

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact ctagaatttacccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg atgagctatctgaatgcttcc

Figure 23E

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)***-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCaagaaagtggtgctgggcaaa
aaaggggatacagtggaactgacctgtacagcttcccagaagaagagcatacaattccactggaaa
aactccaaccagataaagattctgggaaatcagggctccttcttaactaaaggtccatccaagctg
aatgatcgcgctgactcaagaagaagccctttgggaccaaggaaacttccccctgatcatcaagaat
cttaagatagaagactcagatacttacatctgtgaagtggaggaccagaaggaggaggtgcaattg
ctagtgttcggattgactgccaactctgacacccacctgcttcaggggcagagcctgaccctgacc
ttggagagccccccctggtagtagcccctcagtgcaatgtaggagtccaaggggtaaaaacatacag
gggggaagaccctctccgtgtctcagctggagctccaggatagtggcacctggacatgcactgtc
ttgcagaaccagaagaaggtggagttcaaaatagacatcgtggtgcttgctttccagaaggcctcc
agcatagtctataagaaagaggggggaacaggtggagttctccttcccactcgcctttacagttgaa
aagctgacgggcagtggcgagctgtggtggcaggcggagagggcttcctcctccaagtcttggatc
acctttgacctgaagaacaaggaagtgtctgtaaaatgggttacccaggaccctaagctccagatg
ggcaagaagctcccgctccacctcaccctgccccaggccttgcctcagtatgctggctctggaaac
ctcaccctggcccttgaagcgaaaacaggaaagttgcatcaggaagtgaacctggtggtgatgaga
gccactcagctccagaaaaatttgacctgtgaggtgtggggacccacctcccctaagctgatgctg
agcttgaaactggagaacaaggaggcaaaggtctcgaagcgggagaaggcggtgtgggtgctgaac
cctgaggcggggatgtggcagtgtctgctgagtgactcgggacaggtcctgctggaatccaacatc
aaggttctgcccacatggtccaccccggtgcagccaatggccctgattgtgctgggggcgtcgcc
ggcctcctgcttttcattgggctaggcatcttcttctgtgtcaggtgccggcaccgaaggcgccaa
gcagagcggatgtctcagatcaagagactcctcagtgagaagaagacctgccagtgccctcaccgg
*tttcagaagacatgtagccccatttga*GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAA
TCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAA
ACTAACAGCAATC

Figure 23F

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC

Figure 23G

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA

Figure 23H

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 23I

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 122)

Figure 23J

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)***-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCS*VPGVGVPGVGRNLPVATPDPGMFPCLH
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 23K

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GGGGSGGGGSGGGGSKKVVLGKKGDTVELTCTASQKKSIQFHWKNSNQIKILGNQGSFLTKGPSKL
NDRADSRRSLWDQGNFPLIIKNLKIEDSDTYICEVEDQKEEVQLLVFGLTANSDTHLLQGQSLTLT
LESPPGSSPSVQCRSPRGKNIQGGKTLSVSQLELQDSGTWTCTVLQNQKKVEFKIDIVVLAFQKAS
SIVYKKEGEQVEFSFPLAFTVEKLTGSGELWWQAERASSSKSWITFDLKNKEVSVKRVTQDPKLQM
GKKLPLHLTLPQALPQYAGSGNLTLALEAKTGKLHQEVNLVVMRATQLQKNLTCEVWGPTSPKLML
SLKLENKEAKVSKREKAVWVLNPEAGMWQCLLSDSGQVLLESNIKVLPTWSTPVQPMALIVLGGVA
*GLLLFIGLGIFFCVRCRHRRQAERMSQIKRLLSEKKTCQCPHRFQKTCSPI***MEVHDFETDEFNDF**
NEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTS
CQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKER
WTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFI
SEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQ
GNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKT
VDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWF
VNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSE
VLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFS
LMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEK
WNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQ
GQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQM
VSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIP
TCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSST
FKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKF
RITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLW
SINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLH
LRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCP
DGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILS
NIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFL
FQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEG
SWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGF
LKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIP
HKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQIL
YKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSY

Figure 23L

VSV-M51R-hIL12p70_hCD4 (IL12p70 linked with CD4)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD4TM (italics heavy dash underline)* / **VSV-L (bold underline)**

PPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYR
DFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCW
EYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKT
YGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNL
YAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLL
TISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQ
SFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQL
CRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD

(SEQ ID NO: 123)

Figure 24A

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 24B

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 24C

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 24D

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact ctagaatttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg atgagctatctgaatgcttcc

Figure 24E

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCtgtgaggagccaccaacattt
gaagctatggagctcattggtaaaccaaaaccctactatgagattggtgaacgagtagattataag
tgtaaaaaaggatacttctatatacctcctcttgccacccatactatttgtgatcggaatcataca
tggctacctgtctcagatgacgcctgttatagaggaaacatgtccatatatacgggatcctttaaat
ggccaagcagtccctgcaaatgggacttacgagtttggttatcagatgcactttatttgtaatgag
ggttattacttaattggtgaagaaattctatattgtgaacttaaaggatcagtagcaatttggagc
ggtaagcccccaatatgtgaaaaggttttgtgtacaccacctccaaaaataaaaaatggaaaacac
acctttagtgaagtagaagtatttgagtatcttgatgcagtaacttatagttgtgatcctgcacct
ggaccagatccattttcacttattggagagagcacgatttattgtggtgacaattcagtgtggagt
cgtgctgctccagagtgtaaagtggtcaaatgtcgatttccagtagtcgaaaatggaaaacagata
tcaggatttggaaaaaaattttactacaaagcaacagttatgtttgaatgcgataagggtttttac
ctcgatggcagcgacacaattgtctgtgacagtaacagtacttgggatcccccagttccaaagtgt
cttaaaggtcctaggcctacttacaagcctccagtctcaaattatccaggatatcctaaacctgag
gaaggaatacttgacagtttggatgtttgggtcattgctgtgattgttattgccatagttgttgga
gttgcagtaatttgtgttgtcccgtacagatatcttcaaaggaggaagaagaaaggcacataccta
*actgatgagacccacagagaagtaaaatttacttctctctga*GCTAAGCAAATACAACAGATTCTT
CATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTA
ATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGA**
TTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAA
TCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGATGATATTGACAATTTAATCAGGAAATT
CAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAAC
GTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTC
TGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAAC
ATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGA
AAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTT
GACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAA
AGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTT
TATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATATTCTAATGGACCGAAACTTTCTGTTAAT
GGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATCCATGGTATGTAGAATAGACAACCT
GTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAG
GCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAA

Figure 24F

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGAAAATCATATCAAGACTTC
TGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAA
AACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTA
TTACACTGGACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGC
AAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTG
GTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATG
GCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTT
TGAAATACCCGACTTACTAGACCCATCGATAATATACTCTGACAAAAGTCATTCAATGAATAGGTC
AGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGAC
TATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGA
TGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTT
CTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATATTTGATAAAGACTCATTT
CGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGA
TTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGCCAATCACATTGATTACGA
AAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTT
AGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGG
AAGACCAGACTTGATGCGTGTTCACAACAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTG
GCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGT
TATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGT
TATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCA
AATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTT
GATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAATTATGGAAAAATACCGATTTTCCG
TGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGTGACTTGTGTCACCAATGACCAAAT
ACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGA
GAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGACATTTGCTAGACTCTTGTTGATGAT
GCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTC
TACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTC
CAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCA
TGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAA
GTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAAT
GAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAG

Figure 24G

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GAACCAGGTGATTAAGGATGCAACCATATATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTT
ATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGT
CGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTA
TCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACT
TCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCATGCTGACACATTAAGATA
CAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACA
ACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTG
TCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAAC
ATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGC
TACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACT
TTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGG
GTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGC
AGCATTGACCAGGTTGATGGCAACTACAGACACCATGAGGGATCTGGGAGATCAGAATTTCGACTT
TTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCACCACTGTTGCAAGAGACGGATGGATCAC
CAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCT
GGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGA
AGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACC
TGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAA
ATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGG
TTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAG
TCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATT
GAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGGACCTATTAGAGACGAATTAGAAACGAT
TCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTA
CTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATACAGATCACATTATTCACAATTATGGTT
ATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAAT
CCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTC
ATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTGAAATTCTTCACCAAGGACATATTATT
GTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAG
CTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCCTGTTTATTATACGACCAC
CCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTT
GGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACATGGAATGGGAATCCATTA

Figure 24H

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

CAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGT
GCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCC
TGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATG
TTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGG
CTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAA
AATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAA
GACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAA
GACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAA
AGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAA
CCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTAC
CTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGTAAACATTGAGACTATGCTACAAAT
ATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTT
ATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTATAACATCAATCATATCAGAGTAGG
ACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTAT
AAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCA
GCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTAC
TAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGAT
CAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCA
GCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGA
ATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACTGATGTTGAAGAGTGACCTACACGA
GGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTT
GATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGG
TCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGA
ATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGT
TGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGG
AGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 124)

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF

Figure 24I

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCSVPGVGVPGVG*RNLPVATPDPGMFPCLH*
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 24J

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GGGGSGGGGSGGGGSCEEPPTFEAMELIGKPKPYYEIGERVDYKCKKGYFYIPPLATHTICDRNHT
WLPVSDDACYRETCPYIRDPLNGQAVPANGTYEFGYQMHFICNEGYYLIGEEILYCELKGSVAIWS
GKPPICEKVLCTPPPKIKNGKHTFSEVEVFEYLDAVTYSCDPAPGPDPFSLIGESTIYCGDNSVWS
RAAPECKVVKCRFPVVENGKQISGFGKKFYYKATVMFECDKGFYLDGSDTIVCDSNSTWDPPVPKC
LKGPRPTYKPPVSNYPGYPKPEEGILDSLDVWVIAVIVIAIVVGVAVICVVPYRYLQRRKKKGTYL
*TDETHREVKFTSL*MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNL
IRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKE
AEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLART
FKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCR
IDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENH
IKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDID
VSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPL
IKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDE
KGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIK
KMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLI
YYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQG
DNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKI
PIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARL
LLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFW
RFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESR
QTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSF
KKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEM
LGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPL
IKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFAS
QSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIE
EITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDL
AYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYL
IDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYS
QLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTK

Figure 24K

VSV-M51R-hIL12p70_hCD46 (IL12p70 linked with CD46)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hCD46TM (italics heavy dash underline)* / **VSV-L (bold underline)**

DILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLS
GIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMR
GASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSS
TSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVY
MVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIET
MLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIA
ITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPI
GNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKS
DLHEENSWRD

(SEQ ID NO: 125)

Figure 25A

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 25B

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 25C

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 25D

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-****CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctcccctcgtggcc atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct ggagtaggggtacctggagtgggc *agaaacctccccgtggccactccagacccaggaatgttccca tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact ctagaattttacccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg atgagctatctgaatgcttcc*

Figure 25E

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-****CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCgagtccaaatcttgtgacaaa
actcacacatgcccaccgtgcccagcacctgaactcctgggggggaccgtcagtcttcctcttcccc
ccaaaacccaaggacaccctcatgatctcccggacccctgaggtcacatgcgtggtggtggacgtg
agccacgaagaccctgaggtcaagttcaactggtacgtggacggcgtggaggtgcataatgccaag
acaaagccacgggaggagcagtacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcac
caggactggctgaatggcaaggagtacaagtgcaaggtctccaacaaagccctcccagcccccatc
gagaaaaccatctccaaagccaaagggcagccccgagagccacaggtgtacaccctgcccccatcc
cgggatgagctgaccaagaaccaggtcagcctgacctgcctggtcaaaggcttctatcccagcgac
atcgccgtggagtgggagagcaatgggcagccggagaacaactacaagaccacgcctcccgtgctg
gactccgacggctccttcttcctctacagcaagctcaccgtggacaagagcaggtggcagcaggag
aacgtcttctcatgctccgtgatgcatgaggctctgcacaaccactacacgcagaagagcctctcc
*ctgtctccgggtaaa**ctgctcccatcctgggccattaccttaatctcagtaaatggaatttttgtg***
atatgctgcctgacctactgctttgccccaagatgcagagagagaaggaggaatgagagattgaga
agggaaagtgtacgccctgtatgaGCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCA
ACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACT
AACAGCAATC**ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTA**
TGCCACAAGAGAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCT
GAATTCTCCTCTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCC
CTCGATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCC
CATCCCAACATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAG
TCAAGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGAC
CTTCATCCGCGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATT
CAAAATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGC
TGTCTCTGAGGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCA
TGGAACGAACATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGC
TTACTTCAAGAAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTAT
AGGGAGGATGCAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACAT
CTTCTCCCTTCTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTA
TGACTTGATTAAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAG
GCCTTTAGTCCCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAA
AATTGACCGAGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACT

Figure 25F

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGTGATTTATGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAA
ATTACATTCCCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGA
TTTAGCTCGGATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTT
GCTCCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGT
TCAAGATTTTGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACT
AGACCCATCGATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGT
CCGAATGAATCCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGC
TACCAATTGGAAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTAT
TGGTCTTAAAGGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAA
ATTGCGAGAATACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGG
CCTGACAATGGCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGG
ATTGAAGTCATATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCA
AAGGAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAAT
CGAGAGAACTCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCG
TGTTCACAACAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGG
ACTGGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAA
AATCAGAAACACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAA
AACGAAGAAATCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGA
GAAAATTATGACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGAC
TATGCAATCTGCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTT
AGAGACCAAGAGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATAT
AATGAGCTCAGTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCAT
GATACAGTACAATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCG
TCAATCATTGTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCAT
GTTGTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGC
CTTCCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGA
GCATCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACAT
AGACAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTT
AAAGACTGAGGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGA
TGCAACCATATATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCT
GTTCCCTAGATTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAG

Figure 25G

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-****CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

TCTATTTCAAAATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGA
TTTGATTGTGAGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATC
ATGTAAAATGTGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTAC
AGTTATTGGGACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCC
TTGTGCACCATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGA
CGTCTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTAT
TTTGCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGC
TATCTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTT
AACAGGCGAAGAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTT
TTCGACATCTCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGAT
GGCAACTACAGACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTT
GCTCTATGCTCAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTA
TCATATTGCCTGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTA
CACGCCCCCAGATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGA
GATAAAACAGATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCA
AGTCGGCAGATGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGA
CAGTTCTCTATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCT
AGACGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAG
GCCGGCCAACGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATT
CCTTTCTCTTACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAAC
CTCCTATCCGACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCG
TCTAATTGAAAAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATC
CATAGACTTCATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTT
ATCTGGGAAAGATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGA
GGGGTGGGAAGACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAG
ACATGCTTGCAAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAG
GGAATCCAGAGGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCT
AGAGATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGG
CGCTCATTATAAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTG
TGGAGACGGCTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATT
CAATAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCT

Figure 25H

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-**CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AGAAACTTTAGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGA
CTTATGTGACCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGA
TTTAATTGTAATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAG
AAATTATGTGCACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATAT
TTGTGAGAGCGAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCA
AACAGAATTTAGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAAT
CGATGAACCCAATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTC
ATCAGAACAGGAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTC
CCAATTCATTCCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGG
TGTGTCTCATGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTT
TTATATGGCGATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCC
CCCATCAGATGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTT
GATGGAGAAAGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAG
GTGGGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCC
AAAAGATACCCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGT
CCGAAACCAAGTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGA
TAATCATTTGAAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAAT
TTCAAAAGAAGACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGA
TTAAAAAATCATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTT
GTGGTTTTTATTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGG
CGCCGGCTGGGCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCC
GGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATA
ACCCCTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATG
CGGCCGC
(SEQ ID NO: 132)

Figure 25I

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-**CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCS**VPGVGVPGVG*RNLPVATPDPGMFPCLH HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS***

Figure 25J

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG1 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGGGSGGGGSGGGGSESKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDV
SHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVL
*DSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK**LLPSWAITLISVNGIFV***
ICCLTYCFAPRCRERRRNERLRRESVRPVMEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHA
DYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDN
HDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTL
ILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVK
DVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLA
RESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYT
GLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPT
AAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTML
DTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVP
MFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGY
PSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQ
REAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLIN
DDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENP
INAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRF
LIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSP
ANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVAD
GLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKS
WGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSE
STSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSA
LHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSC
TDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAE
QSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLA
HLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFK
YQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLL
RSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPY
PKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHS
RGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLG

Figure 25K

VSV-M51R-hIL12p70_hIgG1 (IL12p70 linked with hIgG1 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-hIgG1 (italics heavy dash underline)-****CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

LQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTV
DLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLT
GIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPI
PPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRG
DGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWI
NRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 133)

Figure 26A

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 26B

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 26C

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 26D

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctccctcgtggcc
atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa
atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt
gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac
acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga
atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag
gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc
agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct
gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc
tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat
gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag
ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact
ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa
gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg
cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct
ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca*
tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact
ctagaattttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc
acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc
tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt
agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg
atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag
gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa
actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg
atgagctatctgaatgcttcc

Figure 26E

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCgagtccaaatatggtccccca
tgcccatcatgcccagcacctgagttcctgggggaccatcagtcttcctgttcccccaaaaccc
aaggacactctcatgatctcccggacccctgaggtcacgtgcgtggtggtggacgtgaggccaggaa
gaccccgaggtccagttcaactggtacgtggatggcgtggaggtgcataatgccaagacaaagcca
cgggaggagcagttcaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactgg
ctgaacggcaaggagtacaagtgcaaggtctccaacaaaggcctcccgtcctccatcgagaaaaccc
atctccaaagccaaagggcagccccgagagccacaggtgtacaccctgcccccatcccaggaggag
atgaccaagaaccaggtcagcctgacctgcctggtcaaaggcttctaccccagcgacatcgccgtg
gagtgggagagcaatgggcagccggagaacaactacaagaccacgcctcccgtgctggactccgac
ggctccttcttcctctacagcaggctaaccgtggacaagagccaggtggcaggaggggaatgtcttc
tcatgctccgtgatgcatgaggctctgcacaaccactacacacagaagagcctctccctgtctctg
*ggtaaa**ctgctcccatcctgggccattaccttaatctcagtaaatggaatttttgtgatatgctgc***
ctgacctactgctttgccccaagatgcagagagagaaggaggaatgagagattgagaagggaaagt
gtacgccctgtatgaGCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGAT
ACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAAT
C**ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAG**
AGAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCC
TCTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTG
GGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAAC
ATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTA
TAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCG
CGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCT
CGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGA
GGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAA
CATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAA
GAAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGAT
GCAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCT
TCTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGAT
TAAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGT
CCCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCG
AGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTA

Figure 26F

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

TGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTC
CCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCG
GATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCA
TGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTT
TGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATC
GATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAA
TCCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTG
GAAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAA
AGGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGA
ATACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAAT
GGCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTC
ATATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTT
ATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAAC
TCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAA
CAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGG
TCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAA
CACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAA
ATCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTAT
GACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATC
TGCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAA
GAGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTC
AGTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTA
CAATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATT
GTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTT
GGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGA
TCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAA
GGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCT
AGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGA
GGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCAT
ATATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAG
ATTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCA

Figure 26G

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AAATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGT
GAGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAAT
GTGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGG
GACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACC
ATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAG
TTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCC
TTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTG
GTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGA
AGAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATC
TCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTAC
AGACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGC
TCAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGC
CTGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCC
AGATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACA
GATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAG
ATGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCT
ATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATT
AATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAA
CGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCT
TACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCC
GACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGA
AAAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTT
CATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAA
AGATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGA
AGACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTG
CAAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAG
AGGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCC
TCCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTA
TAAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGG
CTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCT
GTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTT

Figure 26H

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGA
CCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGT
AATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGT
GCACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAG
CGAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATT
TAGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACC
CAATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACA
GGAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCAT
TCCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCA
TGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGC
GATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGA
TGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAA
AGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGC
TGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATAC
CCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCA
AGTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTT
GAAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGA
AGACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAAT
CATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTT
ATTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTG
GGCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAA
CAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGG
GGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 130)

Figure 26I

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
***FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCS*VPGVGVPGVG*RNLPVATPDPGMFPCLH**
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 26J

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGGGSGGGGSGGGGSESKYGPPCPSCPAPEFLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSQE
DPEVQFNWYVDGVEVHNAKTKPREEQFNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKT
ISKAKGQPREPQVYTLPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSD
*GSFFLYSRLTVDKSRWQEGNVFSCSVMHEALHNHYTQKSLSLSLGK**LLPSWAITLISVNGIFVICC***
LTYCFAPRCRERRRNERLRRESVRPVMEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYN
LNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDA
SQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILN
AVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVI
IGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARES
RPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLE
KLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQ
VQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTK
ATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFK
GLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSL
IERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREA
KIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDE
TMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINA
MIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIR
AFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANL
LKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLI
SLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGR
TVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTS
ILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHR
FSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDH
YHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSY
QVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLK
RPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQC
RLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSG
EGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKM
LEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGI
FNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQI

Figure 26K

VSV-M51R-hIL12p70_hIgG4 (IL12p70 linked with hIgG4 (switch))

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-hIgG4 (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

DLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLV
QTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIP
SQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPN
PPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGL
PKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRR
ISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 131)

Figure 27A

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 27B

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 27C

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 27D

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctccccctcgtggcc
atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa
atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt
gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac
acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga
atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag
gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc
agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct
gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc
tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat
gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag
ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact
ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa
gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg
***cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagt*gttcct**
ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca*
tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact
ctagaattttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc
acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc
tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt
agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg
atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag
gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa
actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg
atgagctatctgaatgcttcc

Figure 27E

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCTGCTCCGGAGAGGGGCTGCAG
ATCCCCACCCTCTCCCCTGCACCTGACTGCAGCCAGCCCCTGGACGTGATCCTTCTCCTGGATGGC
TCCTCCAGTTTCCCAGCTTCTTATTTTGATGAAATGAAGAGTTTCGCCAAGGCTTTCATTTCAAAA
GCCAATATAGGGCCTCGTCTCACTCAGGTGTCAGTGCTGCAGTATGGAAGCATCACCACCATTGAC
GTGCCATGGAACGTGGTCCCGGAGAAAGCCCATTTGCTGAGCCTTGTGGACGTCATGCAGCGGGAG
GGAGGCCCCAGCCAAATCGGGGATGCCTTGGGCTTTGCTGTGCGATACTTGACTTCAGAAATGCAT
GGTGCCAGGCCGGGAGCCTCAAAGGCGGTGGTCATCCTGGTCACGGACGTCTCTGTGGATTCAGTG
GATGCAGCAGCTGATGCCGCCAGGTCCAACAGAGTGACAGTGTTCCCTATTGGAATTGGAGATCGC
TACGATGCAGCCCAGCTACGGATCTTGGCAGGCCCAGCAGGCGACTCCAACGTGGTGAAGCTCCAG
CGAATCGAAGACCTCCCTACCATGGTCACCTTGGGCAATTCCTTCCTCCACAAACTGTGCTCTGGA
*TAG*GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAA
GAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCA**
CGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAA
TCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGA
TGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAA
CTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCA
TAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACA
TGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAA
CAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTG
TCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCT
CAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGAT
TAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATAT
TCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCT
ATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTA
CAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGA
ACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCC
TCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATT
CCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAG
ACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCCCAAGTAACCAT
GAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATT
TCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTT

Figure 27F

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

TAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATG
GCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGATAATATACTC
TGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCC
TATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCT
TAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAG
GGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAAT
TACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCT
AACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAAT
TTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCC
AGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTT
TGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAACAACACACTGAT
CAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAA
AGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAA
AGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGT
TGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAA
AATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTT
GAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACG
AGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAA
TGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGG
GACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCA
AGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCAT
TGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGA
AAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGC
AGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCC
AACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATG
CTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATATTTGTATCA
TGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGA
ATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTAC
TATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGT
ATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTC
AGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACC

Figure 27G

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

CCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATC
AGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACC
ATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGA
AAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACC
CGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAA
AAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCA
TGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGACACCATGAG
GGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCAC
CACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTG
TTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCA
TGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTT
AGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTT
TCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATC
TATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAG
TTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGG
AGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGG
ACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCG
TGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATA
CAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATT
CTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGA
GTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGT
GAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGAT
TGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTAC
AACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCA
AAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAG
TATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGAT
GACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATC
AGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAA
ATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTG
GGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGA
AGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTT

Figure 27H

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

GGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGC
AGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCA
AACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTG
GTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAG
AGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTT
TGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTT
AAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTA
TTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACA
AAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACT
ATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAA
AGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGA
CTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAA
TCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAA
TTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTAT
ACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACT
CCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTG
GTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCG
AGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAA
GGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACG
GGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 126)

Figure 27I

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)*-*GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCSVPGVGVPGVG*RNLPVATPDPGMFPCLH*
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 27J

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

GGGGSGGGGSGGGGSCSGEGLQIPTLSPAPDCSQPLDVILLLDGSSSFPASYFDEMKSFAKAFISK
ANIGPRLTQVSVLQYGSITTIDVPWNVVPEKAHLLSLVDVMQREGGPSQIGDALGFAVRYLTSEMH
GARPGASKAVVILVTDVSVDSVDAAADAARSNRVTVFPIGIGDRYDAAQLRILAGPAGDSNVVKLQ
*RIEDLPTMVTLGNSFLHKLCSG*MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSP
LISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGY
SFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSE
VELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRM
QTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLV
PQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHS
QVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDF
GDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNW
KEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTM
ADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERT
HEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRN
TAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQS
ADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQY
NYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPD
PVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTE
VKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQ
NSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIG
TTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQP
WERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTS
RMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIA
CKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGR
CIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPAN
AVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIE
KGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWE
DIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMP
PRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSL
LELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIV
MDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEF

Figure 27K

VSV-M51R-hIL12p70_CBD1 (IL12p70 linked with CBD1)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-CBD1 (italics heavy dash underline)* / **VSV-L (bold underline)**

SSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFI
PDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSD
GIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDT
RISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKE
DRSILMLKSDLHEENSWRD
(SEQ ID NO: 127)

Figure 28A

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 28B

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 28C

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)*-***GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 28D

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

atgtgtcaccagcagttggtcatctcttggttttccctggtttttctggcatctccctcgtggcc
atatgggaactgaagaaagatgtttatgtcgtagaattggattggtatccggatgcccctggagaa
atggtggtcctcacctgtgacacccctgaagaagatggtatcacctggaccttggaccagagcagt
gaggtcttaggctctggcaaaaccctgaccatccaagtcaaagagtttggagatgctggccagtac
acctgtcacaaaggaggcgaggttctaagccattcgctcctgctgcttcacaaaaaggaagatgga
atttggtccactgatattttaaaggaccagaaagaacccaaaaataagacctttctaagatgcgag
gccaagaattattctggacgtttcacctgctggtggctgacgacaatcagtactgatttgacattc
agtgtcaaaagcagcagaggctcttctgacccccaaggggtgacgtgcggagctgctacactctct
gcagagagagtcagaggggacaacaaggagtatgagtactcagtggagtgccaggaggacagtgcc
tgcccagctgctgaggagagtctgcccattgaggtcatggtggatgccgttcacaagctcaagtat
gaaaactacaccagcagcttcttcatcagggacatcatcaaacctgacccacccaagaacttgcag
ctgaagccattaaagaattctcggcaggtggaggtcagctgggagtaccctgacacctggagtact
ccacattcctacttctccctgacattctgcgttcaggtccagggcaagagcaagagagaaaagaaa
gatagagtcttcacggacaagacctcagccacggtcatctgccgcaaaaatgccagcattagcgtg
cgggcccaggaccgctactatagctcatcttggagcgaatgggcatctgtgccctgcagtgttcct
ggagtaggggtacctggagtgggc*agaaacctccccgtggccactccagacccaggaatgttccca*
tgccttcaccactcccaaaacctgctgagggccgtcagcaacatgctccagaaggccagacaaact
ctagaattttaccttgcacttctgaagagattgatcatgaagatatcacaaaagataaaaccagc
acagtggaggcctgtttaccattggaattaaccaagaatgagagttgcctaaattccagagagacc
tctttcataactaatgggagttgcctggcctccagaaagacctcttttatgatggccctgtgcctt
agtagtatttatgaagacttgaagatgtaccaggtggagttcaagaccatgaatgcaaagcttctg
atggatcctaagaggcagatctttctagatcaaaacatgctggcagttattgatgagctgatgcag
gccctgaatttcaacagtgagactgtgccacaaaaatcctcccttgaagaaccggatttttataaa
actaaaatcaagctctgcatacttcttcatgctttcagaattcgggcagtgactattgatagagtg
atgagctatctgaatgcttcc

Figure 28E

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCTGCTCCGGAGAGGGGCTGCAG
ATCCCCACCCTCTCCCCTGCACCTGACTGCAGCCAGCCCCTGGACGTGATCCTTCTCCTGGATGGC
TCCTCCAGTTTCCCAGCTTCTTATTTTGATGAAATGAAGAGTTTCGCCAAGGCTTTCATTTCAAAA
GCCAATATAGGGCCTCGTCTCACTCAGGTGTCAGTGCTGCAGTATGGAAGCATCACCACCATTGAC
GTGCCATGGAACGTGGTCCCGGAGAAAGCCCATTTGCTGAGCCTTGTGGACGTCATGCAGCGGGAG
GGAGGCCCCAGCCAAATCGGGGATGCCTTGGGCTTTGCTGTGCGATACTTGACTTCAGAAATGCAT
GGTGCCAGGCCGGGAGCCTCAAAGGCGGTGGTCATCCTGGTCACGGACGTCTCTGTGGATTCAGTG
GATGCAGCAGCTGATGCCGCCAGGTCCAACAGAGTGACAGTGTTCCCTATTGGAATTGGAGATCGC
TACGATGCAGCCCAGCTACGGATCTTGGCAGGCCCAGCAGGCGACTCCAACGTGGTGAAGCTCCAG
CGAATCGAAGACCTCCCTACCATGGTCACCTTGGGCAATTCCTTCCTCCACAAACTGTGCTCTGGA
GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCTGCTCCGGAGAGGGGCTGCAG
ATCCCCACCCTCTCCCCTGCACCTGACTGCAGCCAGCCCCTGGACGTGATCCTTCTCCTGGATGGC
TCCTCCAGTTTCCCAGCTTCTTATTTTGATGAAATGAAGAGTTTCGCCAAGGCTTTCATTTCAAAA
GCCAATATAGGGCCTCGTCTCACTCAGGTGTCAGTGCTGCAGTATGGAAGCATCACCACCATTGAC
GTGCCATGGAACGTGGTCCCGGAGAAAGCCCATTTGCTGAGCCTTGTGGACGTCATGCAGCGGGAG
GGAGGCCCCAGCCAAATCGGGGATGCCTTGGGCTTTGCTGTGCGATACTTGACTTCAGAAATGCAT
GGTGCCAGGCCGGGAGCCTCAAAGGCGGTGGTCATCCTGGTCACGGACGTCTCTGTGGATTCAGTG
GATGCAGCAGCTGATGCCGCCAGGTCCAACAGAGTGACAGTGTTCCCTATTGGAATTGGAGATCGC
TACGATGCAGCCCAGCTACGGATCTTGGCAGGCCCAGCAGGCGACTCCAACGTGGTGAAGCTCCAG
CGAATCGAAGACCTCCCTACCATGGTCACCTTGGGCAATTCCTTCCTCCACAAACTGTGCTCTGGA
TAGGCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAA
GAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC

Figure 28F

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT

Figure 28G

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA

Figure 28H

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 28I

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 128)

Figure 28J

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCHQQLVISWFSLVFLASPLVAIWE***
LKKDVYVVELDWYPDAPGEMVVLTCDTPEEDGITWTLDQSSEVLGSGKTLTIQVKEFGDAGQYTCH
KGGEVLSHSLLLLHKKEDGIWSTDILKDQKEPKNKTFLRCEAKNYSGRFTCWWLTTISTDLTFSVK
SSRGSSDPQGVTCGAATLSAERVRGDNKEYEYSVECQEDSACPAAEESLPIEVMVDAVHKLKYENY
TSSFFIRDIIKPDPPKNLQLKPLKNSRQVEVSWEYPDTWSTPHSYFSLTFCVQVQGKSKREKKDRV
FTDKTSATVICRKNASISVRAQDRYYSSSWSEWASVPCSVPGVGVPGVG*RNLPVATPDPGMFPCLH*
HSQNLLRAVSNMLQKARQTLEFYPCTSEEIDHEDITKDKTSTVEACLPLELTKNESCLNSRETSFI
TNGSCLASRKTSFMMALCLSSIYEDLKMYQVEFKTMNAKLLMDPKRQIFLDQNMLAVIDELMQALN
FNSETVPQKSSLEEPDFYKTKIKLCILLHAFRIRAVTIDRVMSYLNAS

Figure 28K

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

GGGGSGGGGSGGGGSCSGEGLQIPTLSPAPDCSQPLDVILLLDGSSSFPASYFDEMKSFAKAFISK
ANIGPRLTQVSVLQYGSITTIDVPWNVVPEKAHLLSLVDVMQREGGPSQIGDALGFAVRYLTSEMH
GARPGASKAVVILVTDVSVDSVDAAADAARSNRVTVFPIGIGDRYDAAQLRILAGPAGDSNVVKLQ
*RIEDLPTMVTLGNSFLHKLCSG****GGGGSGGGGSGGGGSCSGEGLQIPTLSPAPDCSQPLDVILLLDG***
SSSFPASYFDEMKSFAKAFISKANIGPRLTQVSVLQYGSITTIDVPWNVVPEKAHLLSLVDVMQRE
GGPSQIGDALGFAVRYLTSEMHGARPGASKAVVILVTDVSVDSVDAAADAARSNRVTVFPIGIGDR
YDAAQLRILAGPAGDSNVVKLQRIEDLPTMVTLGNSFLHKLCSG*MEVHDFETDEFNDFNEDDYATR*
EFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPT
SQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKIL
AYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFK
KLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLI
KMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIY
GSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPH
DHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMN
PNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLRE
YFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKL
SNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEG
LRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIM
TAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSS
VSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYL
DPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKL
VEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPR
FLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKM
WTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFS
SRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGE
EWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYA
QITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQ
IYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGL
MRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYP
TSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGK
DKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESR

Figure 28L

VSV-M51R-hIL12p70_CBD2 (IL12p70 linked with CBD2)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***hIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-hIL12p35 (italics underline)-GGGGSx3-CBD (italics heavy dash underline)-****GGGGSx3-CBD (bold italics underline)*** / **VSV-L (bold underline)**

GTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDG
SGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCD
PRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICES
EKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQ
EFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMA
IISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEA
VSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHL
KWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 129)

Figure 29A

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 29B

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 29C

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 29D

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCGTGAGGCGCGCCTATGAAAAAAACTAACAGATATC*ATGTGTCAATCACGCTA*
CCTCCTCTTTTTGGCCACCCTTGCCCTCCTAAACCACCTCAGTTTGGCCAGGGTCATTCCAGTCTC
TGGACCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGAC
GGCCAGAGAAAAACTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACG
GGACCAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGC
TACTAGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGAT
GACCCTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAA
CGCAGCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGA
TGAGCTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGC
AGACCCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGAC
*CATCAACAGGGTGATGGGCTATCTGAGCTCCGCCTGA*GCTAAGCAAATACAACAGATTCTTCATGT
TTGGACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTT
TATGAAAAAAACTAACAGCAATC

Figure 29E

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC

Figure 29F

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA

Figure 29G

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA

Figure 29H

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 110)

Figure 29I

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRS*MCQSRYLLFLATLALLNHLS*
LARVIPVSGPARCLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLEL
HKNESCLATRETSSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILD
*KGMLVAIDELMQSLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA***MEV**
HDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSK
NWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWG

Figure 29J

VSV-M51R-mIL12p40-mIL12p35 (Secreted unlinked IL12 p40 and p35, mouse)

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*** / *mIL12p35 (italics underline)* / **VSV-L (bold underline)**

NKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICR
IRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNI
YRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIR
FLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVL
FQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIY
SDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKE
RELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEA
ICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTL
INSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRN
VVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWS
RVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEV
QDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMS
AVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLY
HEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSE
VSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNT
SGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVE
PDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTM
RDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVS
HVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPL
SIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRS
GPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGP
FSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFG
IAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIR
SILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGD
KSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRI
LDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPD
WSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAA
LKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIP
LYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRL
NPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 111)

Figure 30A

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 30B

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 30C

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 30D

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCGgttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA*
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
*AACAGGGTGATGGGCTATCTGAGCTCCGCCTGA*GGGGGGGGGAGGCAGTGGAGGCGGTGGTTCAGGT*
GGTGGTGGGTCCAACACACTTGTGCTCTTTGGGGCAGGATTCGGCGCAGTAATAACAGTCGTCGTC
ATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGTTTCAGAAGAAGAAATGAGGCAAGC
AGAGAAACAAACAACAGCCTTACCTTCGGGCCTGAAGAAGCATTAGCTGAACAGACCGTCTTCCTT
*TAG*GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAA
GAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC

Figure 30E

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT

Figure 30F

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA

Figure 30G

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 30H

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 56)

Figure 30I

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPAR*
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSAGGGGSGGGGSGGGGS
*NTLVLFGAGFGAVITVVVIVVIIKCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQTVFL*MEVH
DFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKN

Figure 30J

VSV-M51R-mIL12p70TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

WDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGN
KPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRI
RVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIY
RIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRF
LHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLF
QQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYS
DKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKER
ELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAI
CIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLI
NSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNV
VELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSR
VTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQ
DKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSA
VFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYH
EEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEV
SSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTS
GFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEP
DSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMR
DLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSH
VLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLS
IQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSG
PIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPF
SISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGI
AKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRS
ILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDK
SRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRIL
DEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDW
SSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAAL
KSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPL
YQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLN
PFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 55)

Figure 31A

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 31B

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 31C

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 31D

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGTGTCAATCACGCTACCTCCTCTTTTTGGCCACCCTTGCCCTCCTAAACCACCTCAGTTTGGCC
AGGGTCATACCGGTCTCTGGACCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACA
GATGACATGGTGAAGACGGCCAGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGAT
CATGAAGACATCACACGGGACCAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAG
AACGAGAGTTGCCTGGCTACTAGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAG
AAGACGTCTTTGATGATGACCCTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACA
GAGTTCCAGGCCATCAACGCAGCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGC
ATGCTGGTGGCCATCGATGAGCTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAA
CCTCCTGTGGGAGAAGCAGACCCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTC
AGCACCCGCGTCGTGACCATCAACAGGGTGATGGGCTATCTGAGCTCCGCCGGGGGGGGAGGCAGT
GGAGGCGGTGGTTCAGGTGGTGGTGGGTCCAACACACTTGTGCTCTTTGGGGCAGGATTCGGCGCA
GTAATAACAGTCGTCGTCATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGTTTCAGA
AGAAGAAATGAGGCAAGCAGAGAAACAAACAACAGCCTTACCTTCGGGGCCTGAAGAAGCATTAGCT
*GAACAGACCGTCTTCCTTTAG*GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACT
TGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAAC
AGCAATC**ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGC**
CACAAGAGAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAA
TTCTCCTCTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTC
GATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCAT
CCCAACATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCA
AGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTT
CATCCGCGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAA
AATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGT
CTCTGAGGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGG
AACGAACATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTA
CTTCAAGAAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGG
GAGGATGCAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTT
CTCCCTTCTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGA
CTTGATTAAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCC
TTTAGTCCCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAAT
TGACCGAGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGT
GATTTATGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATT

Figure 31E

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

ACATTCCCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTT
AGCTCGGATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCT
CCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCA
AGATTTTGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGA
CCCATCGATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCG
AATGAATCCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTAC
CAATTGGAAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGG
TCTTAAAGGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATT
GCGAGAATACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCT
GACAATGGCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATT
GAAGTCATATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAG
GAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGA
GAGAACTCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGT
TCACAACAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACT
GGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAAT
CAGAAACACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAAC
GAAGAAATCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAA
AATTATGACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTAT
GCAATCTGCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGA
GACCAAGAGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAAT
GAGCTCAGTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGAT
ACAGTACAATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCA
ATCATTGTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTT
GTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTT
CCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCA
TCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGA
CAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAA
GACTGAGGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGC
AACCATATATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTT
CCCTAGATTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCT
ATTTCAAAATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTT
GATTGTGAGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATG

Figure 31F

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TAAAATGTGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGT
TATTGGGACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTG
TGCACCATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGT
CTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTT
GCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTAT
CTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAAC
AGGCGAAGAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTC
GACATCTCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGC
AACTACAGACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCT
CTATGCTCAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCA
TATTGCCTGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACAC
GCCCCCAGATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGAT
AAAACAGATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGT
CGGCAGATGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAG
TTCTCTATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGA
CGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCC
GGCCAACGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCT
TTCTCTTACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTC
CTATCCGACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCT
AATTGAAAAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCAT
AGACTTCATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATC
TGGGAAAGATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGG
GTGGGAAGACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACA
TGCTTGCAAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGA
ATCCAGAGGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGA
GATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGC
TCATTATAAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGG
AGACGGCTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAA
TAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGA
AACTTTAGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTT
ATGTGACCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTT
AATTGTAATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAA

Figure 31G

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

TTATGTGCACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTG
TGAGAGCGAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAAC
AGAATTTAGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGA
TGAACCCAATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATC
AGAACAGGAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCA
ATTCATTCCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGT
GTCTCATGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTA
TATGGCGATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCC
ATCAGATGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGAT
GGAGAAAGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTG
GGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAA
AGATACCCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCG
AAACCAAGTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAA
TCATTTGAAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTC
AAAAGAAGACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTA
AAAAATCATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTG
GTTTTTATTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGC
CGGCTGGGCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGC
TGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACC
CCTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGG
CCGC
(SEQ ID NO: 58)

Figure 31H

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK*MCQSRYLLFLATLALLNHLSLARVI*
PVSGPARCLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNES
CLATRETSSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLV
AIDELMQSLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSAGGGGSGGG
GSGGGGSNTLVLFGAGFGAVITVVVIVVIIKCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQT
*VFL*MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIP
SMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVET
FIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSH
GTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDI
FSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAK
IDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASD

Figure 31I

VSV-M51R-mIL12p35TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *mIL12p35 (italics underline)-GGGGSx3-CD80TM (italics heavy dash underline)* / **VSV-L (bold underline)**

LARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLL
DPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLII
GLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQG
LKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMR
VHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYK
TKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGL
ETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALR
QSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSE
HLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKD
ATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDD
LIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETP
CAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDA
ISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLM
ATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDY
TPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAED
SSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPF
LSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLS
IDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIR
HACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTG
AHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSAL
ETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVR
NYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLI
DEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTG
VSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSL
MEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELV
RNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 57)

Figure 32A

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 32B

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 32C

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 32D

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCGgttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA*
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
*AACAGGGTGATGGGCTATCTGAGCTCCGCCTGA*GCTAAGCAAATACAACAGATTCTTCATGTTTGG
ACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATG
AAAAAAACTAACAGCAATC

Figure 32E

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC

Figure 32F

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA

Figure 32G

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA

Figure 32H

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 60)

INCORPORATED BY REFERENCE (RULE 20.6)

Figure 32I

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MWELEKDVYVVEVDWTPDAPGETVN***
LTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCHKGGETLSHSHLLLHKKENGIWS
TEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSSSSPDSRAVTCGMASLSAEKVTL
DQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYSTSFFIRDIIKPDPPKNLQMKPLK
NSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCNQKGAFLVEKTSTEVQCKGGNVC
VQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPARCLSQSRNLLKTTDDMVKTAREK*
LKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRETSSTTRGSCLPPQKTSLMMTLCL
GSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQSLNHNGETLRQKPPVGEADPYR
*VKMKLCILLHAFSTRVVTINRVMGYLSSA*MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHA
DYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDN
HDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTL

Figure 32J

VSV-M51R-mIL12p70woSP

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVK
DVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLA
RESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYT
GLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPT
AAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTML
DTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVP
MFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGY
PSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQ
REAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLIN
DDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENP
INAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRF
LIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSP
ANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVAD
GLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKS
WGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSE
STSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSA
LHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSC
TDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAE
QSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLA
HLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFK
YQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLL
RSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPY
PKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHS
RGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLG
LQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTV
DLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLT
GIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPI
PPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRG
DGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWI
NRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 59)

Figure 33A

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 33B

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 33C

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 33D

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGCGGCTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
***TGCAGAGTCCGATCG*gttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA**
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
*AACAGGGTGATGGGCTATCTGAGCTCCGCCTGA*GCTAAGCAAATACAACAGATTCTTCATGTTTGG
ACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATG
AAAAAAACTAACAGCAATC

Figure 33E

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT

Figure 33F

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA

Figure 33G

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 33H

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 52)

Figure 33I

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVK*AA*LDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
***QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRS*VPGVGVPGVG*RVIPVSGPAR**
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
*SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA*MEVHDFETDEFNDFN
EDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSC

Figure 33J

VSV-M51R-mIL12p70_2xALA

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x2 alanine substitutions) (bold italics)***-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

QANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERW
TDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFIS
EGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQG
NFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTV
DLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFV
NGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEV
LKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSL
MSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKW
NNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQG
QEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMV
SNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPT
CANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTF
KYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFR
ITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWS
INPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHL
RRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPD
GIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSN
IHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLF
QATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGS
WGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFL
KGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPH
KIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILY
KPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYP
PWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRD
FLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWE
YPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTY
GTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLY
AFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLT
ISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQS
FPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLC
RTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD

(SEQ ID NO: 51)

Figure 34A

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 34B

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 34C

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 34D

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGCGGCTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACGCGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
***TGCAGAGTCCGATCG*gttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA**
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
*AACAGGGTGATGGGCTATCTGAGCTCCGCCTGA*GCTAAGCAAATACAACAGATTCTTCATGTTTGG
ACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATG
AAAAAAACTAACAGCAATC

Figure 34E

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT

Figure 34F

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA

Figure 34G

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 34H

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 54)

Figure 34I

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
*PIDKSYFGVDER*DTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
***LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVK*AALDAGQYTCH**
KGGETLSHSHLLLHAKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
***QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRS*VPGVGVPGVG*RVIPVSGPAR**
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
*SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA*MEVHDFETDEFNDFN
EDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSC

Figure 34J

VSV-M51R-mIL12p70_3xALa

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (x3 alanine substitutions) (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

QANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERW
TDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFIS
EGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQG
NFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTV
DLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFV
NGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEV
LKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSL
MSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKW
NNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQG
QEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMV
SNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPT
CANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTF
KYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFR
ITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWS
INPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHL
RRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPD
GIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSN
IHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLF
QATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGS
WGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFL
KGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPH
KIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILY
KPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYP
PWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRD
FLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWE
YPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTY
GTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLY
AFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLT
ISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQS
FPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLC
RTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD

(SEQ ID NO: 53)

Figure 35A

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 35B

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 35C

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 35D

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
***TGCAGAGTCCGATCG*gttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA**
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
*AACAGGGTGATGGGCTATCTGAGCTCCGCCTGA*GCTAAGCAAATACAACAGATTCTTCATGTTTGG
ACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATG
AAAAAAACTAACAGCAATC

Figure 35E

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT
CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC

Figure 35F

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA
TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA

Figure 35G

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA
GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA

Figure 35H

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 50)

Figure 35I

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPAR*
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
*SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA***MEVHDFETDEFNDFN
EDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSC
QANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERW

Figure 35J

VSV-M51R-mIL12p70

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)* / **VSV-L (bold underline)**

TDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFIS
EGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQG
NFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTV
DLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFV
NGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEV
LKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSL
MSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKW
NNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQG
QEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMV
SNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPT
CANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTF
KYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFR
ITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWS
INPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHL
RRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPD
GIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSN
IHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLF
QATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGS
WGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFL
KGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPH
KIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILY
KPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYP
PWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRD
FLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWE
YPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTY
GTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLY
AFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLT
ISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQS
FPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLC
RTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 49)

Figure 36A

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 36B

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 36C

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 36D

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)*-***GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCG*gttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
AACAGGGTGATGGGCTATCTGAGCTCCGCC

Figure 36E

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)***-*mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)*-***GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCAAGACGCTGGTGCTGGGGAAG
GAAGGGGAATCAGCAGAACTGCCCTGCGAGAGTTCCCAGAAGAAGATCACAGTCTTCACCTGGAAG
TTCTCTGACCAGAGGAAGATTCTGGGGCAGCATGGCAAAGGTGTATTAATTAGAGGAGGTTCGCCT
TCGCAGTTTGATCGTTTTGATTCCAAAAAAGGGGCATGGGAGAAAGGATCGTTTCCTCTCATCATC
AATAAACTTAAGATGGAAGACTCTCAGACTTATATCTGTGAGCTGGAGAACAGGAAAGAGGAGGTG
GAGTTGTGGGTGTTCAAAGTGACCTTCAGTCCGGGTACCAGCCTGTTGCAAGGGCAGAGCCTGACC
CTGACCTTGGATAGCAACTCTAAGGTCTCTAACCCCTTGACAGAGTGCAAACACAAAAAGGGTAAA
GTTGTCAGTGGTTCCAAAGTTCTCTCCATGTCCAACCTAAGGGTTCAGGACAGCGACTTCTGGAAC
TGCACCGTGACCCTGGACCAGAAAAAGAACTGGTTCGGCATGACACTCTCAGTGCTGGGTTTTCAG
AGCACAGCTATCACGGCCTATAAGAGTGAGGGAGAGTCAGCGGAGTTCTCCTTCCCACTCAACTTT
GCAGAGGAAAACGGGTGGGGAGAGCTGATGTGGAAGGCAGAGAAGGATTCTTTCTTCCAGCCCTGG
ATCTCCTTCTCCATAAAGAACAAAGAGGTGTCCGTACAAAAGTCCACCAAAGACCTCAAGCTCCAG
CTGAAGGAAACGCTCCCACTCACCCTCAAGATACCCCAGGTCTCGCTTCAGTTTGCTGGTTCTGGC
AACCTGACTCTGACTCTGGACAAAGGGACACTGCATCAGGAAGTGAACCTGGTGGTGATGAAAGTG
GCTCAGCTCAACAATACTTTGACCTGTGAGGTGATGGGACCTACCTCTCCCAAGATGAGACTGACC
CTGAAGCAGGAGAACCAGGAGGCCAGGGTCTCTGAGGAGCAGAAAGTAGTTCAAGTGGTGGCCCCT
GAGACAGGGCTGTGGCAGTGTCTACTGAGTGAAGGTGATAAGGTCAAGATGGACTCCAGGATCCAG
*GTTTTATCCAGAGGGGTGAACCAGACAGTG**GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGT***
GGTGGGTCCAACACACTTGTGCTCTTTGGGGCAGGATTCGGCGCAGTAATAACAGTCGTCGTCATC
GTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGTTTCAGAAGAAGAAATGAGGCAAGCAGA
GAAACAAACAACAGCCTTACCTTCGGGCCTGAAGAAGCATTAGCTGAACAGACCGTCTTCCTTTAG
GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAAGAG
GCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCACGA**
TTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCC
CGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGATGA
TATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAACTG
GGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCATAA
ATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACATGA
AGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAACAA
ACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTGTCA
AAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCTCAA

Figure 36F

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

CTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGATTAG
GGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATATTCT
AATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATC
CATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAG
AATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACC
GATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCA
TTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCT
CCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACA
TTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCCCAAGTAACCATGAA
GAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATTTCA
ACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTTTAA
AAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATGGCA
TGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGATAATATACTCTGA
CAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCCTAT
CCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAA
AGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGA
ACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTAC
CGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAAC
TGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTG
CATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGT
GTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTTTGA
GAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAACAACACACTGATCAA
TTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAAAGG
ATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAAAGT
CTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGTTGT
AGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAAAAT
AGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAA
TTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGT
GACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGC
TCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGAC
ATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGA

Figure 36G

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)*-***GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

TAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGG
AGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAG
TCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGCAGT
ATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCCAAC
CTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATGCTT
AATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATATTTGTATCATGA
AGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGAATT
CAAATCAGGCACTTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTAT
TCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATC
CTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGC
TACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCA
TCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGG
GTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATT
GCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAG
CAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACCCGA
CTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAAAAG
GCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCATGG
TGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGACACCATGAGGGA
TCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCACCAC
TGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTT
GAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGT
GCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGA
AGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCT
ATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTAT
ACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTG
CTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGG
TTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGGACC
TATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCGTGA
TATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATACAG
ATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATTCTC
TATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGAGTT

Figure 36H

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

GAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTGAA
ATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGC
TAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAAC
AATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAA
TCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAGTAT
ATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGAC
TGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATCAGG
GTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAAATC
GAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTGGGA
CTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGAAGT
TCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTTGGA
TGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGCAGT
AACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAAC
GTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTC
TTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGC
AAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGT
AAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAA
ATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTTATATGGCGATTATATCGTATTA
TAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACAAAA
TGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACTATA
TCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGG
AGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGACTC
CTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAATCC
ATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAATTT
GCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACT
GATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCA
AACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTT
TTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCGAGG
GGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAAGGA
AGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGT
CTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 134)

Figure 36I

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
*PIDKSYFGVDE*R*DTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY*
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPAR*
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSAGGGGSGGGGSGGGGS
KTLVLGKEGESAELPCESSQKKITVFTWKFSDQRKILGQHGKGVLIRGGSPSQFDRFDSKKGAWEK

Figure 36J

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

GSFPLIINKLKMEDSQTYICELENRKEEVELWVFKVTFSPGTSLLQGQSLTLTLDSNSKVSNPLTE
CKHKKGKVVSGSKVLSMSNLRVQDSDFWNCTVTLDQKKNWFGMTLSVLGFQSTAITAYKSEGESAE
FSFPLNFAEENGWGELMWKAEKDSFFQPWISFSIKNKEVSVQKSTKDLKLQLKETLPLTLKIPQVS
LQFAGSGNLTLTLDKGTLHQEVNLVVMKVAQLNNTLTCEVMGPTSPKMRLTLKQENQEARVSEEQK
*VVQVVAPETGLWQCLLSEGDKVKMDSRIQVLSRGVNQTV****GGGGSGGGGSGGGGSNTLVLFGAGFGA***
VITVVVIVVIIKCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQTVFLMEVHDFETDEFNDFNE
DDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQ
ANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWT
DSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISE
GWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGN
FSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVD
LTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVN
GDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVL
KHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLM
SWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWN
NHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQ
EGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVS
NNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTC
ANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFK
YAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRI
THIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSI
NPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLR
RGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDG
IHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNI
HSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQ
ATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSW
GQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLK
GLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHK
IPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYK
PFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPP
WGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDF

Figure 36K

VSV-M51R-mIL12p70-mCD4-d1-4TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mCD4-d1-4 (italics heavy dash underline)-****GGGGSx3-TM (bold italics underline)*** / **VSV-L (bold underline)**

LSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEY
PSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYG
TYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYA
FQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTI
SLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSF
PIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCR
TVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 135)

Figure 37A

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 37B

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 37C

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 37D

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCG*gttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
AACAGGGTGATGGCTATCTGAGCTCCGCCGCTGAGGCCGCAGCCAAGGAGGCCTGCTGCCAAGGAG
GCCGCAGCAAAGGAAGCTGCTGCCAAGGCCCTGGAGGCAGAAGCCGCTGCAAAAGAAGCAGCCGCC
*AAAGAGGCGGCGGCCAAAGAAGCGGCAGCTAAGGCT**AACACACTTGTGCTCTTTGGGGCAGGATTC***
GGCGCAGTAATAACAGTCGTCGTCATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGT
TTCAGAAGAAGAAATGAGGCAAGCAGAGAAACAAACAACAGCCTTACCTTCGGGCCTGAAGAAGCA
TTAGCTGAACAGACCGTCTTCCTTTAG

Figure 37E

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

GCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAAGAG
GCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCACGA**
TTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCC
CGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGATGA
TATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAACTG
GGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCATAA
ATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACATGA
AGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAACAA
ACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTGTCA
AAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCTCAA
CTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGATTAG
GGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATATTCT
AATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATC
CATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAG
AATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACC
GATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCA
TTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCT
CCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACA
TTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCCCAAGTAACCATGAA
GAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATTTCA
ACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTTTAA
AAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATGGCA
TGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGATAATATACTCTGA
CAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCCTAT
CCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAA
AGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGA
ACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTAC
CGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAAC
TGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTG
CATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGT
GTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTTTGA

Figure 37F

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

GAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAACAACACACTGATCAA
TTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAAAGG
ATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAAAGT
CTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGTTGT
AGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAAAAT
AGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAA
TTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGT
GACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGC
TCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGAC
ATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGA
TAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGG
AGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAG
TCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGCAGT
ATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCCAAC
CTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATGCTT
AATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATATTTGTATCATGA
AGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGAATT
CAAATCAGGCACTTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTAT
TCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATC
CTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGC
TACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCA
TCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGG
GTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATT
GCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAG
CAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACCCGA
CTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAAAAG
GCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCATGG
TGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGACACCATGAGGGA
TCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCACCAC
TGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTT
GAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGT

Figure 37G

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

GCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGA
AGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCT
ATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTAT
ACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTG
CTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGG
TTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGGACC
TATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCGTGA
TATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATACAG
ATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATTCTC
TATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGAGTT
GAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTGAA
ATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGC
TAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAAC
AATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAA
TCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAGTAT
ATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGAC
TGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATCAGG
GTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAAATC
GAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTGGGA
CTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGAAGT
TCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTTGGA
TGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGCAGT
AACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAAC
GTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTC
TTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGC
AAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGT
AAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAA
ATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTA
TAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACAAAA
TGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACTATA
TCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGG

Figure 37H

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

AGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGACTC
CTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAATCC
ATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAATTT
GCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACT
GATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCA
AACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTT
TTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCGAGG
GGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAAGGA
AGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGT
CTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 136)

Figure 37I

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPAR*
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSAAEAAAKEAAAKEAAA
*KEAAAKALEAEAAAKEAAAKEAAAKEAAAKEAAAKA****NTLVLFGAGFGAVITVVVIVVIIKCFCKHRSCFRR***
RNEASRETNNSLTFGPEEALAEQTVFLMEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADY

Figure 37J

VSV-M51R-mIL12p70-H4-2TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_4$ALEA(EAAAK)$_4$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

NLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHD
ASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLIL
NAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDV
IIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARE
SRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGL
EKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAA
QVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDT
KATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMF
KGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPS
LIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQRE
AKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDD
ETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPIN
AMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLI
RAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPAN
LLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGL
ISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWG
RTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSEST
SILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALH
RFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTD
HYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQS
YQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHL
KRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQ
CRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRS
GEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPK
MLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRG
IFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQ
IDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDL
VQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGI
PSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPP
NPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDG
LPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINR
RISKEDRSILMLKSDLHEENSWRD(SEQ ID NO: 137)

Figure 38A

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 38B

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 38C

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 38D

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*A(EAAAK)$_3$A (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCCC
TGCAGAGTCCGATCGgttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA*
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
AACAGGGTGATGGGCTATCTGAGCTCCGCCGCAGAGGCTGCAGCCAAAGAAGCTGCTGCCAAGGAG
*GCCGCCGCCAAGGCCA**ACACACTTGTGCTCTTTGGGGCAGGATTCGGCGCAGTAATAACAGTCGTC***
GTCATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGTTTCAGAAGAAGAAATGAGGCA
AGCAGAGAAACAAACAACAGCCTTACCTTCGGGCCTGAAGAAGCATTAGCTGAACAGACCGTCTTC
CTTTAGGCTAAGCAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTC
AAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC

Figure 38E

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*A(EAAAK)$_3$A (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGA
GAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCT
CTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGG
GATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACA
TCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTAT
AGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGC
GGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTC
GCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAG
GTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAAC
ATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAG
AAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATG
CAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTT
CTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATT
AAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTC
CCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGA
GGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTAT
GGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCC
CAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGG
ATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCAT
GATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTT
GGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCG
ATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAAT
CCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGG
AAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAA
GGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAA
TACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATG
GCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCA
TATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTA
TCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACT
CATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAAC
AACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGT

Figure 38F

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

CTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAAC
ACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAA
TCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATG
ACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCT
GCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAG
AGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCA
GTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTAC
AATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTG
TATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTG
GACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGAT
CCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAG
GAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTA
GTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAG
GTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATA
TATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGA
TTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAA
AATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTG
AGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATG
TGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGG
ACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCA
TGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGT
TCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCT
TGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGG
TTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAA
GAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCT
CGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACA
GACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCT
CAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCC
TGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCA
GATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAG
ATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGA

Figure 38G

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

TGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTA
TTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTA
ATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAAC
GCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTT
ACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCG
ACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAA
AAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTC
ATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAA
GATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAA
GACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGC
AAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGA
GGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCT
CCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTAT
AAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGC
TCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTG
TTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTA
GGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGAC
CCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTA
ATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTG
CACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGC
GAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTT
AGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCC
AATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAG
GAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATT
CCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCAT
GCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCG
ATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGAT
GGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAA
GACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCT
GTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACC
CGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAA

Figure 38H

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** / **VSV-L (bold underline)**

GTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTG
AAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAA
GACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATC
ATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTA
TTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGG
GCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAAC
AAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGG
GCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 138)

Figure 38I

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)-**CD80TM (bold italics underline)** /* **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
*PIDKSYFGVDER*DTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRS*VPGVGVPGVG*RVIPVSGPAR
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSAAEAAAKEAAAKEAAA
*KA****NTLVLFGAGFGAVITVVVIVVIIKCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQTVFL***

Figure 38J

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-*A(EAAAK)$_3$A (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

MCPQKLTISWFAIVLLVSPLMAMWELEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRH
GVIGSGKTLTITVKEFLDAGQYTCHKGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPN
YSGRFTCSWLVQRNMDLKFNIKSSSSSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCP
TAEETLPIELALEARQQNKYENYSTSFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHS
YFSLKFFVRIQRKKEKMKETEEGCNQKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVP
CRVRS*VPGVGVPGVG*RVIPVSGPARCLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRD
QTSTLKTCLPLELHKNESCLATRETSSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINA
ALQNHNHQQIILDKGMLVAIDELMQSLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTI
*NRVMGYLSSA*MEVHDFETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRK
FNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEI
TFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKG
KVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDN
LFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKT
SVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSY
AKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKC
FEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGL
DDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKML
DSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYN
GRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQ
VICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIF
RGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLM
MHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFI
HVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTI
RNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKK
YHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGP
QHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKR
ATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQST
AALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEIT
LDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYR
KSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDK

Figure 38K

VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-A(EAAAK)$_3$A (italics heavy dash underline)*-***CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

LSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLW
LFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDIL
LCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIR
LGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGAS
PEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSL
KIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVC
KGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQ
IFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITG
ISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNW
IRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLH
EENSWRD
(SEQ ID NO: 139)

Figure 39A

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 39B

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 39C

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)*-***GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 39D

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCG**gttcctggagtaggggtacctggagtgggc***AGGGTCATACCGGTCTCTGGA*
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
AACAGGGTGATGGGCTATCTGAGCTCCGCC

Figure 39E

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCGTGCCCAGGGATTGTGGTTGTAAG
CCTTGCATATGTACAGTCCCAGAAGTATCATCTGTCTTCATCTTCCCCCCAAAGCCCAAGGATGTG
CTCACCATTACTCTGACTCCTAAGGTCACGTGTGTTGTGGTAGCCATCAGCAAGGATGATCCCGAG
GTCCAGTTCAGCTGGTTTGTAGATGATGTGGAGGTGCACACAGCTCAGACGCAACCCCGGGAGGAG
CAGTTCAACAGCACTTTCCGCTCAGTCAGTGAACTTCCCATCATGCACCAGGACTGGCTCAATGGC
AAGGAGTTCAAATGCAGGGTCAACAGTGCAGCTTTCCCTGCCCCCATCGAGAAAACCATCTCCAAA
ACCAAAGGCAGACCGAAGGCTCCACAGGTGTACACCATTCCACCTCCCAAGGAGCAGATGGCCAAG
GATAAAGTCAGTCTGACCTGCATGATAACAGACTTCTTCCCTGAAGACATTACTGTGGAGTGGCAG
TGGAATGGGCAGCCAGCGGAGAACTACAAGAACACTCAGCCCATCATGGACACAGATGGCTCTTAC
TTCGTCTACAGCAAGCTCAATGTGCAGAAGAGCAACTGGGAGGCAGGAAATACTTTCACCTGCTCT
GTGTTACATGAGGGCCTGCACAACCACCATACTGAGAAGAGCCTCTCCCACTCTCCTGGTAAAGGA
*GGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCC****AACACACTTGTGCTCTTTGGGGCA***
GGATTCGGCGCAGTAATAACAGTCGTCGTCATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGA
AGCTGTTTCAGAAGAAGAAATGAGGCAAGCAGAGAAACAAACAACAGCCTTACCTTCGGGCCTGAA
GAAGCATTAGCTGAACAGACCGTCTTCCTTTAGGCTAAGCAAATACAACAGATTCTTCATGTTTGG
ACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTTGAGTTTTTAATTTTTATG
AAAAAAACTAACAGCAATC**ATGGAAGTCCACGATTTTGAGACCGACGAGTTCAATGATTTCAATGA**
AGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGAGCGCATGACGTACTTGAATCATGCTGA
TTACAACCTGAATTCTCCTCTAATTAGTGATGATATTGACAATTTAATCAGGAAATTCAATTCTCT
TCCAATTCCCTCGATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAACGTCATGTCA
AGCCAATCCCATCCCAACATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAATCA
TGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGT
GGTGGAGACCTTCATCCGCGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGAC
TGACTCATTCAAAATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAAT
CTTAAATGCTGTCTCTGAGGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAG
AAGTTCTCATGGAACGAACATATGCAGGATTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGA
AGGATGGGCTTACTTCAAGAAACTTGATATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGA
TGTGATTATAGGGAGGATGCAAACGGTGCTATCCATGGTATGTAGAATAGACAACCTGTTCTCAGA
GCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGGAGATAAAATTGTGGAGAGGCAGGGAAA
TTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATGCAACTTGAAGCTGATGAAATTAGCAAG
AGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGAAAATCATATCAAGACTTCTGTTGATGA

Figure 39F

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAAAACAGTGGA
TCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACACTGG
ACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACT
TGCAAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAA
TGGAGACTTGCTCCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGC
TGCTCAAGTTCAAGATTTTGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACC
CGACTTACTAGACCCATCGATAATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTT
GAAACATGTCCGAATGAATCCGAACACTCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGA
CACAAAGGCTACCAATTGGAAAGAATTTCTTAAAGAGATTGATGAGAAGGGCTTAGATGATGATGA
TCTAATTATTGGTCTTAAAGGAAAGGAGAGGGAACTGAAGTTGGCAGGTAGATTTTTCTCCCTAAT
GTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATATTTGATAAAGACTCATTTCGTCCCTAT
GTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGTCATTAAAAAGATGTTAGATTCCTCATC
CGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGCCAATCACATTGATTACGAAAAATGGAA
TAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTATCC
ATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGA
CTTGATGCGTGTTCACAACAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACA
AGAGGGTGGACTGGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAG
AGAGGCTAAAATCAGAAACACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCAC
ACAGTATAAAACGAAGAAATCGAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTC
TAATAATGAGAAAATTATGACTGCAATCAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGA
CGATGAGACTATGCAATCTGCAGATTACTTGAATTATGGAAAAATACCGATTTTCCGTGGAGTGAT
TAGAGGGTTAGAGACCAAGAGATGGTCACGAGTGACTTGTGTCACCAATGACCAAATACCCACTTG
TGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCACCGTAGCTCATTTTGCTGAGAACCCAAT
CAATGCCATGATACAGTACAATTATTTTGGGACATTTGCTAGACTCTTGTTGATGATGCATGATCC
TGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTCTACTTTCAA
ATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTTTTT
GATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGC
TCGAAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAAT
AACTCACATAGACAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGC
GAACTTGTTAAAGACTGAGGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGT
GATTAAGGATGCAACCATATATTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAAT

Figure 39G

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)*-***GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AAATCCTCTGTTCCCTAGATTTTTAAGTGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGG
GCTCATCAGTCTATTTCAAAATTCTCGTACTATTCGGAACTCCTTTAAGAAAAAGTATCATAGGGA
ATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTTGACACATTTAGGGAAACTTCATTTGAG
AAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCATGCTGACACATTAAGATACAAATCCTG
GGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATTAGAAATGTTGGGTCCACAACATCGAAA
AGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTGTCCAGACGG
GATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGAATC
TACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCT
TAGAGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACAT
CCACTCTTTAACAGGCGAAGAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCT
TCATAGGTTTTCGACATCTCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGAC
CAGGTTGATGGCAACTACAGACACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCA
AGCAACGTTGCTCTATGCTCAAATTACCACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTAC
AGATCATTATCATATTGCCTGTAAGTCCTGTTTGAGACCCATAGAAGAGATCACCCTGGACTCAAG
TATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAAGACATGGAGGAATGGGGAAGGTTCGTG
GGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAATTGGAAGAATTTAGCACCTGCAGAGCA
ATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGGAGACTTGGCGTATAGAAAATCTACTCA
TGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGGTTTCTTAAA
AGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGCTCA
TTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATC
ACCTCCATTCCTTTCTCTTACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAA
GATCCCAACCTCCTATCCGACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATA
CCAATGCCGTCTAATTGAAAAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGA
TGTCTTATCCATAGACTTCATTGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAA
GCCATTTTTATCTGGGAAAGATAAGAATGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAG
ATCAGGAGAGGGGTGGGAAGACATACATGTGAAATTCTTCACCAAGGACATATTATTGTGTCCAGA
GGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGATAATAATAAAGACATGAGCTATCCCCC
TTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCCTGTTTATTATACGACCACCCCTTACCC
AAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGGAATCAGGTTGGGCCAATT
ACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACATGGAATGGGAATCCATTACAGGGACTT
CTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAGCAG

Figure 39H

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)*-***GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCC
CAGTGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATA
TCCATCTGACTTATGTGACCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCT
TCAAATTGATTTAATTGTAATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGAC
GAATGTTAGAAATTATGTGCACCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGG
AACATATATTTGTGAGAGCGAAAAGAATGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGA
CTTAGTTCAAACAGAATTTAGTAGTTCTCAAACGTCTGAAGTATATATGGTATGTAAAGGTTTGAA
GAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCATCAATGAATCCTGGAAAAACCTGTACGC
ATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAAGGTTAGTACATACTTTACCTTGACAGG
TATTCCCTCCCAATTCATTCCTGATCCTTTTGTAAACATTGAGACTATGCTACAAATATTCGGAGT
ACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTTATTGACCAT
TAGCCTTTTTTATATGGCGATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGATACC
TCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTG
GCTGAGTTTGATGGAGAAAGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATT
CCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGA
TGGGCTCCCAAAAGATACCCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCT
GGAATTGGTCCGAAACCAAGTTCGTCTAAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCG
TACAGTGGATAATCATTTGAAATGGTCAAATTTGCGAAGAAACACAGGAATGATTGAATGGATCAA
TAGACGAATTTCAAAAGAAGACCGGTCTATACTGATGTTGAAGAGTGACCTACACGAGGAAAACTC
TTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTTAAGTATGAAAAAAACTTTGATCCTTAA
GACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGGTCTTCGTGGCCGGCATGGTCCCAGCCT
CCTCGCTGGCGCCGGCTGGGCAACATTCCGAGGGGACCGTCCCCTCGGTAATGGCGAATGGGACGC
GGCCGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGTTGAGCAATA
ACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCTGAAAGGAGGAACTAT
ATCCGGATGCGGCCGC
(SEQ ID NO: 140)

Figure 39I

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
*PIDKSYFGVDER*DTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPAR*
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSAGGGSGGGGSGGGGSV
PRDCGCKPCICTVPEVSSVFIFPPKPKDVLTITLTPKVTCVVVAISKDDPEVQFSWFVDDVEVHTA

Figure 39J

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

QTQPREEQFNSTFRSVSELPIMHQDWLNGKEFKCRVNSAAFPAPIEKTISKTKGRPKAPQVYTIPP
PKEQMAKDKVSLTCMITDFFPEDITVEWQWNGQPAENYKNTQPIMDTDGSYFVYSKLNVQKSNWEA
*GNTFTCSVLHEGLHNHHTEKSLSHSPGK****GGGGSGGGGSGGGGSNTLVLFGAGFGAVITVVVIVVII***
KCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQTVFL*MCPQKLTISWFAIVLLVSPLMAMWELE*
KDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCHKG
GETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSSSS
PDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYSTSF
FIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCNQK
GAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRS*VPGVGVPGVG*RVIPVSGPARCL
SQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRETSS
TTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQSL
*NHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA*MEVHDFETDEFNDFNED
DYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQA
NPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTD
SFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEG
WAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNF
SYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDL
TLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNG
DLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLK
HVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMS
WKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNN
HQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQE
GGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSN
NEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCA
NIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKY
AMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRIT
HIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSIN
PLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRR
GSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGI
HDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIH
SLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQA

Figure 39K

VSV-M51R-mIL12p70-D265A_mIgG1TM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx4-mIgG1(D265A) (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

TLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWG
QEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKG
LLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKI
PTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKP
FLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPW
GRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFL
SCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYP
SDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGT
YICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAF
QSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTIS
LFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFP
IRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRT
VDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 141)

Figure 40A

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 40B

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 40C

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)*-***GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 40D

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCGgttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA*
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
AACAGGGTGATGGGCTATCTGAGCTCCGCC

Figure 40E

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCGAGCCCAGAGGGCCCACAATCAAG
CCCTGTCCTCCATGCAAATGCCCAGCACCTAACCTCTTGGGTGGACCATCCGTCTTCATCTTCCCT
CCAAAGATCAAGGATGTACTCATGATCTCCCTGAGCCCCATAGTCACATGTGTGGTGGTGGATGTG
AGCGAGGATGACCCAGATGTCCAGATCAGCTGGTTTGTGAACAACGTGGAAGTACACACAGCTCAG
ACACAAACCCATAGAGAGGATTACAACAGTACTCTCCGGGTGGTCAGTGCCCTCCCCATCCAGCAC
CAGGACTGGATGAGTGGCAAGGAGTTCAAATGCAAGGTCAACAACAAAGACCTCCCAGCGCCCATC
GAGAGAACCATCTCAAAACCCAAAGGGTCAGTAAGAGCTCCACAGGTATATGTCTTGCCTCCACCA
GAAGAAGAGATGACTAAGAAACAGGTCACTCTGACCTGCATGGTCACAGACTTCATGCCTGAAGAC
ATTTACGTGGAGTGGACCAACAACGGGAAAACAGAGCTAAACTACAAGAACACTGAACCAGTCCTG
GACTCTGATGGTTCTTACTTCATGTACAGCAAGCTGAGAGTGGAAAAGAAGAACTGGGTGGAAAGA
AATAGCTACTCCTGTTCAGTGGTCCACGAGGGTCTGCACAATCACCACACGACTAAGAGCTTCTCC
*CGGACTCCCGGGTAAA**GGAGGGGGAGGCAGTGGAGGCGGTGGTTCAGGTGGTGGTGGGTCCAACACA***
CTTGTGCTCTTTGGGGCAGGATTCGGCGCAGTAATAACAGTCGTCGTCATCGTTGTCATCATCAAA
TGCTTCTGTAAGCACAGAAGCTGTTTCAGAAGAAGAAATGAGGCAAGCAGAGAAACAAACAACAGC
CTTACCTTCGGGCCTGAAGAAGCATTAGCTGAACAGACCGTCTTCCTTTAGGCTAAGCAAATACAA*
CAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCAATTATATTT
GAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCACGATTTTGAGACCGACGA**
GTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGAGCGCATGAC
GTACTTGAATCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGATGATATTGACAATTTAAT
CAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGA
GATGTTAACGTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCATAAATGGATGGGAAGTTG
GTTAATGTCTGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGC
AGAAATAACATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAACAAACCAATTGAATACAT
CAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTT
ACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCTCAACTTGGCGAGGACTTT
CAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGATTAGGGTTCCCAGCTTGGG
TCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATATTCTAATGGACCGAAACTT
TCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATCCATGGTATGTAGAAT
AGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGGAGATAAAAT
TGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATGCAACTTGAA
GCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGAAAATCATAT

Figure 40F

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

CAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGATCAGATAAT
GAGTGTGAAAACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGGTCATCCTTT
TATAGATTATTACACTGGACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGATATTGATGT
GTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTTCAATGATCA
TAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGA
AAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATGGCATGAACTTCCGCTGAT
TAAATGTTTTGAAATACCCGACTTACTAGACCCATCGATAATATACTCTGACAAAAGTCATTCAAT
GAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCCTATCCCTAGTAAAAAGGT
GTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAAAGAGATTGATGAGAA
GGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGAACTGAAGTTGGCAGG
TAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATATTTGATAAA
GACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGTCATTAAAAA
GATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGCCAATCACAT
TGATTACGAAAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGG
CCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAGTCTTATATA
CTACAATGGAAGACCAGACTTGATGCGTGTTCACAACAACACACTGATCAATTCAACCTCCCAACG
AGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAA
TCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAAAGTCTTGGCACAAGGTGA
TAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGTTGTAGAATTACAGGGTGC
TCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAAAATAGGGACAGGGAAGTT
AGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAATTATGGAAAAATACC
GATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGTGACTTGTGTCACCAA
TGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCACCGTAGCTCA
TTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGACATTTGCTAGACTCTT
GTTGATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGATACCGGGCTT
GCACAGTTCTACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCAT
GTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAG
ATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGA
GATAGCCAAGTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGC
TATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATGCTTAATCGAATCAAGACA
AACCATCAGGAACCAGGTGATTAAGGATGCAACCATATATTTGTATCATGAAGAGGATCGGCTCAG

Figure 40G

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGAATTCAAATCAGGCACTTT
TTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTATTCGGAACTCCTTTAA
GAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTTGACACATTT
AGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCATGCTGACAC
ATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATTAGAAATGTT
GGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAATTATGTTTC
TGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGG
GTCTAAAACATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGAT
TAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAAT
GACTATACTTTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAAAAGGCAGCATGGGTTCAA
AAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCATGGTGGGTTCGCATCTCA
GAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGACACCATGAGGGATCTGGGAGATCAGAA
TTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCACCACTGTTGCAAGAGACGG
ATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTTGAGACCCATAGAAGA
GATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAAGACATGGAG
GAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAATTGGAAGAA
TTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGGAGACTTGGC
GTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGGTCGTATTAG
AGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACA
CCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGATTTACTTGAT
TGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGGACCTATTAGAGACGAATT
AGAAACGATTCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCGTGATATGGGGGTGATTGT
CAGAAATTACTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATACAGATCACATTATTCACA
ATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATTCTCTATTTCCACCACCCT
CTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGAGTTGAGAGAGCTGGCAAA
TCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTGAAATTCTTCACCAAGGA
CATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGATAATAATAA
AGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCCTGTTTATTA
TACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGG
AATCAGGTTGGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACATGGAATGGG
AATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGCATTACTACG

Figure 40H

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

AGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGG
CGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATGTGTAAATGG
TGAAACATGTTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTGGGACTATTTCCTCCGACT
CAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGAAGTTCGGGATTCTTCTAC
TAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTTGGATGAGCAAGGAGTTTT
AATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGCAGTAACAATCCTTGGTCC
CATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAACGTCTGAAGTATATAT
GGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCATCAATGAATC
CTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAAGGTTAGTAC
ATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGTAAACATTGAGACTAT
GCTACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATCTGATAGACC
TGCAGATTTATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTATAACATCAATCATAT
CAGAGTAGGACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGGGATCGCTAT
AACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACTATATCAACAGTGTTTAGC
AGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAA
GTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGACTCCTTGGCCCCAATCGG
GAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAATCCATTCAATGAGATCTT
GTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAATTTGCGAAGAAACACAGG
AATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACTGATGTTGAAGAGTGA
CCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTTAAGTATGAA
AAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGGTCTTCGTGG
CCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCGAGGGGACCGTCCCCTCGG
TAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGC
TGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTT
GCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 142)

Figure 40I

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQAVGEIDEIEAQRAEKSNYELF
QEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVEGFIQGPLDDYADEEVDVVFTS
DWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKYWNLAECTFEASGEGVIMKERQ
ITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPLTISLDELFSSRGEFISVGGDG
RMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTSMEYAPSA*
PIDKSYFGVDERDTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFY
KILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPPMLNVPEHFRRPFNIGLYKGTI
*ELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKASGAWVLDSIGHFK*MKCLLYLA
FLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLIGTALQVKMPKSHKAIQADGWM
CHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA
VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDYKVKGLCDSNLISMDITFFS
EDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEG
SSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAFTIINGT
LKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVEIGPNGVLRTSSGYKFPLYMIG
HGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFF
IIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK***MCPQKLTISWFAIVLLVSPLMAMWE***
LEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCH
KGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSS
SSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYST
SFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCN
QKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPAR*
CLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRET
SSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQ
SLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA

Figure 40J

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

GGGSGGGGSGGGGSEPRGPTIKPCPPCKCPAPNLLGGPSVFIFPPKIKDVLMISLSPIVTCVVVDV
SEDDPDVQISWFVNNVEVHTAQTQTHREDYNSTLRVVSALPIQHQDWMSGKEFKCKVNNKDLPAPI
ERTISKPKGSVRAPQVYVLPPPEEEMTKKQVTLTCMVTDFMPEDIYVEWTNNGKTELNYKNTEPVL
*DSDGSYFMYSKLRVEKKNWVERNSYSCSVVHEGLHNHHTTKSFSRTPGK****GGGGSGGGGSGGGGSNT***
LVLFGAGFGAVITVVVIVVIIKCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQTVFLMEVHDF
ETDEFNDFNEDDYATREFLNPDERMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWD
GVLEMLTSCQANPIPTSQMHKWMGSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKP
IEYIKKERWTDSFKILAYLCQKFLDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRV
PSLGPTFISEGWAYFKKLDILMDRNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRI
GDKIVERQGNFSYDLIKMVEPICNLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLH
DQIMSVKTVDLTLVIYGSFRHWGHPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQ
FNDHKKWFVNGDLLPHDHPFKSHVKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDK
SHSMNRSEVLKHVRMNPNTPIPSKKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKEREL
KLAGRFFSLMSWKLREYFVITEYLIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICI
ANHIDYEKWNNHQRKLSNGPVFRVMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINS
TSQRVCWQGQEGGLEGLRQKGWSILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVE
LQGALNQMVSNNEKIMTAIKIGTGKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVT
CVTNDQIPTCANIMSSVSTNALTVAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDK
IPGLHSSTFKYAMLYLDPSIGGVSGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVF
GNPEIAKFRITHIDKLVEDPTSLNIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEE
DRLRSFLWSINPLFPRFLSEFKSGTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSS
LTHLGKLHLRRGSCKMWTCSATHADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGF
NYVSVHCPDGIHDVFSSRGPLPAYLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDS
KLAMTILSNIHSLTGEEWTKRQHGFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDL
GDQNFDFLFQATLLYAQITTTVARDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVL
KTWRNGEGSWGQEIKQIYPLEGNWKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQ
GRIRGRGFLKGLLDGLMRASCCQVIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPI
RDELETIPHKIPTSYPTSNRDMGVIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSI
STTLLQILYKPFLSGKDKNELRELANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAK
DNNKDMSYPPWGRESRGTITTIPVYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSIL
HGMGIHYRDFLSCGDGSGGMTAALLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSR

Figure 40K

VSV-M51R-mIL12p70-mIgG2aTM

VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / ***mIL12p40 (bold italics)-VPGVGx2 linker (bold heavy dash underline)****-mIL12p35 (italics underline)-GGGGSx3-mIgG2a (italics heavy dash underline)-****GGGGSx3-CD80TM (bold italics underline)*** / **VSV-L (bold underline)**

CVNGETCWEYPSDLCDPRTWDYFLRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDE
QGVLIYKTYGTYICESEKNAVTILGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSS
INESWKNLYAFQSSEQEFARAKKVSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKS
SDRPADLLTISLFYMAIISYYNINHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQ
QCLAVIQQSFPIRWEAVSVKGGYKQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPF
NEILFNQLCRTVDNHLKWSNLRRNTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 143)

Figure 41A

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA***ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCC***
ACTCATGGCCATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGC
CCCTGGAGAAACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGA
CCAGAGACATGGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGC
TGGCCAGTACACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAA
GGAAAATGGAATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGA
AGCACCAAATTACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTT
CAACATCAAGAGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTC
TGCAGAGAAGGTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGT
CACCTGCCCAACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAA
ATATGAGAACTACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTT
GCAGATGAAGCCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCAC
TCCCCATTCCTACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGA
GACAGAGGAGGGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATG
CAAAGGCGGGAATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGC
***ATGTGTTCCCTGCAGAGTCCGATCG*gttcctggagtaggggtacctggagtgggc*<u>*AGGGTCATACC*</u>**
<u>*GGTCTCTGGACCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGT*</u>
<u>*GAAGACGGCCAGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACAT*</u>
<u>*CACACGGGACCAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTG*</u>
<u>*CCTGGCTACTAGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTT*</u>
<u>*GATGATGACCCTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGC*</u>
<u>*CATCAACGCAGCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGC*</u>
<u>*CATCGATGAGCTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGG*</u>
<u>*AGAAGCAGACCCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGT*</u>
<u>*CGTGACCATCAACAGGGTGATGGGCTATCTGAGCTCCGCCTGA**GGGGGGGGAGGCAGTGGAGGCGG***</u>
<u>***TGGTTCAGGTGGTGGTGGGTCCAACACACTTGTGCTCTTTGGGGCAGGATTCGGCGCAGTAATAAC***</u>
<u>***AGTCGTCGTCATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGTTTCAGAAGAAGAAA***</u>
<u>***TGAGGCAAGCAGAGAAACAAACAACAGCCTTACCTTCGGGCCTGAAGAAGCATTAGCTGAACAGAC***</u>
<u>***CGTCTTCCTTTAG***</u>

Figure 41B

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

ATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGGCGCGCCTGCCACC**ATGTCTGTTACAGTCA**
AGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCCTGCAAATGAGGATCCAGTGGAATACC
CGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTACATCAATACTACAAAAAGTTTGTCAG
ATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAATGTATCAATCATACATGTCAACAGCT
ACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGATAAAGATTGGTCAAGTTTCGGAATAA
ACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCTTGTATCCTTGAAAGCCCTGGACGGCG
TACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGCAGATGACAAATGGTTGCCTTTGTATC
TACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGAATACAGAAAAAAGCTCATGGATGGGC
TGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACCTCTTGTGCCAGAAGGTCGTGACATTT
TTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGTCGCTGCAGTGGACATGTTCTTCCACA
TGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAACTATTGTTTCCAGATTCAAAGATTGTG
CTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGGAATGTCTACAGAAGATGTAACGACCT
GGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAATGATGCTTCCAGGCCAAGAAATTGACA
AGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATTGTCTTCTAAGTCTCCATATTCTTCCG
TCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGCTCTTCTGCTCAGATCCACCAGAGCAA
GGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCTTACTACAGCAGGTTTGTTGTACGCTT
ATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTGTGTTGGAGATAACAAATACACTCCAG
ATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACAAGGCAGAGATGTGGTCGAATGGCTCG
GATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATATGATGCAGTATGCGAAAAGAGCAGTCA
TGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTATGCTAAGTCAGAATTTGACAAATGAC
CCTATAATTCTCGAGTCACCTATTATATATTATGCTACATATGAAAAAAACTAACAGATATC

Figure 41C

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 41D

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 41E

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

ATGGTGAGCAAGGGCGAGGAGCTGTTCACCGGGGTGGTGCCCATCCTGGTCGAGCTGGACGGCGAC
GTAAACGGCCACAAGTTCAGCGTGTCCGGCGAGGGCGAGGGCGATGCCACCTACGGCAAGCTGACC
CTGAAGTTCATCTGCACCACCGGCAAGCTGCCCGTGCCCTGGCCCACCCTCGTGACCACCCTGACC
TACGGCGTGCAGTGCTTCAGCCGCTACCCCGACCACATGAAGCAGCACGACTTCTTCAAGTCCGCC
ATGCCCGAAGGCTACGTCCAGGAGCGCACCATCTTCTTCAAGGACGACGGCAACTACAAGACCCGC
GCCGAGGTGAAGTTCGAGGGCGACACCCTGGTGAACCGCATCGAGCTGAAGGGCATCGACTTCAAG
GAGGACGGCAACATCCTGGGGCACAAGCTGGAGTACAACTACAACAGCCACAACGTCTATATCATG
GCCGACAAGCAGAAGAACGGCATCAAGGTGAACTTCAAGATCCGCCACAACATCGAGGACGGCAGC
GTGCAGCTCGCCGACCACTACCAGCAGAACACCCCCATCGGCGACGGCCCCGTGCTGCTGCCCGAC
AACCACTACCTGAGCACCCAGTCCGCCCTGAGCAAAGACCCCAACGAGAAGCGCGATCACATGGTC
*CTGCTGGAGTTCGTGACCGCCGCCGGGATCACTCTCGGCATGGACGAGCTGTACAAGTAA*GCTAAG
CAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCA
ATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCACGATTTTGA**
GACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGA
GCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGATGATATTGA
CAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAACTGGGATGG
AGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCATAAATGGAT
GGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGA
CAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAACAAACCAAT
TGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTGTCAAAAGTT
TTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCTCAACTTGGC
GAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGATTAGGGTTCC
CAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATATTCTAATGGA
CCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATCCATGGT
ATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGG
AGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATG
CAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGA
AAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGA
TCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGG
TCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGA
TATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTT

Figure 41F

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

CAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTTTAAAAGTCA
TGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATGGCATGAACT
TCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGATAATATACTCTGACAAAAG
TCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCCTATCCCTAG
TAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAAAGAGAT
TGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGAACTGAA
GTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATA
TTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGT
CATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGC
CAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCG
AGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAG
TCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAACAACACACTGATCAATTCAAC
CTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAAAGGATGGAG
TATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAAAGTCTTGGC
ACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGTTGTAGAATT
ACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAAAATAGGGAC
AGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAATTATGG
AAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGTGACTTG
TGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCAC
CGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGACATTTGC
TAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGAT
ACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGT
GTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTC
ATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGG
AAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCCAACCTCTCT
GAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATGCTTAATCGA
ATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATATTTGTATCATGAAGAGGA
TCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGAATTCAAATC
AGGCACTTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTATTCGGAA
CTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTT
GACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCA

Figure 41G

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

TGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATT
AGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAA
TTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGC
TTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGT
CCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAA
ACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAAAAGGCAGCA
TGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCATGGTGGGTT
CGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGACACCATGAGGGATCTGGG
AGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCACCACTGTTGC
AAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTTGAGACC
CATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAA
GACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAA
TTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGG
AGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGG
TCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCA
AGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGAT
TTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGGACCTATTAG
AGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCGTGATATGGG
GGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATACAGATCACA
TTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATTCTCTATTTC
CACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGAGTTGAGAGA
GCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTGAAATTCTT
CACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGA
TAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCC
TGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCT
GCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACA
TGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGC
ATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGT
CATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATG
TGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTGGGACTATTT
CCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGAAGTTCGGGA

Figure 41H

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

TTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTTGGATGAGCA
AGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGCAGTAACAAT
CCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAACGTCTGA
AGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCAT
CAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAA
GGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGTAAACAT
TGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATC
TGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTATAACAT
CAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGG
GATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACTATATCAACA
GTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGGAGGATA
CAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGACTCCTTGGC
CCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAATCCATTCAA
TGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAATTTGCGAAG
AAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACTGATGTT
GAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTT
AAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGG
TCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCGAGGGGACCG
TCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGA
GTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTGAG
GGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 144)

Figure 41I

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

MCPQKLTISWFAIVLLVSPLMAMWELEKDVYVVEVDWTPDAPGETVNLTCDTPEEDDITWTSDQRH
GVIGSGKTLTITVKEFLDAGQYTCHKGGETLSHSHLLLHKKENGIWSTEILKNFKNKTFLKCEAPN
YSGRFTCSWLVQRNMDLKFNIKSSSSSPDSRAVTCGMASLSAEKVTLDQRDYEKYSVSCQEDVTCP
TAEETLPIELALEARQQNKYENYSTSFFIRDIIKPDPPKNLQMKPLKNSQVEVSWEYPDSWSTPHS
YFSLKFFVRIQRKKEKMKETEEGCNQKGAFLVEKTSTEVQCKGGNVCVQAQDRYYNSSCSKWACVP
CRVRS*VPGVGVPGVG*RVIPVSGPARCLSQSRNLLKTTDDMVKTAREKLKHYSCTAEDIDHEDITRD
QTSTLKTCLPLELHKNESCLATRETSSTTRGSCLPPQKTSLMMTLCLGSIYEDLKMYQTEFQAINA
ALQNHNHQQIILDKGMLVAIDELMQSLNHNGETLRQKPPVGEADPYRVKMKLCILLHAFSTRVVTI
*NRVMGYLSSA****GGGGSGGGGSGGGGSNTLVLFGAGFGAVITVVVIVVIIKCFCKHRSCFRRRNEASR***
***ETNNSLTFGPEEALAEQTVFL*MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTT**
KSLSDLRGYVYQGLKSGNVSIIHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLK
ALDGVLPDGVSDASRTSADDKWLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPE
GRDIFDVWGNDSNYTKIVAAVDMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTE
DVTTWILNREVADEMVQMMLPGQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLR
STRARNARQPDDIEYTSLTTAGLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDV
VEWLGWFEDQNRKPTPDMMQYAKRAVMSLQGLREKTIGKYAKSEFDKMDNLTKVREYLKSYSRLDQ
AVGEIDEIEAQRAEKSNYELFQEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVE
GFIQGPLDDYADEEVDVVFTSDWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKY
WNLAECTFEASGEGVIMKERQITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPL
TISLDELFSSRGEFISVGGDGRMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSK*
*KLGIAPPPYEEDTSMEYAPSAPIDKSYFGVDER*DTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDV
AAAVSHWDHMYIGMAGKRPFYKILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPP
MLNVPEHFRRPFNIGLYKGTIELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKA
*SGAWVLDSIGHFK*MKCLLYLAFLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLI
GTALQVKMPKSHKAIQADGWMCHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGT
WLNPGFPPQSCGYATVTDAEAVIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHS
DYKVKGLCDSNLISMDITFFSEDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGV
WFEMADKDLFAAARFPECPEGSSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVD
LSYLAPKNPGTGPAFTIINGTLKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVE
IGPNGVLRTSSGYKFPLYMIGHGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKN
PIELVEGWFSSWKSSIASFFFIIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK*MVSK*

Figure 41J

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

GEELFTGVVPILVELDGDVNGHKFSVSGEGEGDATYGKLTLKFICTTGKLPVPWPTLVTTLTYGVQ
CFSRYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTLVNRIELKGIDFKEDGN
ILGHKLEYNYNSHNVYIMADKQKNGIKVNFKIRHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHYL
*STQSALSKDPNEKRDHMVLLEFVTAAGITLGMDELYK*MEVHDFETDEFNDFNEDDYATREFLNPDE
RMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWM
GSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKF
LDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMD
RNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPIC
NLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWG
HPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSH
VKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPS
KKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEY
LIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFR
VMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWS
ILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGT
GKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALT
VAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGV
SGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSL
NIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKS
GTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATH
ADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPA
YLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQH
GFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVA
RDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGN
WKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQ
VIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMG
VIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRE
LANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIP
VYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAA
LLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYF
LRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTI

Figure 41K

VSV-mIL12p70TM-N-M51R-GFP

***mIL12p40 (bold italics)*-VPGVGx2 linker (bold heavy dash underline)-*mIL12p35 (italics underline)*-*GGGGSx4-CD80TM (bold italics underline)* / VSV-N (bold) / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / VSV-L (bold underline)**

LGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKK
VSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNI
NHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGY
KQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRR
NTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 145)

Figure 42A

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

TACGTATTGTAATACGACTCACTATAGGGAGACTTCGTCTGATGAGTCCGTGAGGACGAAACGGAG
TCTAGACTCCGTCACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAAC
AGTAATCAAA**ATGTCTGTTACAGTCAAGAGAATCATTGACAACACAGTCGTAGTTCCAAAACTTCC**
TGCAAATGAGGATCCAGTGGAATACCCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTA
CATCAATACTACAAAAAGTTTGTCAGATCTAAGAGGATATGTCTACCAAGGCCTCAAATCCGGAAA
TGTATCAATCATACATGTCAACAGCTACTTGTATGGAGCATTAAAGGACATCCGGGGTAAGTTGGA
TAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAAGCAGGGGATACAATCGGAATATTTGACCT
TGTATCCTTGAAAGCCCTGGACGGCGTACTTCCAGATGGAGTATCGGATGCTTCCAGAACCAGCGC
AGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACACAAATGCCTGA
ATACAGAAAAAAGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTTGAACC
TCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGT
CGCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAAC
TATTGTTTCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGG
AATGTCTACAGAAGATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAAATGGTCCAAAT
GATGCTTCCAGGCCAAGAAATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATT
GTCTTCTAAGTCTCCATATTCTTCCGTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGC
TCTTCTGCTCAGATCCACCAGAGCAAGGAATGCCCGACAGCCTGATGACATTGAGTATACATCTCT
TACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGATCCTCTGCCGACTTGGCACAACAGTTTTG
TGTTGGAGATAACAAATACACTCCAGATGATAGTACCGGAGGATTGACGACTAATGCACCGCCACA
AGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGAAAACCGACTCCTGATAT
GATGCAGTATGCGAAAAGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACAATTGGCAAGTA
TGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCGAGTCACCTATTATATATTATGCTACAT
ATGAAAAAAACTAACAGATATC

Figure 42B

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGTGTCCTCAGAAGCTAACCATCTCCTGGTTTGCCATCGTTTTGCTGGTGTCTCCACTCATGGCC
ATGTGGGAGCTGGAGAAAGACGTTTATGTTGTAGAGGTGGACTGGACTCCCGATGCCCCTGGAGAA
ACAGTGAACCTCACCTGTGACACGCCTGAAGAAGATGACATCACCTGGACCTCAGACCAGAGACAT
GGAGTCATAGGCTCTGGAAAGACCCTGACCATCACTGTCAAAGAGTTTCTAGATGCTGGCCAGTAC
ACCTGCCACAAAGGAGGCGAGACTCTGAGCCACTCACATCTGCTGCTCCACAAGAAGGAAAATGGA
ATTTGGTCCACTGAAATTTTAAAAAATTTCAAAAACAAGACTTTCCTGAAGTGTGAAGCACCAAAT
TACTCCGGACGGTTCACGTGCTCATGGCTGGTGCAAAGAAACATGGACTTGAAGTTCAACATCAAG
AGCAGTAGCAGTTCCCCTGACTCTCGGGCAGTGACATGTGGAATGGCGTCTCTGTCTGCAGAGAAG
GTCACACTGGACCAAAGGGACTATGAGAAGTATTCAGTGTCCTGCCAGGAGGATGTCACCTGCCCA
ACTGCCGAGGAGACCCTGCCCATTGAACTGGCGTTGGAAGCACGGCAGCAGAATAAATATGAGAAC
TACAGCACCAGCTTCTTCATCAGGGACATCATCAAACCAGACCCGCCCAAGAACTTGCAGATGAAG
CCTTTGAAGAACTCACAGGTGGAGGTCAGCTGGGAGTACCCTGACTCCTGGAGCACTCCCCATTCC
TACTTCTCCCTCAAGTTCTTTGTTCGAATCCAGCGCAAGAAAGAAAAGATGAAGGAGACAGAGGAG
GGGTGTAACCAGAAAGGTGCGTTCCTCGTAGAGAAGACATCTACCGAAGTCCAATGCAAAGGCGGG
AATGTCTGCGTGCAAGCTCAGGATCGCTATTACAATTCCTCATGCAGCAAGTGGGCATGTGTTCCC
TGCAGAGTCCGATCGgttcctggagtaggggtacctggagtgggc*AGGGTCATACCGGTCTCTGGA*
CCTGCCAGGTGTCTTAGCCAGTCCCGAAACCTGCTGAAGACCACAGATGACATGGTGAAGACGGCC
AGAGAAAAGCTGAAACATTATTCCTGCACTGCTGAAGACATCGATCATGAAGACATCACACGGGAC
CAAACCAGCACATTGAAGACCTGTTTACCACTGGAACTACACAAGAACGAGAGTTGCCTGGCTACT
AGAGAGACTTCTTCCACAACAAGAGGGAGCTGCCTGCCCCCACAGAAGACGTCTTTGATGATGACC
CTGTGCCTTGGTAGCATCTATGAGGACTTGAAGATGTACCAGACAGAGTTCCAGGCCATCAACGCA
GCACTTCAGAATCACAACCATCAGCAGATCATTCTAGACAAGGGCATGCTGGTGGCCATCGATGAG
CTGATGCAGTCTCTGAATCATAATGGCGAGACTCTGCGCCAGAAACCTCCTGTGGGAGAAGCAGAC
CCTTACAGAGTGAAAATGAAGCTCTGCATCCTGCTTCACGCCTTCAGCACCCGCGTCGTGACCATC
*AACAGGGTGATGGGCTATCTGAGCTCCGCCTGA****GGGGGGGGAGGCAGTGGAGGCGGTGGTTCAGGT***
GGTGGTGGGTCCAACACACTTGTGCTCTTTGGGGCAGGATTCGGCGCAGTAATAACAGTCGTCGTC
ATCGTTGTCATCATCAAATGCTTCTGTAAGCACAGAAGCTGTTTCAGAAGAAGAAATGAGGCAAGC
AGAGAAACAAACAACAGCCTTACCTTCGGGCCTGAAGAAGCATTAGCTGAACAGACCGTCTTCCTT
TAGATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGGCGCGCCTGCCACC

Figure 42C

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCTCGTCTGGATCAGGCGGTAGGA
GAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTGTTCCAAGAGGATGGA
GTGGAAGAGCATACTAAGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAATCTGAACCA
GAAATTGAAGACAATCAAGGCTTGTATGCACCAGATCCAGAAGCAGAGCAAGTTGAAGGCTTTATA
CAGGGGCCTTTAGATGACTATGCAGATGAGGAAGTGGATGTTGTATTTACTTCGGACTGGAAACAG
CCTGAGCTTGAATCTGACGAGCATGGAAAGACCTTACGGTTGACATCGCCAGAGGGTTTAAGTGGA
GAGCAGAAATCCCAGTGGCTTTCGACGATTAAAGCAGTCGTGCAAAGTGCCAAATACTGGAATCTG
GCAGAGTGCACATTTGAAGCATCGGGAGAAGGGGTCATTATGAAGGAGCGCCAGATAACTCCGGAT
GTATATAAGGTCACTCCAGTGATGAACACACATCCGTCCCAATCAGAAGCAGTATCAGATGTTTGG
TCTCTCTCAAAGACATCCATGACTTTCCAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCC
TTGGATGAATTGTTCTCATCTAGAGGAGAGTTCATCTCTGTCGGAGGTGACGGACGAATGTCTCAT
AAAGAGGCCATCCTGCTCGGCCTGAGATACAAAAAGTTGTACAATCAGGCGAGAGTCAAATATTCT
CTGTAGACTATGAAAAAAAGTAACAGATATCACGATCTAAGTGTTACCCGGGTCCATTCATC*ATGA*
GTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCAC
CACCCCCTTATGAAGAGGACACTAGCATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATT
TTGGAGTTGACGAGCGAGACACCTATGATCCGAATCAATTAAGATATGAGAAATTCTTCTTTACAG
TGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCC
ATTGGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAAATCTTGGCTTTTTTGG
GTTCTTCTAATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTC
ACTGCGAAGGCAGGGCTTATTTGCCACATAGGATGGGGAAGACCCCTCCCATGCTCAATGTACCAG
AGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAGGGAACGATTGAGCTCACAATGACCATCT
ACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTG
ATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCATCTGGAGCGTGGGTCC
*TGGACTCTATCGGCCACTTCAAATGA*GCTAGTCTAACTGCATGCTTCTGAACAATCCCCGGTTTAC
TCAGTCTCCCCTAATTCCAGCCTCTCGAACAACTAATATCCTGTCTTTTCTATCCCTATGAAAAAA
ACTAACAGAGATCGATCTGTTTACGCGTCACT

Figure 42D

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGAAGTGCCTTTTGTACTTAGCCTTTTTATTCATTGGGGTGAATTGCAAGTTCACCATAGTTTTT
CCACACAACCAAAAAGGAAACTGGAAAAATGTTCCTTCTAATTACCATTATTGCCCGTCAAGCTCA
GATTTAAATTGGCATAATGACTTAATAGGCACAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAG
GCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCAAATGGGTCACTACTTGTGATTTCCGCTGG
TATGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTCCATCTGTAGAACAATGCAAGGAA
AGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTCCTCAAAGTTGTGGATAT
GCAACTGTGACGGATGCCGAAGCAGTGATTGTCCAGGTGACTCCTCACCATGTGCTGGTTGATGAA
TACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATTACATATGCCCCACT
GTCCATAACTCTACAACCTGGCATTCTGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATT
TCCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTGGGAAAGGAGGGCACAGGG
TTCAGAAGTAACTACTTTGCTTATGAAACTGGAGGCAAGGCCTGCAAAATGCAATACTGCAAGCAT
TGGGGAGTCAGACTCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCC
AGATTCCCTGAATGCCCAGAAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGT
CTAATTCAGGACGTTGAGAGGATCTTGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGA
GCGGGTCTTCCAATCTCTCCAGTGGATCTCAGCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCT
GCTTTCACCATAATCAATGGTACCCTAAAATACTTTGAGACCAGATACATCAGAGTCGATATTGCT
GCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTACCACAGAAAGGGAACTGTGGGAT
GACTGGGCACCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGAGGACCAGTTCAGGATAT
AAGTTTCCTTTATACATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTAGCTCAAAGGCT
CAGGTGTTCGAACATCCTCACATTCAAGACGCTGCTTCGCAACTTCCTGATGATGAGAGTTTATTT
TTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGCTTGTAGAAGGTTGGTTCAGTAGTTGGAAA
AGCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTT
GGTATCCATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATG
AACCGACTTGGAAAGTAAGCTAGCAAATCCTGCTAGGTATGAAAAAAACTAACAGATATCAGCTCA
GCTGCCACC

Figure 42E

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

ATGGTGAGCAAGGGCGAGGAGCTGTTCACCGGGGTGGTGCCCATCCTGGTCGAGCTGGACGGCGAC
GTAAACGGCCACAAGTTCAGCGTGTCCGGCGAGGGCGAGGGCGATGCCACCTACGGCAAGCTGACC
CTGAAGTTCATCTGCACCACCGGCAAGCTGCCCGTGCCCTGGCCCACCCTCGTGACCACCCTGACC
TACGGCGTGCAGTGCTTCAGCCGCTACCCCGACCACATGAAGCAGCACGACTTCTTCAAGTCCGCC
ATGCCCGAAGGCTACGTCCAGGAGCGCACCATCTTCTTCAAGGACGACGGCAACTACAAGACCCGC
GCCGAGGTGAAGTTCGAGGGCGACACCCTGGTGAACCGCATCGAGCTGAAGGGCATCGACTTCAAG
GAGGACGGCAACATCCTGGGGCACAAGCTGGAGTACAACTACAACAGCCACAACGTCTATATCATG
GCCGACAAGCAGAAGAACGGCATCAAGGTGAACTTCAAGATCCGCCACAACATCGAGGACGGCAGC
GTGCAGCTCGCCGACCACTACCAGCAGAACACCCCCATCGGCGACGGCCCCGTGCTGCTGCCCGAC
AACCACTACCTGAGCACCCAGTCCGCCCTGAGCAAAGACCCCAACGAGAAGCGCGATCACATGGTC
*CTGCTGGAGTTCGTGACCGCCGCCGGGATCACTCTCGGCATGGACGAGCTGTACAAGTAA*GCTAAG
CAAATACAACAGATTCTTCATGTTTGGACCAAATCAACTTGTGATACCATGCTCAAAGAGGCCTCA
ATTATATTTGAGTTTTTAATTTTTATGAAAAAAACTAACAGCAATC**ATGGAAGTCCACGATTTTGA**
GACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGA
GCGCATGACGTACTTGAATCATGCTGATTACAACCTGAATTCTCCTCTAATTAGTGATGATATTGA
CAATTTAATCAGGAAATTCAATTCTCTTCCAATTCCCTCGATGTGGGATAGTAAGAACTGGGATGG
AGTTCTTGAGATGTTAACGTCATGTCAAGCCAATCCCATCCCAACATCTCAGATGCATAAATGGAT
GGGAAGTTGGTTAATGTCTGATAATCATGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGA
CAAAGAGGCAGAAATAACATTTGACGTGGTGGAGACCTTCATCCGCGGCTGGGGCAACAAACCAAT
TGAATACATCAAAAAGGAAAGATGGACTGACTCATTCAAAATTCTCGCTTATTTGTGTCAAAAGTT
TTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTCTGAGGTGGAATTGCTCAACTTGGC
GAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACATATGCAGGATTAGGGTTCC
CAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGATATTCTAATGGA
CCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATCCATGGT
ATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGG
AGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATG
CAACTTGAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGA
AAATCATATCAAGACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGA
TCAGATAATGAGTGTGAAAACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGG
TCATCCTTTTATAGATTATTACACTGGACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGA
TATTGATGTGTCATATGCAAAAGCACTTGCAAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTT

Figure 42F

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

CAATGATCATAAAAAGTGGTTCGTGAATGGAGACTTGCTCCCTCATGATCATCCCTTTAAAAGTCA
TGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGATTTTGGAGATAAATGGCATGAACT
TCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGATAATATACTCTGACAAAAG
TCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACACTCCTATCCCTAG
TAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAAAGAGAT
TGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGAACTGAA
GTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATA
TTTGATAAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGT
CATTAAAAAGATGTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGC
CAATCACATTGATTACGAAAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCG
AGTTATGGGCCAGTTCTTAGGTTATCCATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAG
TCTTATATACTACAATGGAAGACCAGACTTGATGCGTGTTCACAACAACACACTGATCAATTCAAC
CTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGGACTGGAAGGTCTACGGCAAAAAGGATGGAG
TATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAGAAACACTGCTGTCAAAGTCTTGGC
ACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATCGAGAAACGTTGTAGAATT
ACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAATCAAAATAGGGAC
AGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAATTATGG
AAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGTGACTTG
TGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCAC
CGTAGCTCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGACATTTGC
TAGACTCTTGTTGATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGAT
ACCGGGCTTGCACAGTTCTACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGT
GTCGGGCATGTCTTTGTCCAGGTTTTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTC
ATTCTGGAGATTCATCCATGTACATGCTCGAAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGG
AAACCCCGAGATAGCCAAGTTTCGAATAACTCACATAGACAAGCTAGTAGAAGATCCAACCTCTCT
GAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGACTGAGGTTAAAAAATGCTTAATCGA
ATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATATTTGTATCATGAAGAGGA
TCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAGTGAATTCAAATC
AGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTATTCGGAA
CTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTT
GACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCA

Figure 42G

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

TGCTGACACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATT
AGAAATGTTGGGTCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAA
TTATGTTTCTGTGCATTGTCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGC
TTATCTAGGGTCTAAAACATCTGAATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGT
CCCACTGATTAAAAGAGCTACACGTCTTAGAGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAA
ACTAGCAATGACTATACTTTCTAACATCCACTCTTTAACAGGCGAAGAATGGACCAAAAGGCAGCA
TGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGACATCTCGGATGAGCCATGGTGGGTT
CGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGACACCATGAGGGATCTGGG
AGATCAGAATTTCGACTTTTTATTCCAAGCAACGTTGCTCTATGCTCAAATTACCACCACTGTTGC
AAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTTGAGACC
CATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAA
GACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAA
TTGGAAGAATTTAGCACCTGCAGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGG
AGACTTGGCGTATAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGG
TCGTATTAGAGGTCGAGGTTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCA
AGTAATACACCGGAGAAGTCTGGCTCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGAT
TTACTTGATTGATAAATTGAGTGTATCACCTCCATTCCTTTCTCTTACTAGATCAGGACCTATTAG
AGACGAATTAGAAACGATTCCCCACAAGATCCCAACCTCCTATCCGACAAGCAACCGTGATATGGG
GGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAATTGAAAAGGGAAAATACAGATCACA
TTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCATTGGACCATTCTCTATTTC
CACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAATGAGTTGAGAGA
GCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTGAAATTCTT
CACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGA
TAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCC
TGTTTATTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCT
GCTGTCCGGAATCAGGTTGGGCCAATTACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACA
TGGAATGGGAATCCATTACAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGC
ATTACTACGAGAAAATGTGCATAGCAGAGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGT
CATGCGAGGCGCCTCTCCTGAGCCCCCCAGTGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATG
TGTAAATGGTGAAACATGTTGGGAATATCCATCTGACTTATGTGACCCAAGGACTTGGGACTATTT
CCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAATTGTAATGGATATGGAAGTTCGGGA

Figure 42H

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

TTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCACCGGATTTTGGATGAGCA
AGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAATGCAGTAACAAT
CCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAACGTCTGA
AGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCAT
CAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAA
GGTTAGTACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGTAAACAT
TGAGACTATGCTACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATC
TGATAGACCTGCAGATTTATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTATAACAT
CAATCATATCAGAGTAGGACCGATACCTCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGG
GATCGCTATAACTGGTATAAGCTTTTGGCTGAGTTTGATGGAGAAAGACATTCCACTATATCAACA
GTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAGGTGGGAGGCTGTTTCAGTAAAAGGAGGATA
CAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGATACCCGAATTTCAGACTCCTTGGC
CCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGTTCGTCTAAATCCATTCAA
TGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTCAAATTTGCGAAG
AAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACTGATGTT
GAAGAGTGACCTACACGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTT
AAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGG
TCTTCGTGGCCGGCATGGTCCCAGCCTCCTCGCTGGCGCCGGCTGGGCAACATTCCGAGGGGACCG
TCCCCTCGGTAATGGCGAATGGGACGCGGCCGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGA
GTTGGCTGCTGCCACCGTTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTGAG
GGGTTTTTTGCTGAAAGGAGGAACTATATCCGGATGCGGCCGC
(SEQ ID NO: 146)

Figure 42I

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

MSVTVKRIIDNTVVVPKLPANEDPVEYPADYFRKSKEIPLYINTTKSLSDLRGYVYQGLKSGNVSI
IHVNSYLYGALKDIRGKLDKDWSSFGINIGKAGDTIGIFDLVSLKALDGVLPDGVSDASRTSADDK
WLPLYLLGLYRVGRTQMPEYRKKLMDGLTNQCKMINEQFEPLVPEGRDIFDVWGNDSNYTKIVAAV
DMFFHMFKKHECASFRYGTIVSRFKDCAALATFGHLCKITGMSTEDVTTWILNREVADEMVQMMLP
GQEIDKADSYMPYLIDFGLSSKSPYSSVKNPAFHFWGQLTALLLRSTRARNARQPDDIEYTSLTTA
GLLYAYAVGSSADLAQQFCVGDNKYTPDDSTGGLTTNAPPQGRDVVEWLGWFEDQNRKPTPDMMQY
AKRAVMSLQGLREKTIGKYAKSEFDK***MCPQKLTISWFAIVLLVSPLMAMWELEKDVYVVEVDWTPD***
APGETVNLTCDTPEEDDITWTSDQRHGVIGSGKTLTITVKEFLDAGQYTCHKGGETLSHSHLLLHK
KENGIWSTEILKNFKNKTFLKCEAPNYSGRFTCSWLVQRNMDLKFNIKSSSSSPDSRAVTCGMASL
SAEKVTLDQRDYEKYSVSCQEDVTCPTAEETLPIELALEARQQNKYENYSTSFFIRDIIKPDPPKN
LQMKPLKNSQVEVSWEYPDSWSTPHSYFSLKFFVRIQRKKEKMKETEEGCNQKGAFLVEKTSTEVQ
CKGGNVCVQAQDRYYNSSCSKWACVPCRVRSVPGVGVPGVG*RVIPVSGPARCLSQSRNLLKTTDDM*
VKTAREKLKHYSCTAEDIDHEDITRDQTSTLKTCLPLELHKNESCLATRETSSTTRGSCLPPQKTS
LMMTLCLGSIYEDLKMYQTEFQAINAALQNHNHQQIILDKGMLVAIDELMQSLNHNGETLRQKPPV
*GEADPYRVKMKLCILLHAFSTRVVTINRVMGYLSSA****GGGGSGGGGSGGGGSNTLVLFGAGFGAVIT***
VVVIVVIIKCFCKHRSCFRRRNEASRETNNSLTFGPEEALAEQTVFLMDNLTKVREYLKSYSRLDQ
AVGEIDEIEAQRAEKSNYELFQEDGVEEHTKPSYFQAADDSDTESEPEIEDNQGLYAPDPEAEQVE
GFIQGPLDDYADEEVDVVFTSDWKQPELESDEHGKTLRLTSPEGLSGEQKSQWLSTIKAVVQSAKY
WNLAECTFEASGEGVIMKERQITPDVYKVTPVMNTHPSQSEAVSDVWSLSKTSMTFQPKKASLQPL
TISLDELFSSRGEFISVGGDGRMSHKEAILLGLRYKKLYNQARVKYSL*MSSLKKILGLKGKGKKSK*
*KLGIAPPPYEEDTSMEYAPSAPIDKSYFGVDER*DTYDPNQLRYEKFFFTVKMTVRSNRPFRTYSDV
AAAVSHWDHMYIGMAGKRPFYKILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHRMGKTPP
MLNVPEHFRRPFNIGLYKGTIELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKA
*SGAWVLDSIGHFK*MKCLLYLAFLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLNWHNDLI
GTALQVKMPKSHKAIQADGWMCHASKWVTTCDFRWYGPKYITHSIRSFTPSVEQCKESIEQTKQGT
WLNPGFPPQSCGYATVTDAEAVIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHS
DYKVKGLCDSNLISMDITFFSEDGELSSLGKEGTGFRSNYFAYETGGKACKMQYCKHWGVRLPSGV
WFEMADKDLFAAARFPECPEGSSISAPSQTSVDVSLIQDVERILDYSLCQETWSKIRAGLPISPVD
LSYLAPKNPGTGPAFTIINGTLKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYEDVE
IGPNGVLRTSSGYKFPLYMIGHGMLDSDLHLSSKAQVFEHPHIQDAASQLPDDESLFFGDTGLSKN
PIELVEGWFSSWKSSIASFFFIIGLIIGLFLVLRVGIHLCIKLKHTKKRQIYTDIEMNRLGK*MVSK*

Figure 42J

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

GEELFTGVVPILVELDGDVNGHKFSVSGEGEGDATYGKLTLKFICTTGKLPVPWPTLVTTLTYGVQ
CFSRYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTLVNRIELKGIDFKEDGN
ILGHKLEYNYNSHNVYIMADKQKNGIKVNFKIRHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHYL
*STQSALSKDPNEKRDHMVLLEFVTAAGITLGMDELYK*MEVHDFETDEFNDFNEDDYATREFLNPDE
RMTYLNHADYNLNSPLISDDIDNLIRKFNSLPIPSMWDSKNWDGVLEMLTSCQANPIPTSQMHKWM
GSWLMSDNHDASQGYSFLHEVDKEAEITFDVVETFIRGWGNKPIEYIKKERWTDSFKILAYLCQKF
LDLHKLTLILNAVSEVELLNLARTFKGKVRRSSHGTNICRIRVPSLGPTFISEGWAYFKKLDILMD
RNFLLMVKDVIIGRMQTVLSMVCRIDNLFSEQDIFSLLNIYRIGDKIVERQGNFSYDLIKMVEPIC
NLKLMKLARESRPLVPQFPHFENHIKTSVDEGAKIDRGIRFLHDQIMSVKTVDLTLVIYGSFRHWG
HPFIDYYTGLEKLHSQVTMKKDIDVSYAKALASDLARIVLFQQFNDHKKWFVNGDLLPHDHPFKSH
VKENTWPTAAQVQDFGDKWHELPLIKCFEIPDLLDPSIIYSDKSHSMNRSEVLKHVRMNPNTPIPS
KKVLQTMLDTKATNWKEFLKEIDEKGLDDDDLIIGLKGKERELKLAGRFFSLMSWKLREYFVITEY
LIKTHFVPMFKGLTMADDLTAVIKKMLDSSSGQGLKSYEAICIANHIDYEKWNNHQRKLSNGPVFR
VMGQFLGYPSLIERTHEFFEKSLIYYNGRPDLMRVHNNTLINSTSQRVCWQGQEGGLEGLRQKGWS
ILNLLVIQREAKIRNTAVKVLAQGDNQVICTQYKTKKSRNVVELQGALNQMVSNNEKIMTAIKIGT
GKLGLLINDDETMQSADYLNYGKIPIFRGVIRGLETKRWSRVTCVTNDQIPTCANIMSSVSTNALT
VAHFAENPINAMIQYNYFGTFARLLLMMHDPALRQSLYEVQDKIPGLHSSTFKYAMLYLDPSIGGV
SGMSLSRFLIRAFPDPVTESLSFWRFIHVHARSEHLKEMSAVFGNPEIAKFRITHIDKLVEDPTSL
NIAMGMSPANLLKTEVKKCLIESRQTIRNQVIKDATIYLYHEEDRLRSFLWSINPLFPRFLSEFKS
GTFLGVADGLISLFQNSRTIRNSFKKKYHRELDDLIVRSEVSSLTHLGKLHLRRGSCKMWTCSATH
ADTLRYKSWGRTVIGTTVPHPLEMLGPQHRKETPCAPCNTSGFNYVSVHCPDGIHDVFSSRGPLPA
YLGSKTSESTSILQPWERESKVPLIKRATRLRDAISWFVEPDSKLAMTILSNIHSLTGEEWTKRQH
GFKRTGSALHRFSTSRMSHGGFASQSTAALTRLMATTDTMRDLGDQNFDFLFQATLLYAQITTTVA
RDGWITSCTDHYHIACKSCLRPIEEITLDSSMDYTPPDVSHVLKTWRNGEGSWGQEIKQIYPLEGN
WKNLAPAEQSYQVGRCIGFLYGDLAYRKSTHAEDSSLFPLSIQGRIRGRGFLKGLLDGLMRASCCQ
VIHRRSLAHLKRPANAVYGGLIYLIDKLSVSPPFLSLTRSGPIRDELETIPHKIPTSYPTSNRDMG
VIVRNYFKYQCRLIEKGKYRSHYSQLWLFSDVLSIDFIGPFSISTTLLQILYKPFLSGKDKNELRE
LANLSSLLRSGEGWEDIHVKFFTKDILLCPEEIRHACKFGIAKDNNKDMSYPPWGRESRGTITTIP
VYYTTTPYPKMLEMPPRIQNPLLSGIRLGQLPTGAHYKIRSILHGMGIHYRDFLSCGDGSGGMTAA
LLRENVHSRGIFNSLLELSGSVMRGASPEPPSALETLGGDKSRCVNGETCWEYPSDLCDPRTWDYF
LRLKAGLGLQIDLIVMDMEVRDSSTSLKIETNVRNYVHRILDEQGVLIYKTYGTYICESEKNAVTI

Figure 42K

VSV-N-mIL12p70TM-P-M51R-GFP

VSV-N (bold) / ***mIL12p40 (bold italics)***-**VPGVGx2 linker (bold heavy dash underline)**-*mIL12p35 (italics underline)*-***GGGGSx4-CD80TM (bold italics underline)*** / VSV-P (underline) / *VSV-M51R (italics)* / VSV-G (heavy dash underline) / *GFP (italics heavy dash underline)* / **VSV-L (bold underline)**

LGPMFKTVDLVQTEFSSSQTSEVYMVCKGLKKLIDEPNPDWSSINESWKNLYAFQSSEQEFARAKK
VSTYFTLTGIPSQFIPDPFVNIETMLQIFGVPTGVSHAAALKSSDRPADLLTISLFYMAIISYYNI
NHIRVGPIPPNPPSDGIAQNVGIAITGISFWLSLMEKDIPLYQQCLAVIQQSFPIRWEAVSVKGGY
KQKWSTRGDGLPKDTRISDSLAPIGNWIRSLELVRNQVRLNPFNEILFNQLCRTVDNHLKWSNLRR
NTGMIEWINRRISKEDRSILMLKSDLHEENSWRD
(SEQ ID NO: 147)

Figure 43

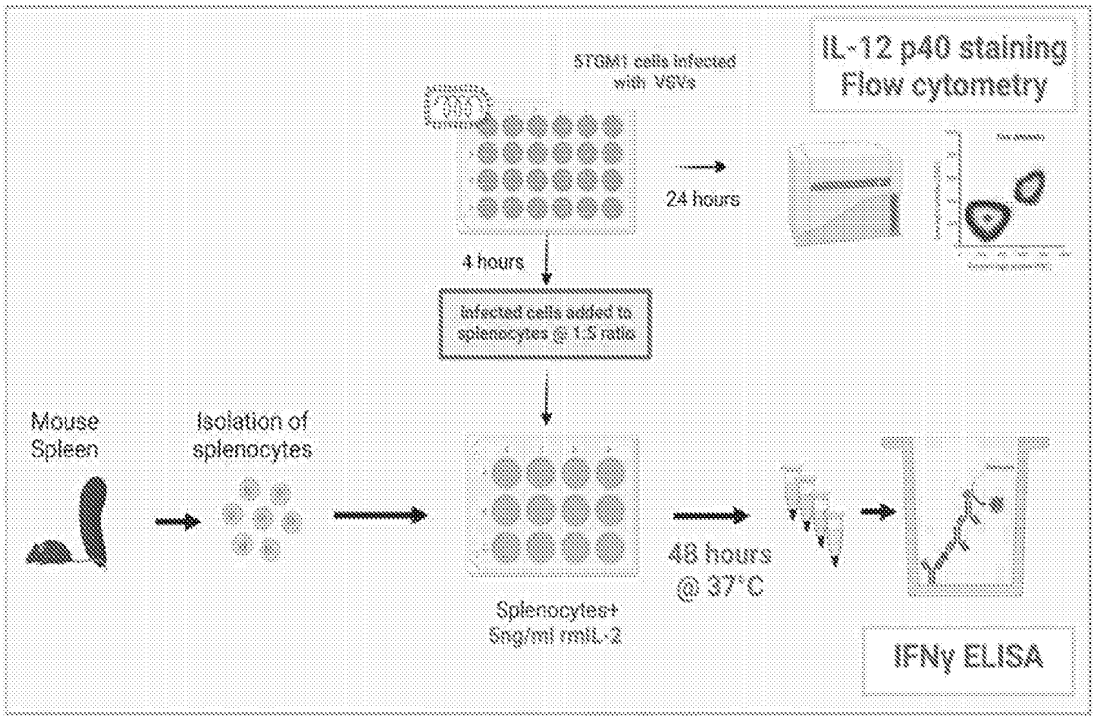

IL-12 p40 staining
Flow cytometry
STOM1 cells infected with VSVs
24 hours
4 hours
Infected cells added to splenocytes @ 1:5 ratio
Mouse Spleen
Isolation of splenocytes
Splenocytes+ 5ng/ml rmIL-2
48 hours @ 37°C
IFNγ ELISA

Figure 44

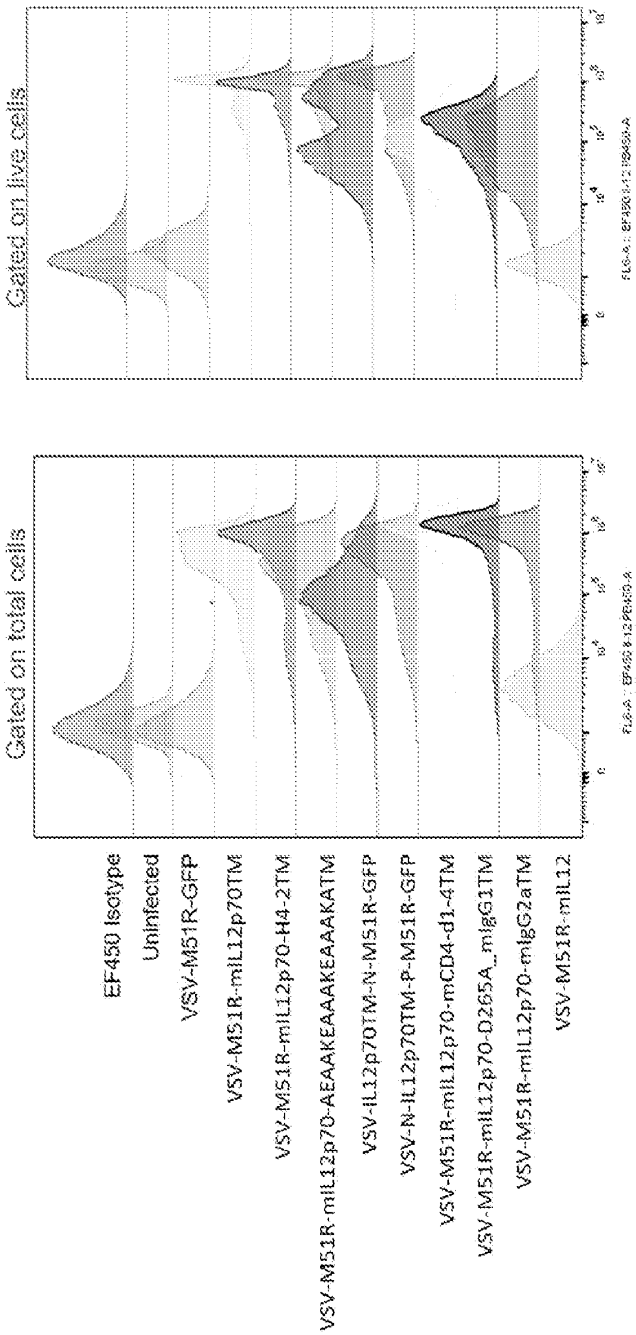
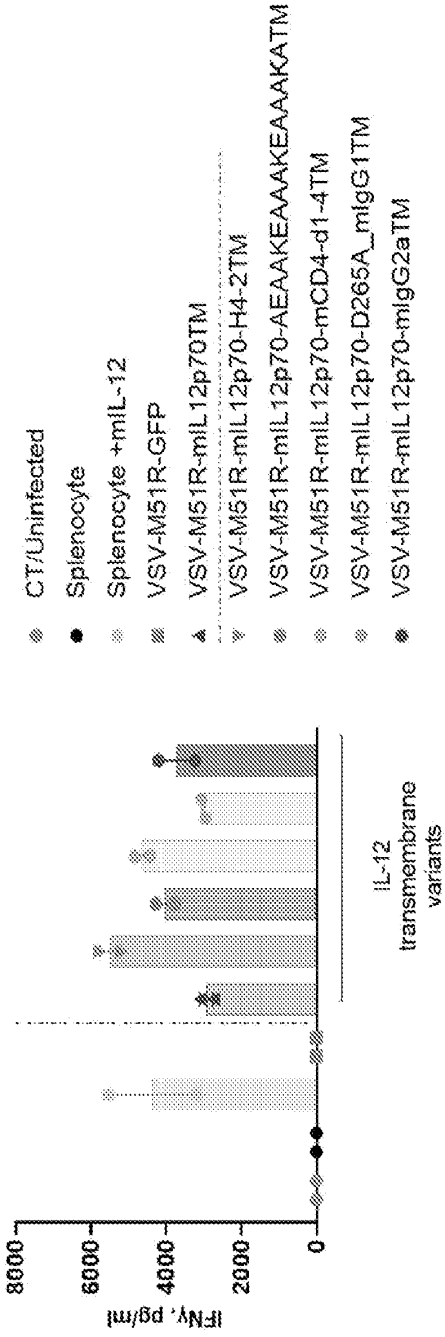

Gated on total cells
Gated on live cells
EF450 Isotype
Uninfected
VSV-M51R-GFP
VSV-M51R-mIL12p70TM
VSV-M51R-mIL12p70-H4-2TM
VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM
VSV-IL12p70TM-N-M51R-GFP
VSV-N-IL12p70TM-P-M51R-GFP
VSV-M51R-mIL12p70-mCD4-d1-4TM
VSV-M51R-mIL12p70-D265A_mIgG1TM
VSV-M51R-mIL12p70-mIgG2aTM
VSV-M51R-mIL12
IL-12p40
5TGM1 cells infected with respective viruses @ MOI of 0.1 and surface expression of IL-12 was measured 24 hours later using flow cytometry

Figure 45



5TGM1 cells infected with respective viruses @MOI of 0.1 and 4hours later, cells were washed and co cultured with splenocytes @ 1:5 ratio for 48 hours. Supernatants were collected and assayed for IFNγ

Figure 46

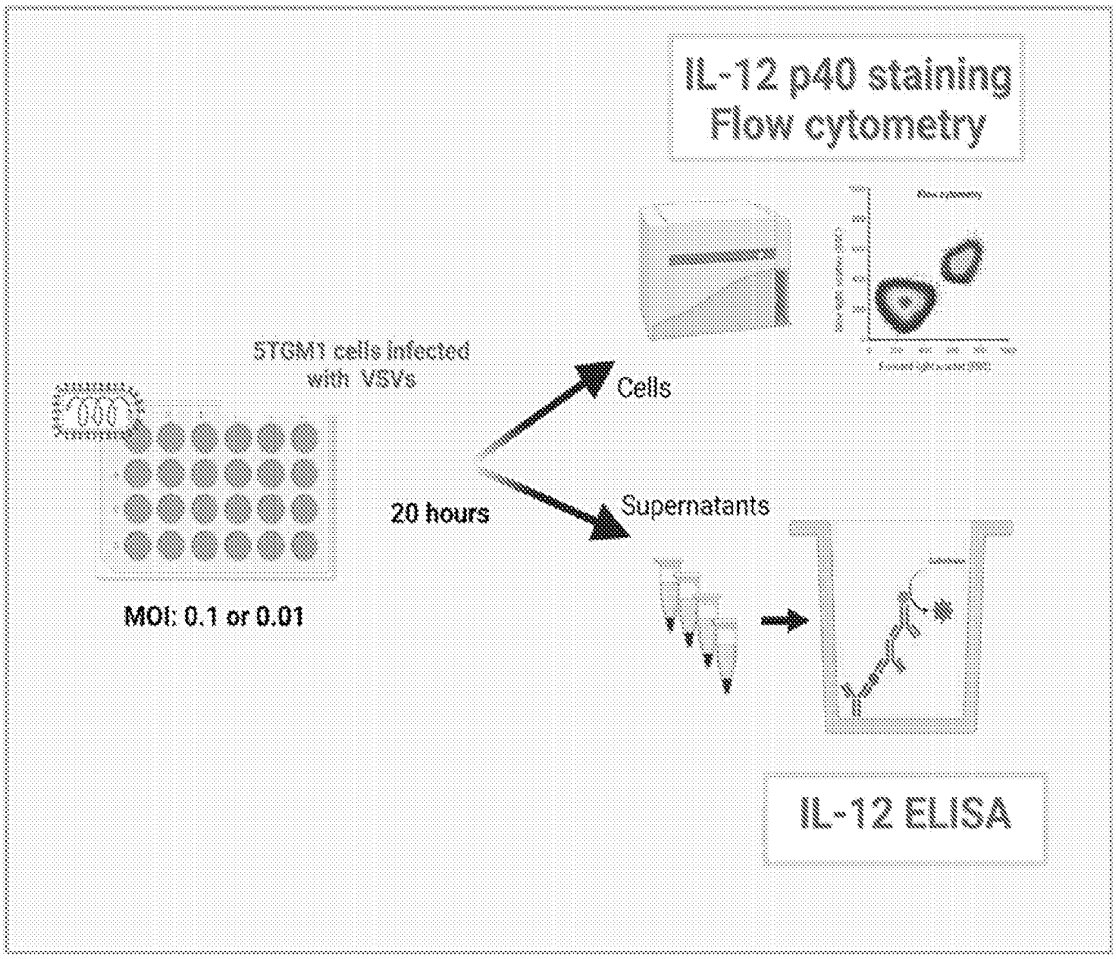
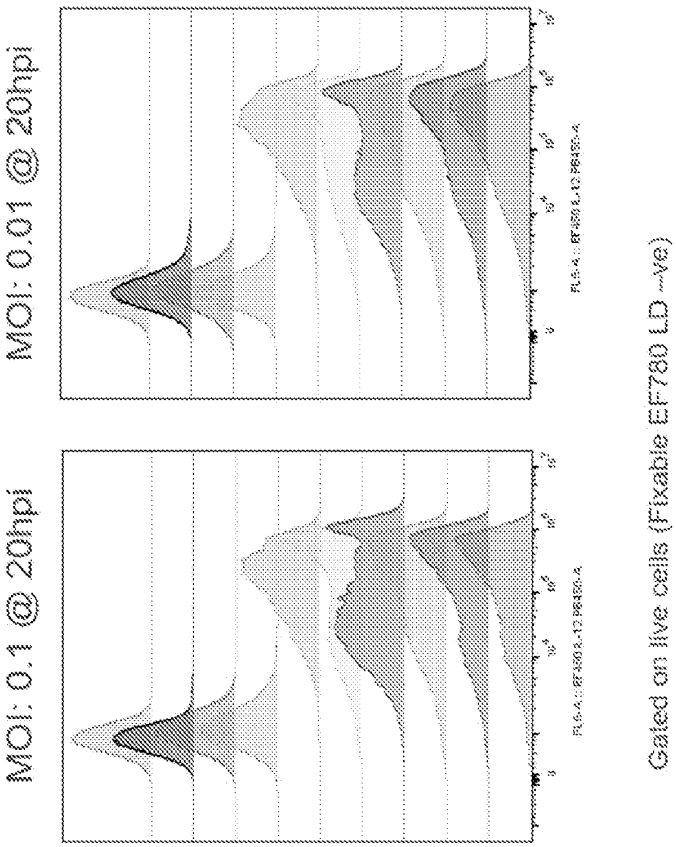

IL-12 p40 staining
Flow cytometry
STGM1 cells infected with VSVs
MOI: 0.1 or 0.01
20 hours
Cells
Supernatants
IL-12 ELISA

Figure 47



5TGM1 cells were infected with VSVs @ MOI of 0.1 or 0.01 and 20 hours later, cells were analyzed for membrane expression of IL-12

Figure 48

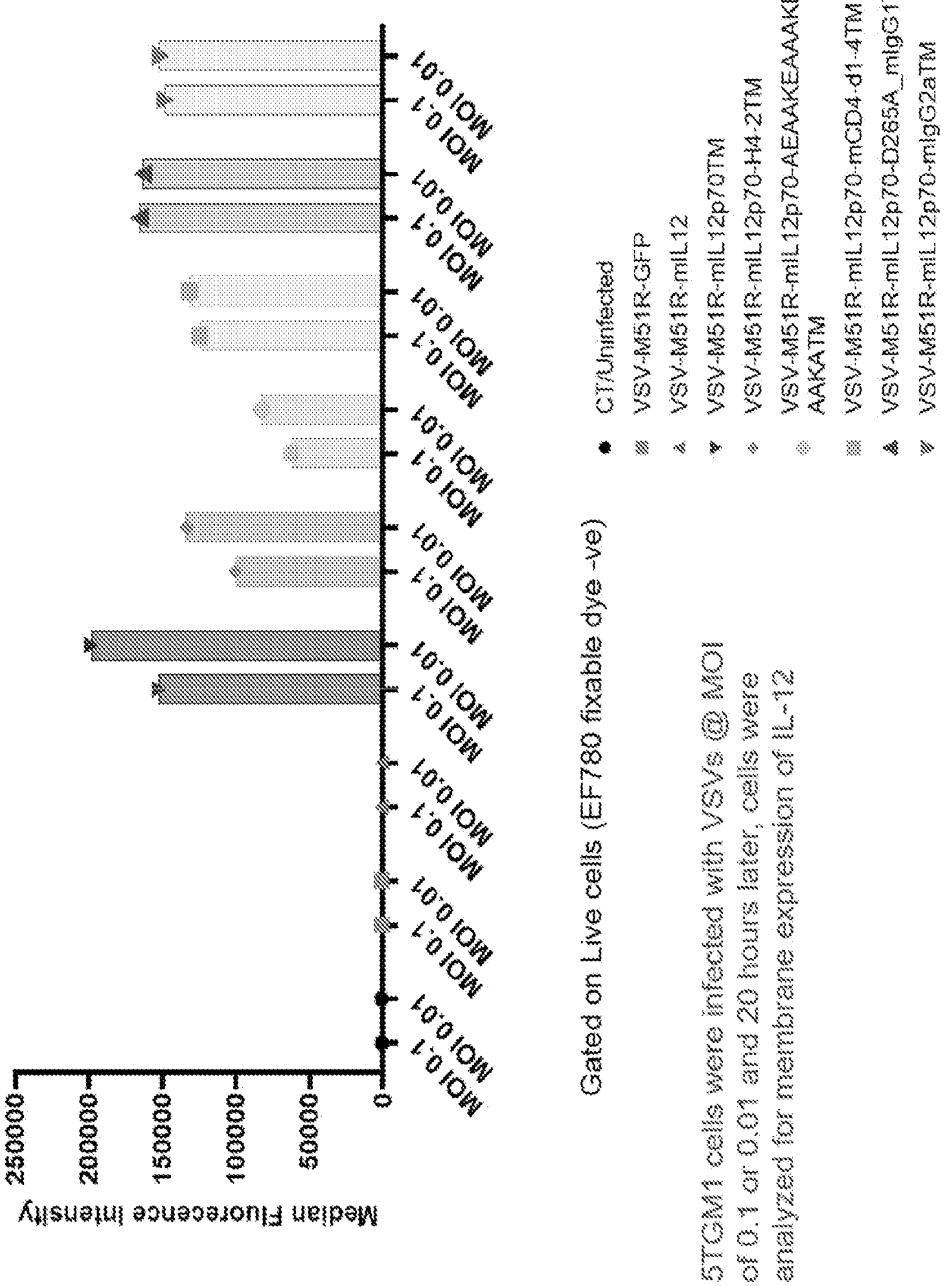

Median Fluorecence Intensity efluor450-IL-12p40 (18Hpi)
Median Fluorecence Intensity
250000
200000
150000
100000
50000
0
MOI 0.1
MOI 0.01
Gated on Live cells (EF780 fixable dye -ve)
CT/Uninfected
VSV-M51R-GFP
VSV-M51R-mIL12
VSV-M51R-mIL12p70TM
VSV-M51R-mIL12p70-H4-2TM
VSV-M51R-mIL12p70-AEAAKEAAAKEA AAKATM
VSV-M51R-mIL12p70-mCD4-d1-4TM
VSV-M51R-mIL12p70-D265A_mIgG1TM
VSV-M51R-mIL12p70-mIgG2aTM
5TGM1 cells were infected with VSVs @ MOI of 0.1 or 0.01 and 20 hours later, cells were analyzed for membrane expression of IL-12

Figure 49

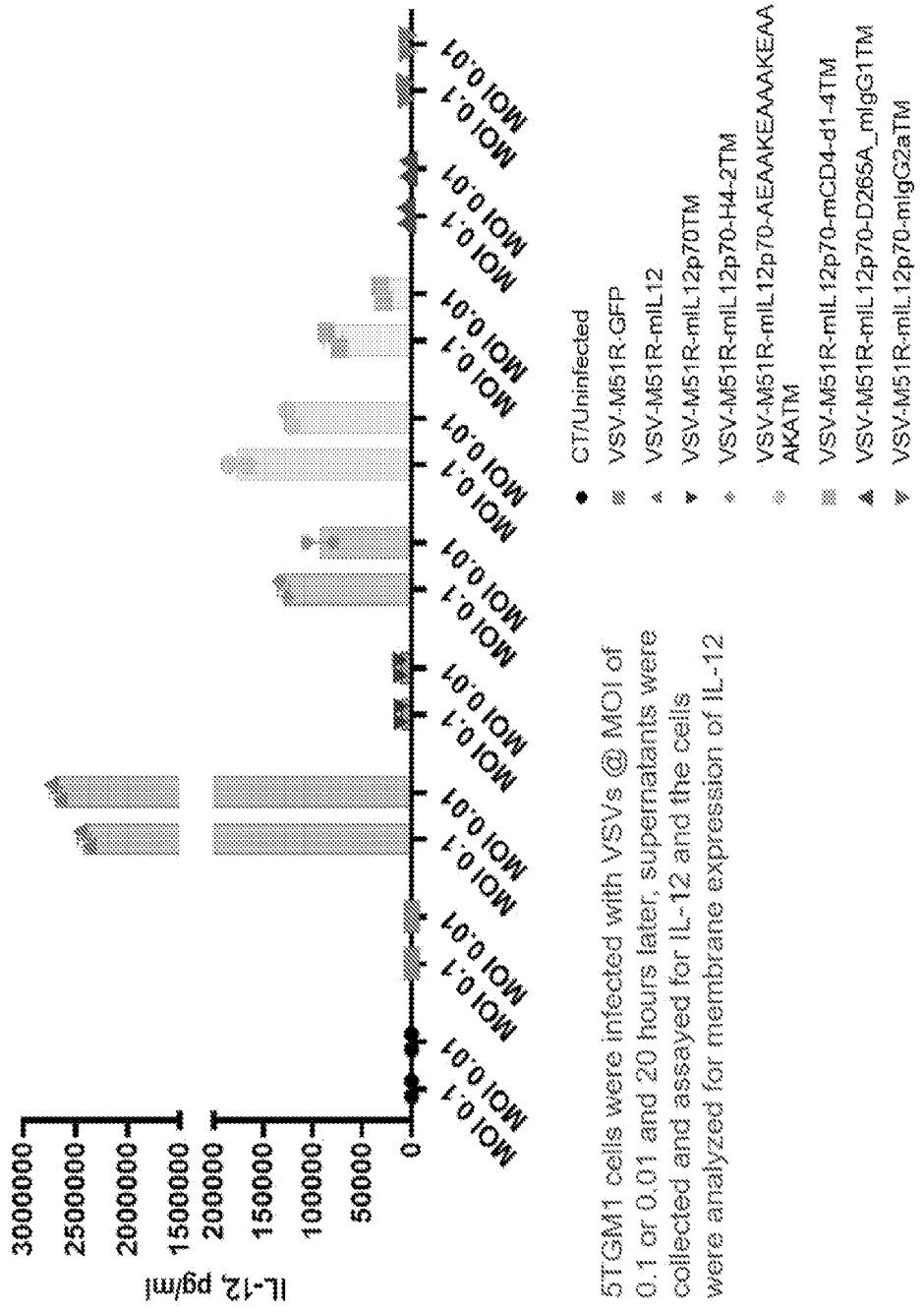

IL-12 levels in 5TGM1 supernatants (18Hpi)
IL-12, pg/ml
3000000
2500000
2000000
1500000
200000
150000
100000
50000
0
MOI 0.1
MOI 0.01
CT/Uninfected
VSV-M51R-GFP
VSV-M51R-mIL12
VSV-M51R-mIL12p70TM
VSV-M51R-mIL12p70-H4-2TM
VSV-M51R-mIL12p70-AEAAKEAAAKEAAAKATM
VSV-M51R-mIL12p70-mCD4-d1-4TM
VSV-M51R-mIL12p70-D265A_mIgG1TM
VSV-M51R-mIL12p70-mIgG2aTM
5TGM1 cells were infected with VSVs @ MOI of 0.1 or 0.01 and 20 hours later, supernatants were collected and assayed for IL-12 and the cells were analyzed for membrane expression of IL-12

Figure 50

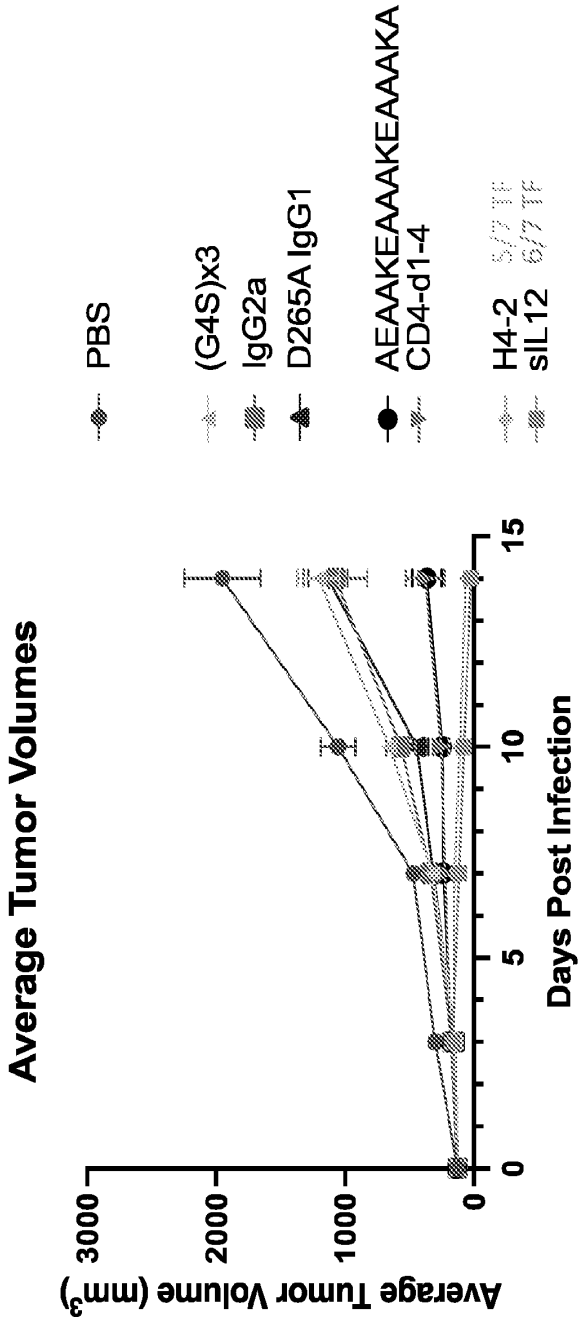

Average Tumor Volumes
Average Tumor Volume (mm3)
3000
2000
1000
0
0
5
10
15
Days Post Infection
PBS
(G4S)x3
IgG2a
D265A IgG1
AEAAKEAAAKEAAAKA
CD4-d1-4
H4-2
sIL12

Figure 51

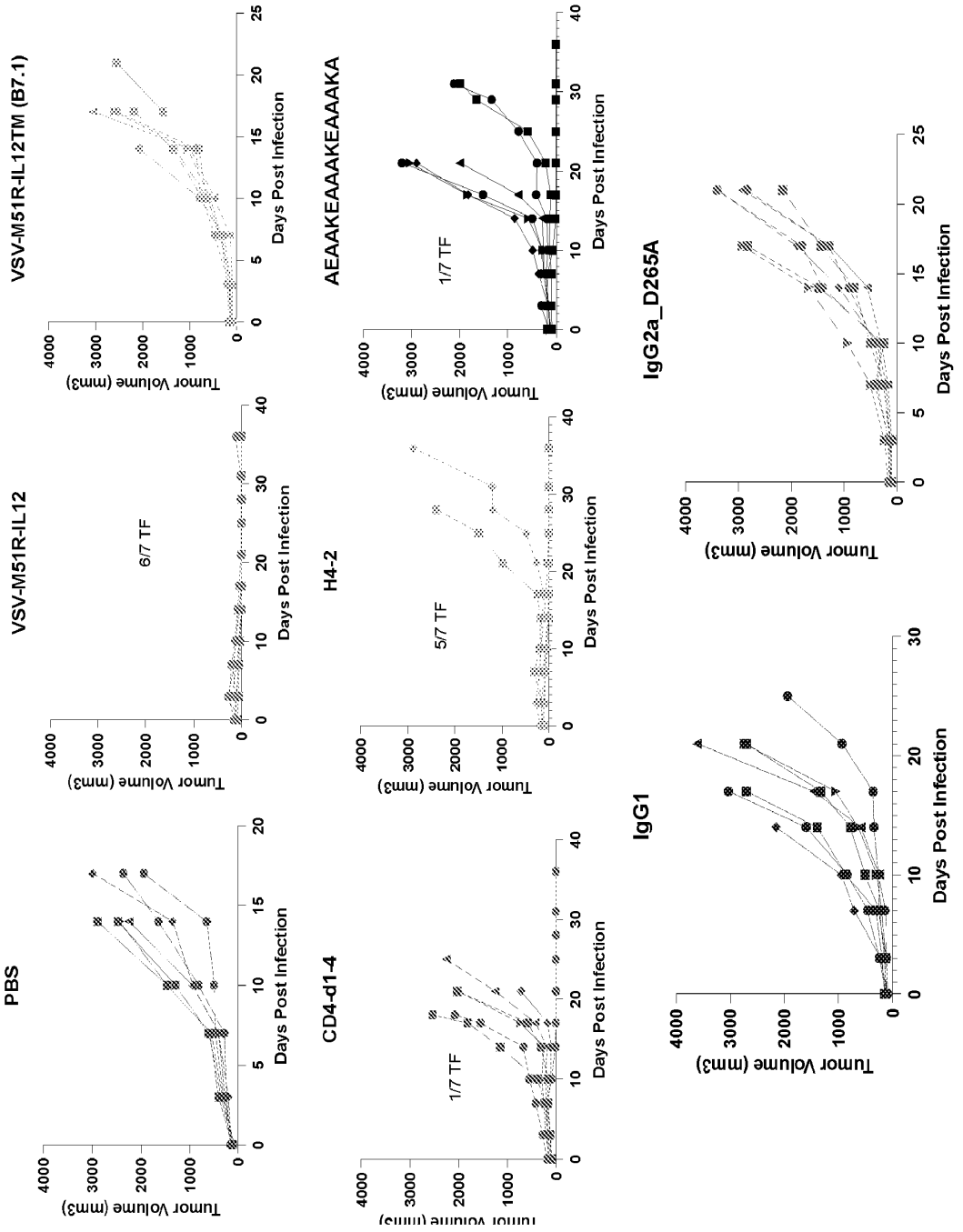

PBS
VSV-M51R-IL12
VSV-M51R-IL12TM (B7.1)
CD4-d1-4
H4-2
AEAAKEAAAKEAAAKA
IgG1
IgG2a_D265A
6/7 TF
5/7 TF
1/7 TF
Tumor Volume (mm3)
Days Post Infection

Figure 52

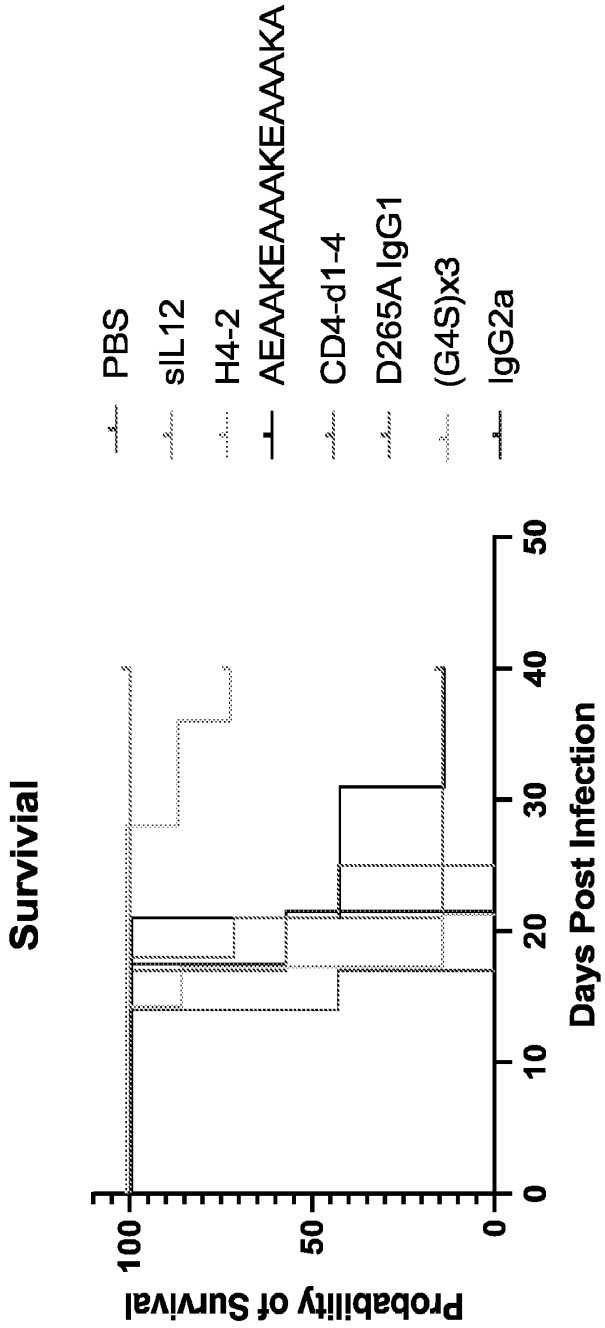

Survivial
Probability of Survival
100
50
0
0
10
20
30
40
50
Days Post Infection
PBS
sIL12
H4-2
AEAAKEAAAKEAAAKA
CD4-d1-4
D265A IgG1
(G4S)x3
IgG2a

Figure 53

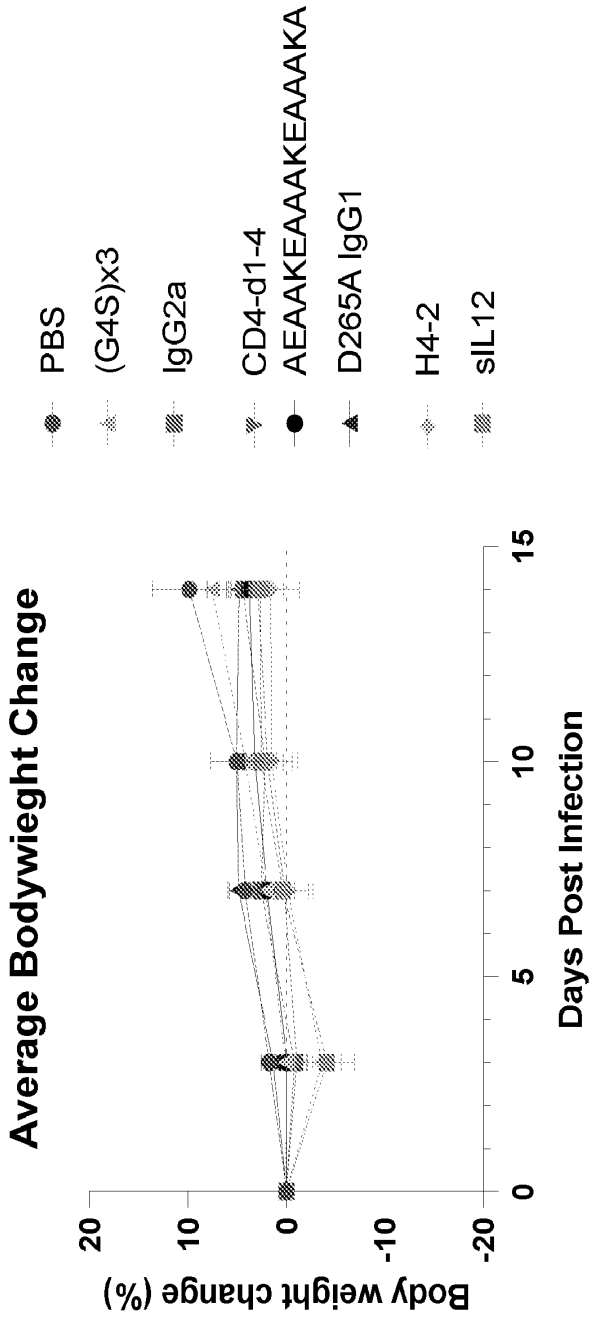

Average Bodyweight Change
PBS
(G4S)x3
IgG2a
CD4-d1-4
AEAAKEAAAKEAAAKA
D265A IgG1
H4-2
sIL12
Body weight change (%)
20
10
0
-10
-20
0
5
10
15
Days Post Infection

Figure 54

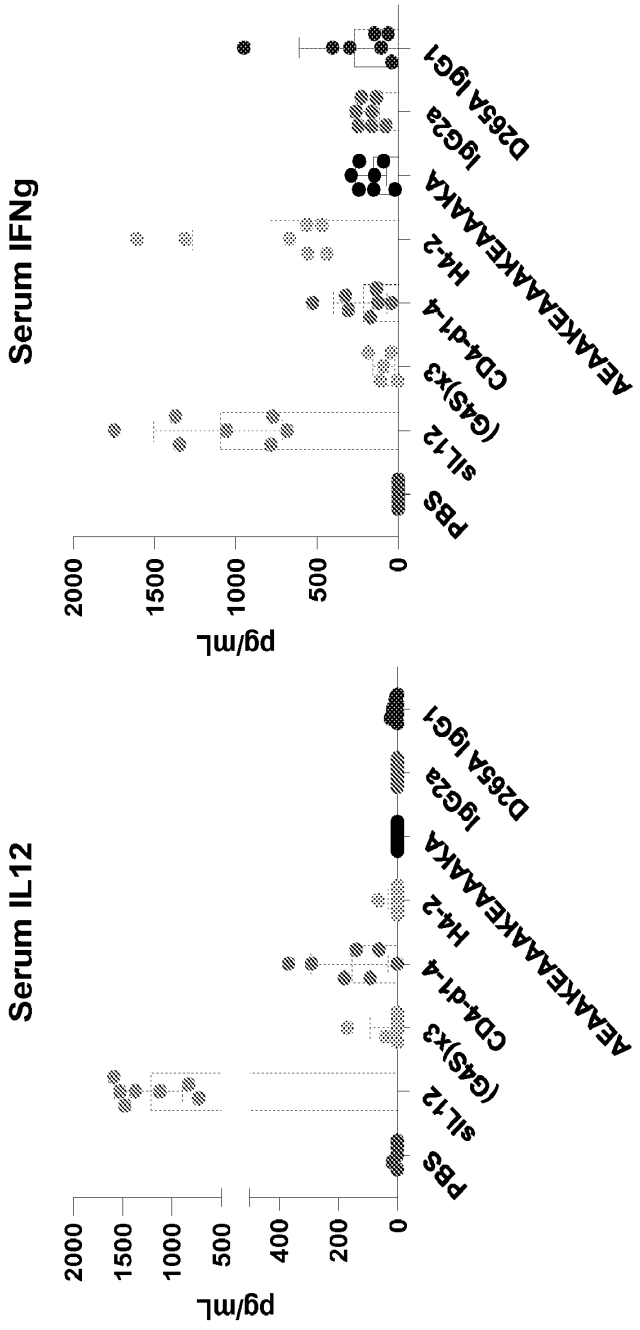

Serum IFNg
pg/mL
2000
1500
1000
500
0
PBS
sIL-12
(G4S)x3
CD4-d1-4
H4-2
AEAAKEAAAKEAAAKA
IgG2a
D265A IgG1
Serum IL12
pg/mL
2000
1500
1000
500
400
200
0
PBS
sIL-12
(G4S)x3
CD4-d1-4
H4-2
AEAAKEAAAKEAAAKA
IgG2a
D265A IgG1

Figure 55

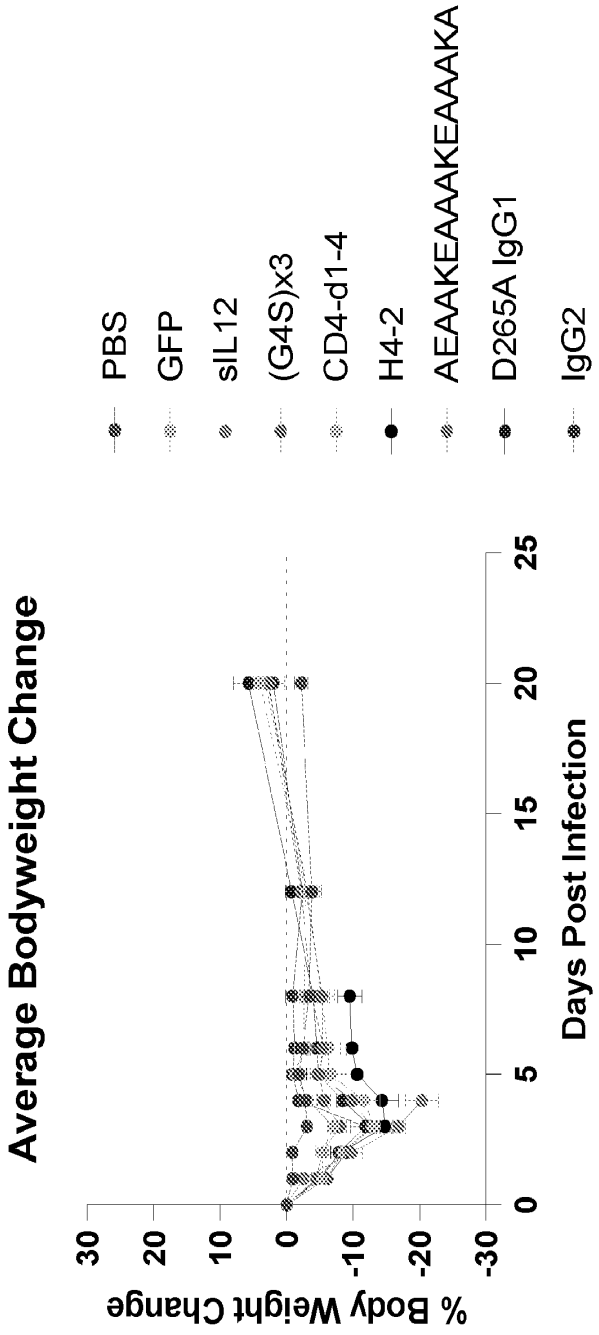

Average Bodyweight Change
% Body Weight Change
30
20
10
0
-10
-20
-30
0
5
10
15
20
25
Days Post Infection
PBS
GFP
sIL12
(G4S)x3
CD4-d1-4
H4-2
AEAAKEAAAKEAAAKA
D265A IgG1
IgG2

Figure 56

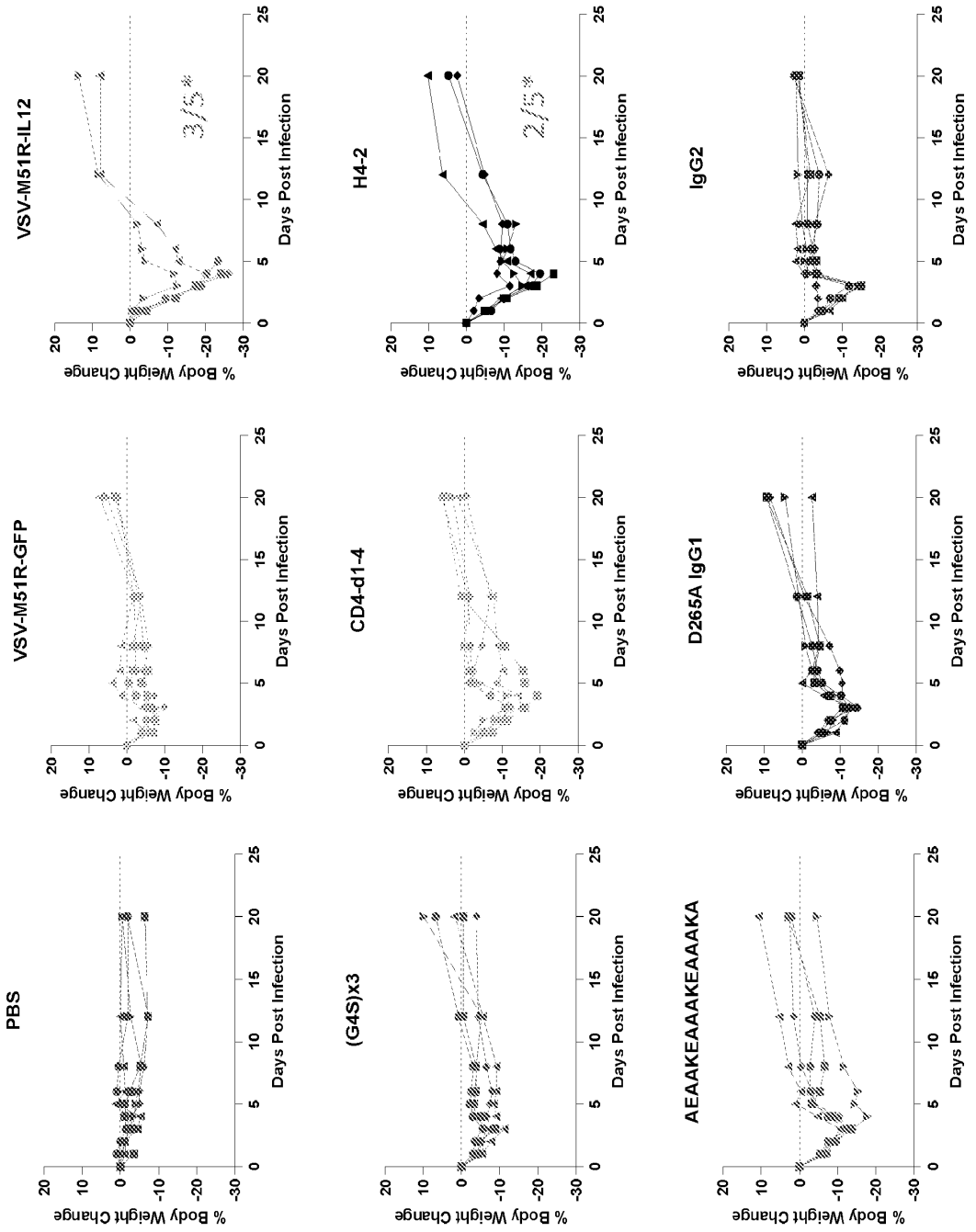

PBS
VSV-M51R-GFP
VSV-M51R-IL12
(G4S)x3
CD4-d1-4
H4-2
AEAAKEAAAKEAAAKA
D265A IgG1
IgG2
% Body Weight Change
Days Post Infection
3/5*
2/5*

Figure 57

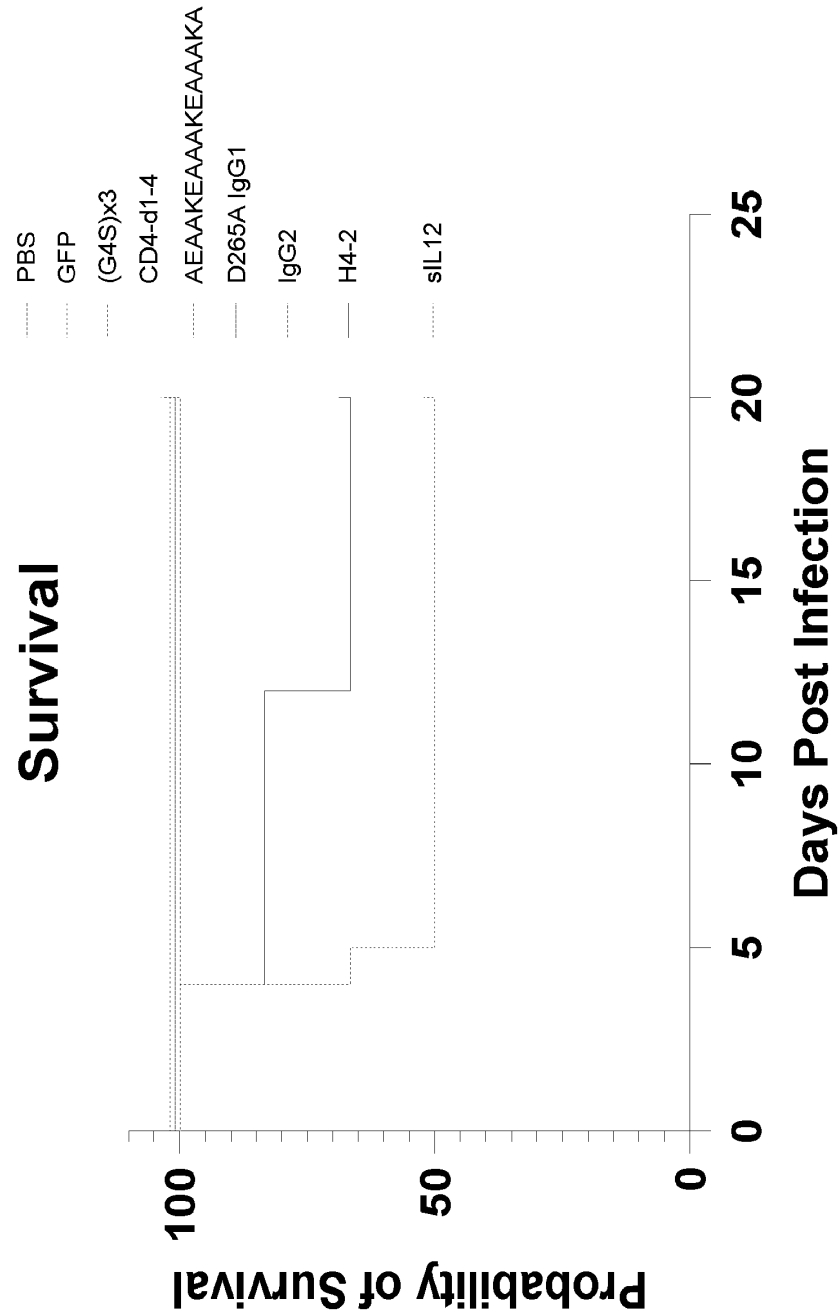

Survival
PBS
GFP
(G4S)x3
CD4-d1-4
AEAAKEAAAKEAAAKA
D265A IgG1
IgG2
H4-2
sIL12
Probability of Survival
100
50
0
0
5
10
15
20
25
Days Post Infection

Figure 58

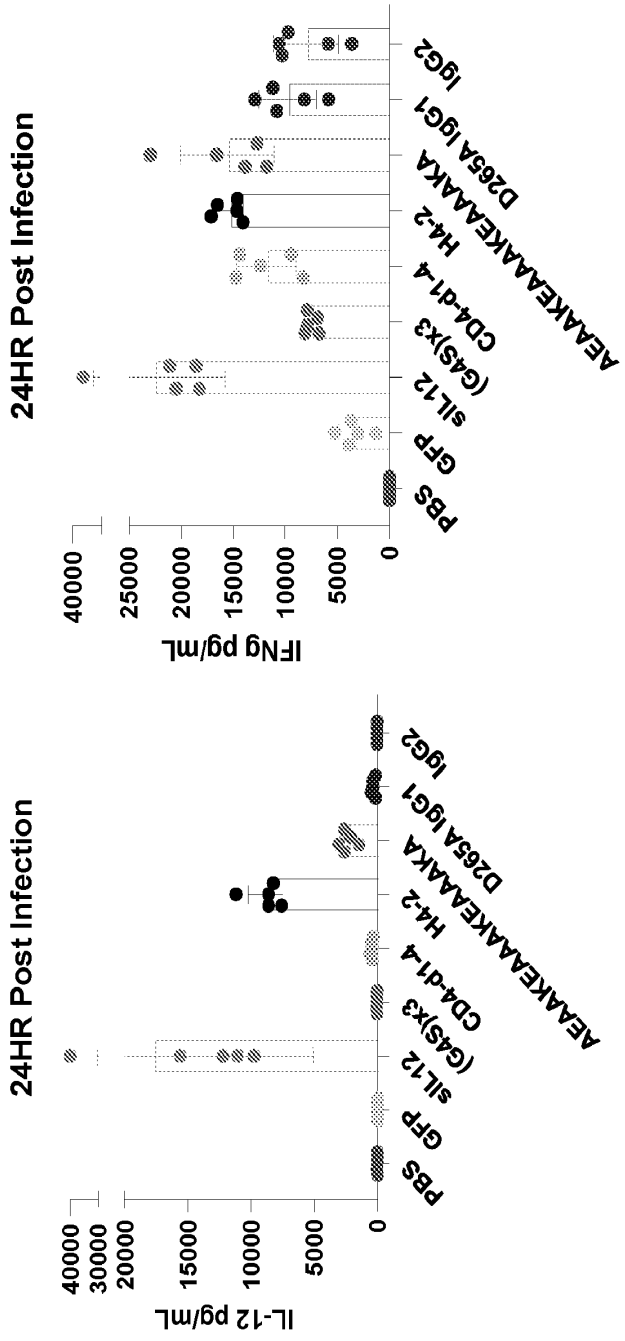

24HR Post Infection
IFNg pg/mL
40000
25000
20000
15000
10000
5000
0
PBS
GFP
sIL12
(GAS)x3
CD4-d1.4
H4-2
AEAAKEAAAKEAAAKA
D265A IgG1
IgG2
24HR Post Infection
IL-12 pg/mL
40000
30000
20000
15000
10000
5000
0
PBS
GFP
sIL12
(GAS)x3
CD4-d1.4
H4-2
AEAAKEAAAKEAAAKA
D265A IgG1
IgG2

Figure 59

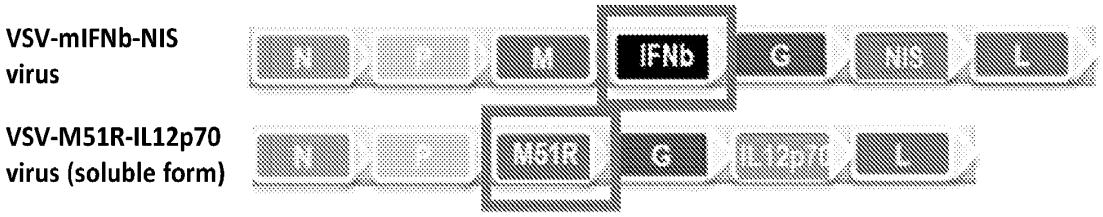


Figure 60

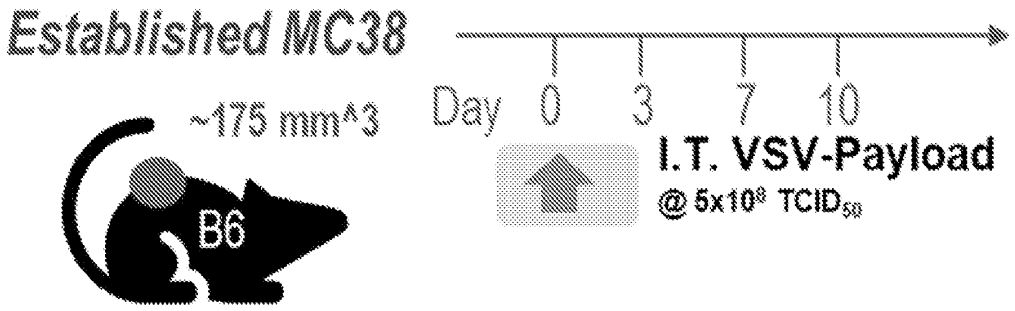


Figure 61

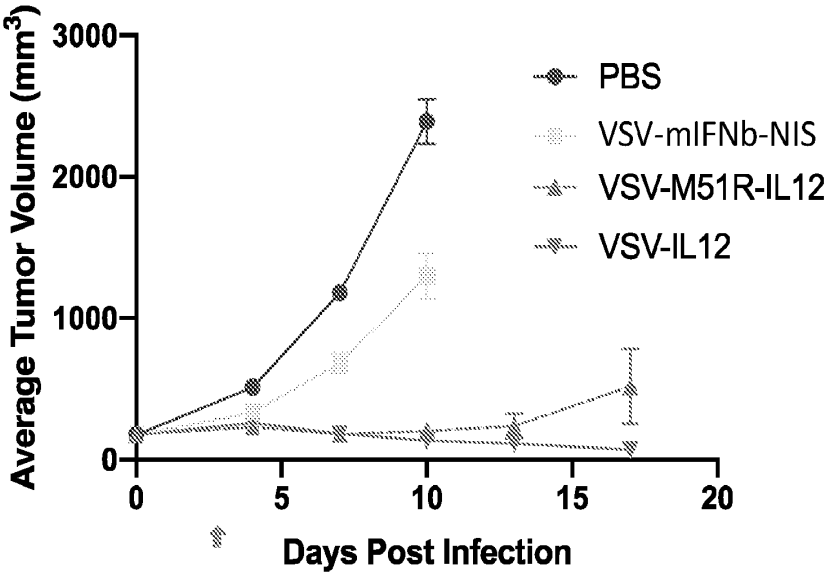


Figure 62

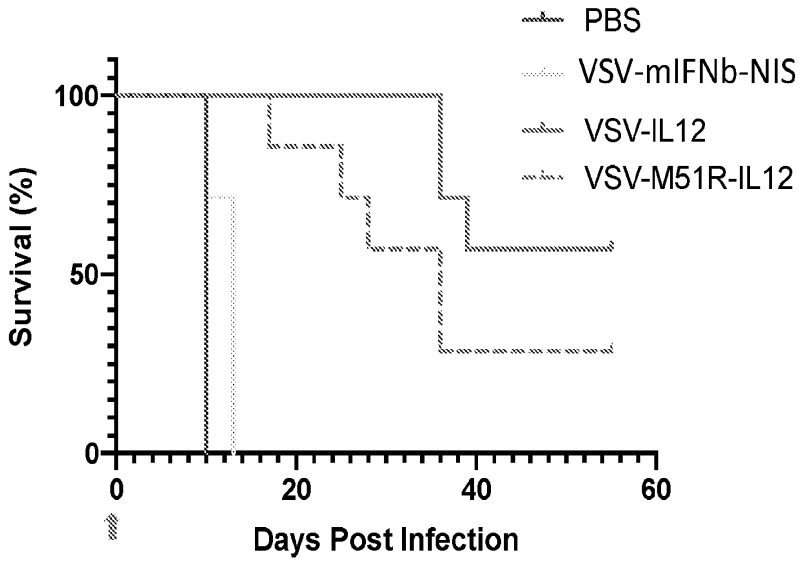


Figure 63

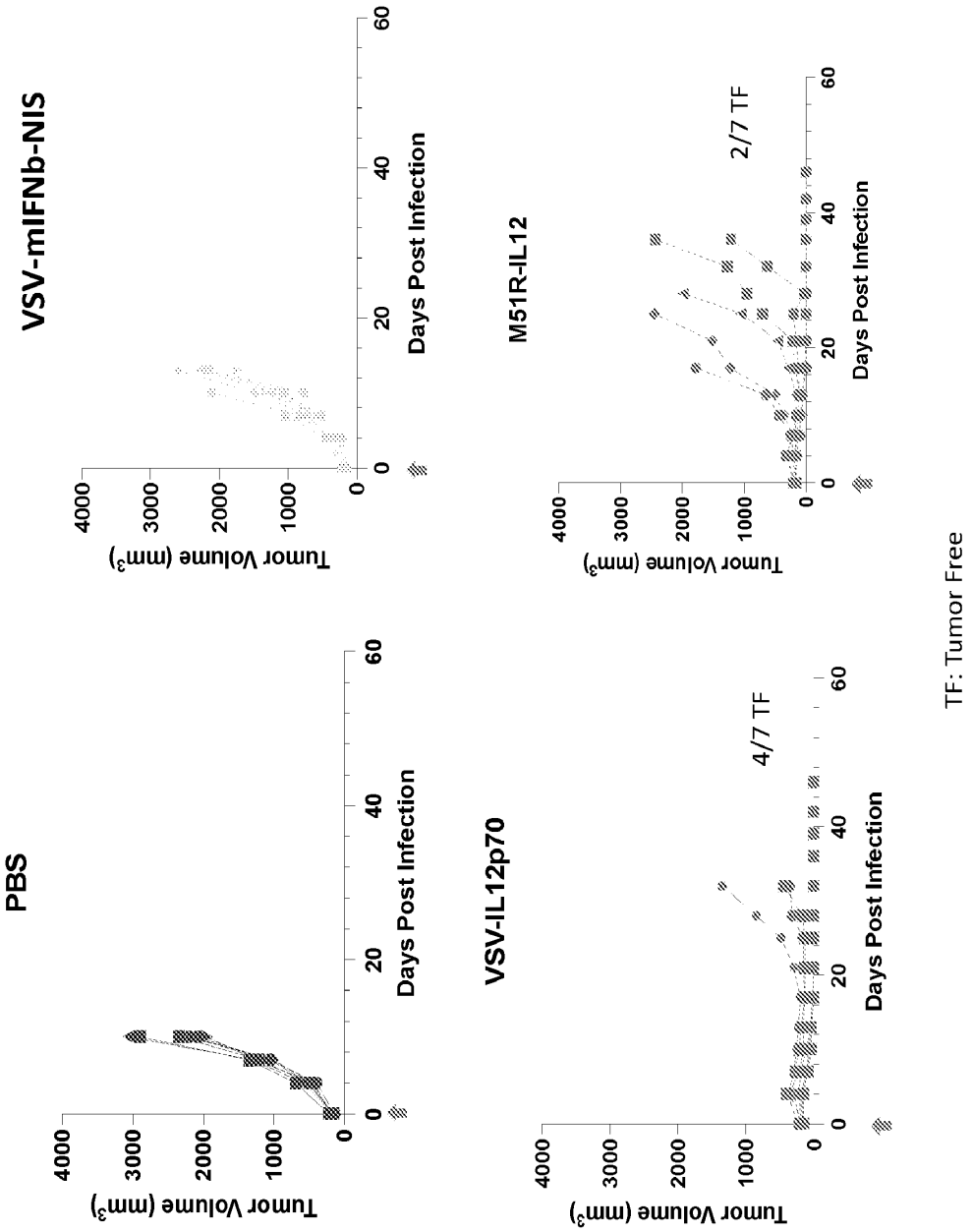

PBS
VSV-mIFNb-NIS
M51R-IL12
VSV-IL12p70
Tumor Volume (mm3)
Days Post Infection
0
1000
2000
3000
4000
0
20
40
60
4/7 TF
2/7 TF
TF: Tumor Free

Figure 64

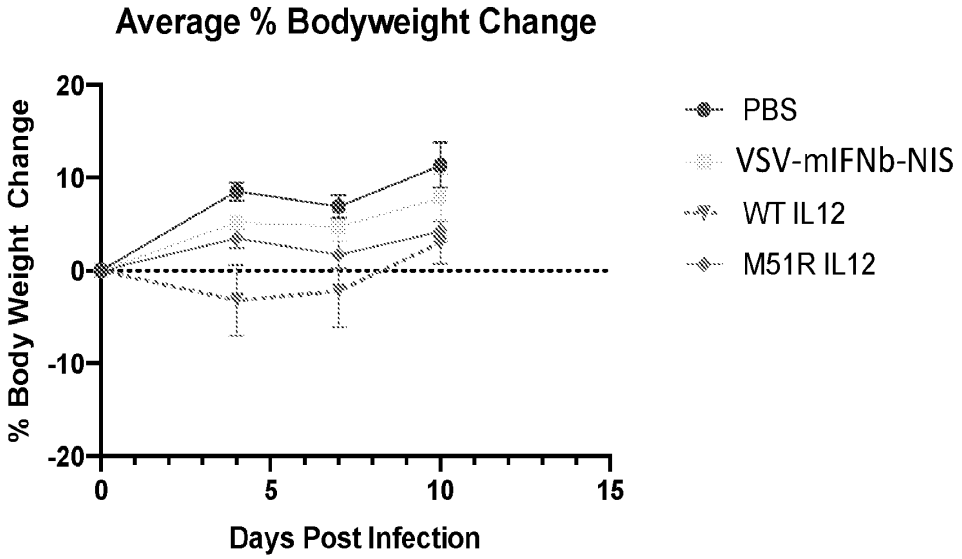


Figure 65

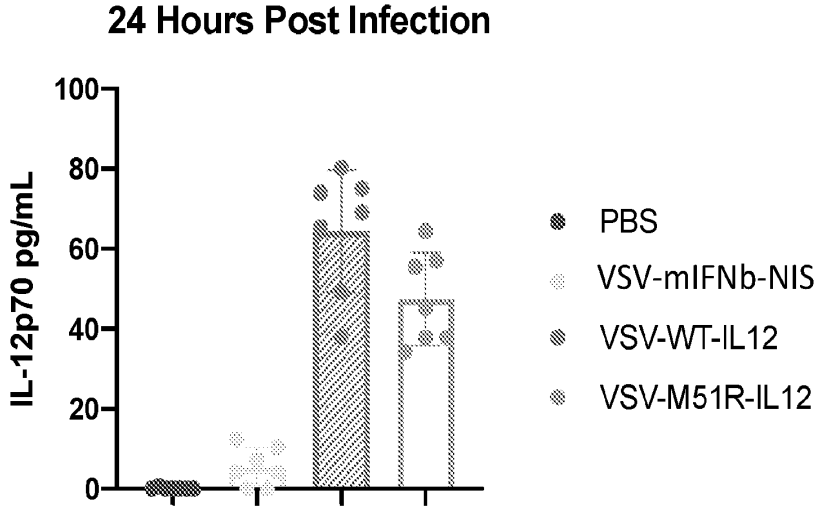


Figure 66

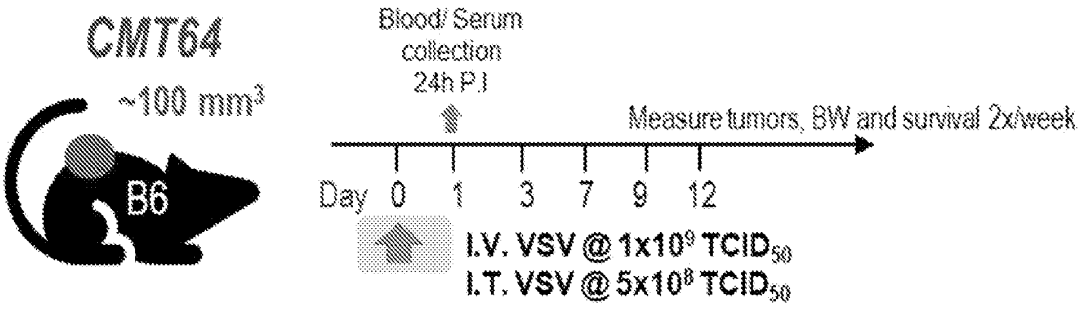


Figure 67

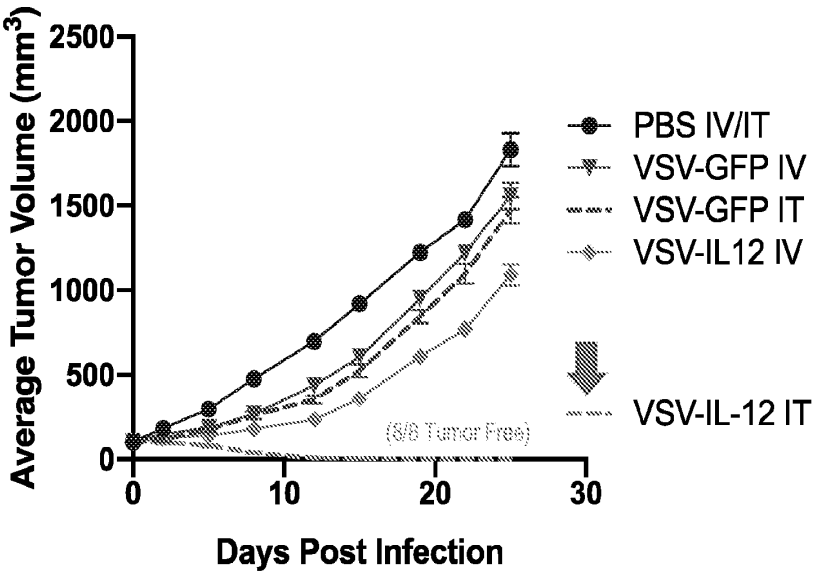


Figure 68

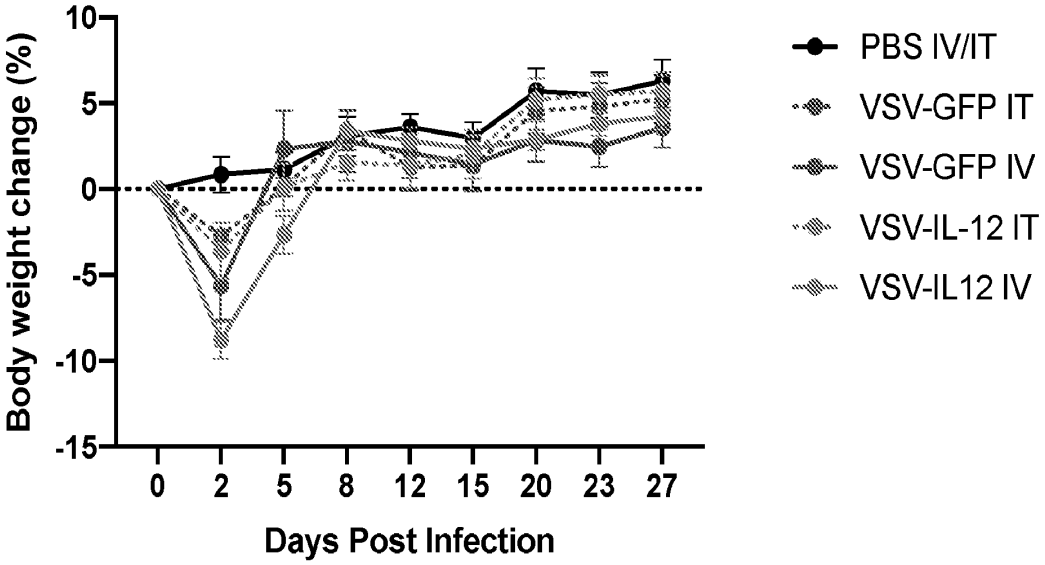


Figure 69

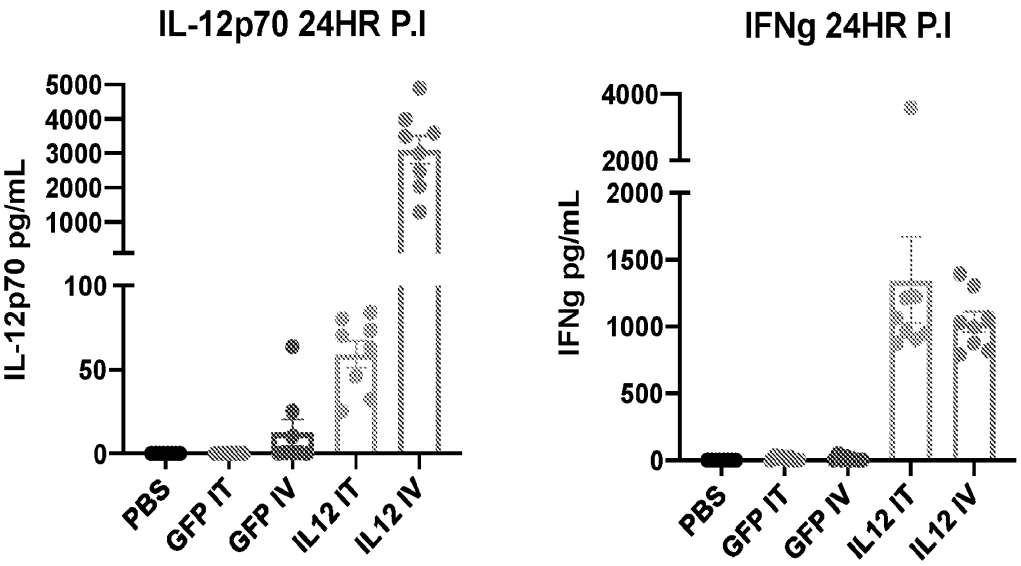


Figure 70

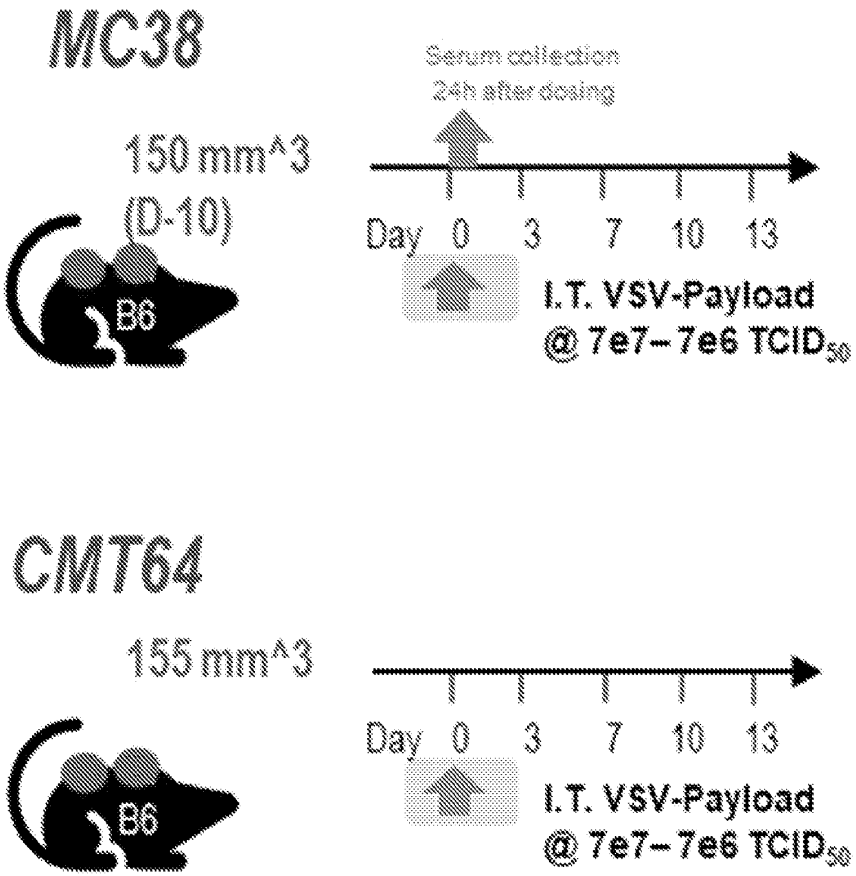

MC38
Serum collection
24h after dosing
150 mm^3
(D-10)
Day 0 3 7 10 13
B6
I.T. VSV-Payload
@ 7e7–7e6 TCID50
CMT64
155 mm^3
Day 0 3 7 10 13
B6
I.T. VSV-Payload
@ 7e7–7e6 TCID50

Figure 71

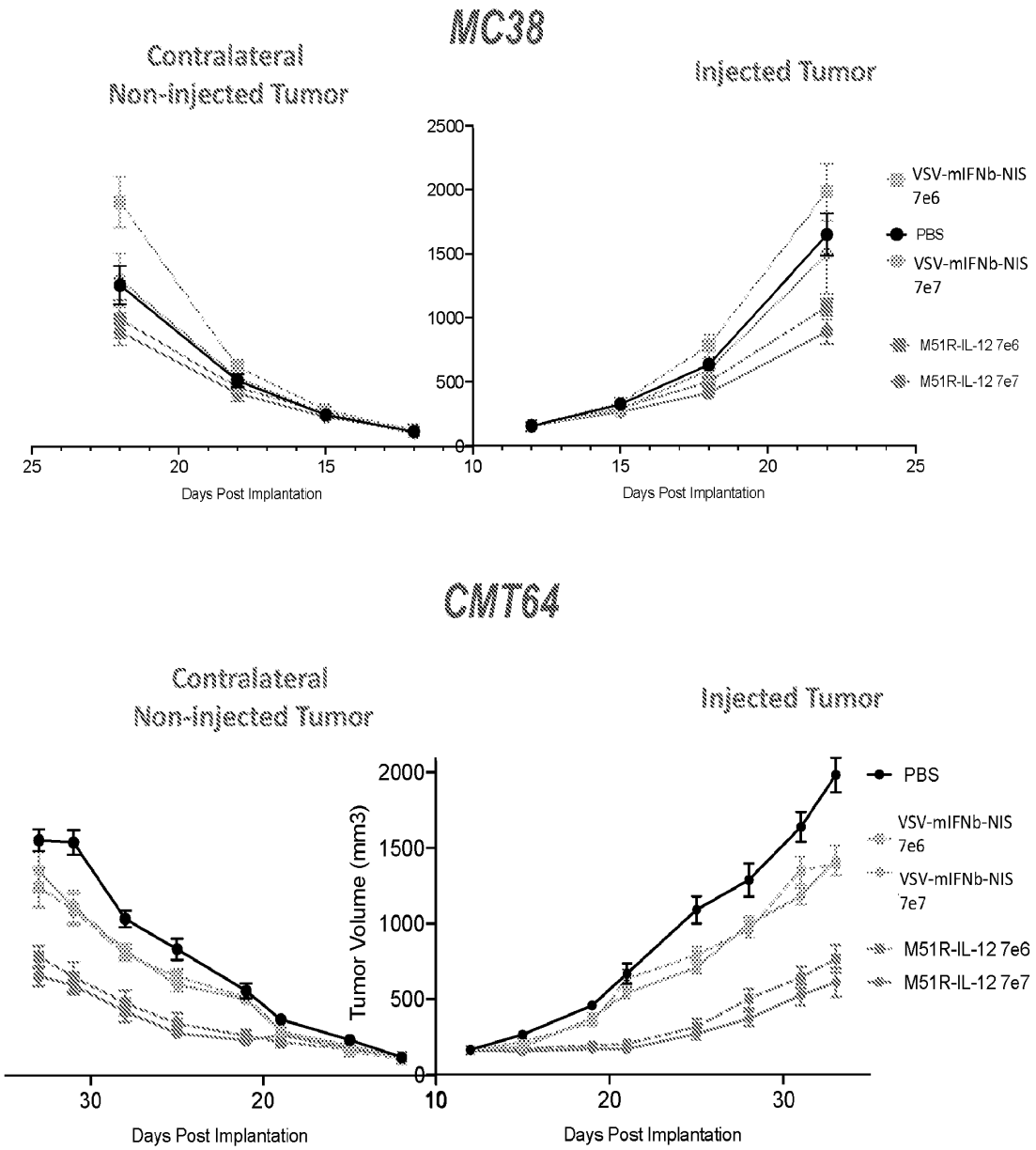

MC38
Contralateral
Non-injected Tumor
Injected Tumor
2500
2000
1500
1000
500
0
25
20
15
10
15
20
25
Days Post Implantation
Days Post Implantation
VSV-mIFNb-NIS 7e6
PBS
VSV-mIFNb-NIS 7e7
M51R-IL-12 7e6
M51R-IL-12 7e7
CMT64
Contralateral
Non-injected Tumor
Injected Tumor
Tumor Volume (mm3)
2000
1500
1000
500
0
30
20
10
20
30
Days Post Implantation
Days Post Implantation
PBS
VSV-mIFNb-NIS 7e6
VSV-mIFNb-NIS 7e7
M51R-IL-12 7e6
M51R-IL-12 7e7

Figure 72

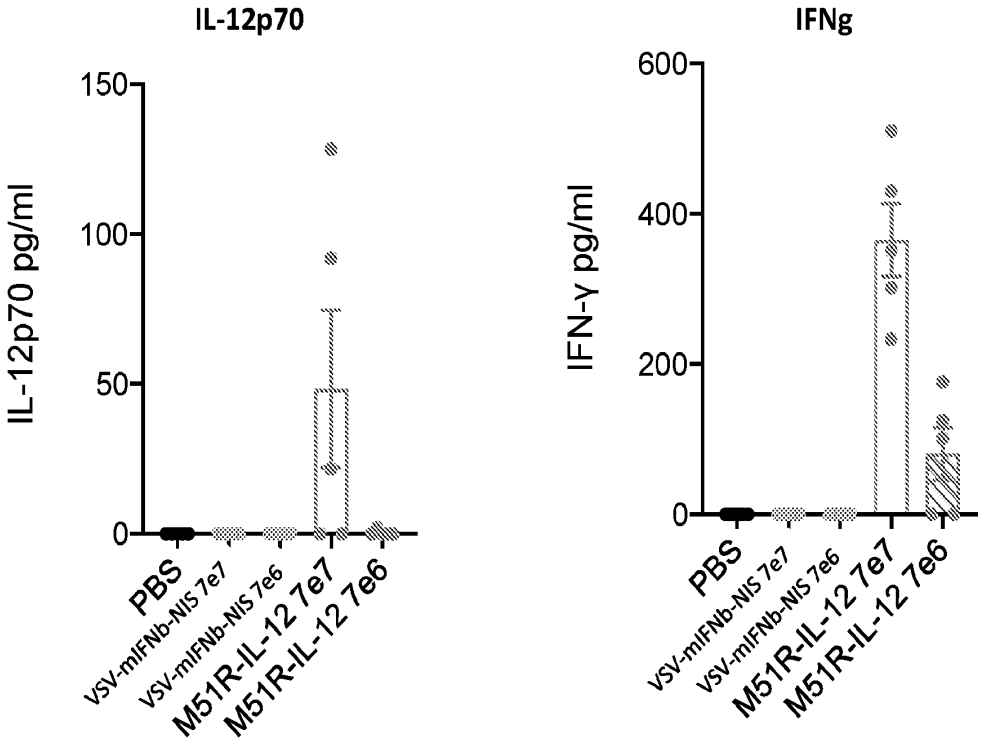

IL-12p70
IL-12p70 pg/ml
150
100
50
0
PBS
VSV-mIFNb-NIS 7e7
VSV-mIFNb-NIS 7e6
M51R-IL-12 7e7
M51R-IL-12 7e6
IFNg
IFN-γ pg/ml
600
400
200
0
PBS
VSV-mIFNb-NIS 7e7
VSV-mIFNb-NIS 7e6
M51R-IL-12 7e7
M51R-IL-12 7e6

Figure 73A

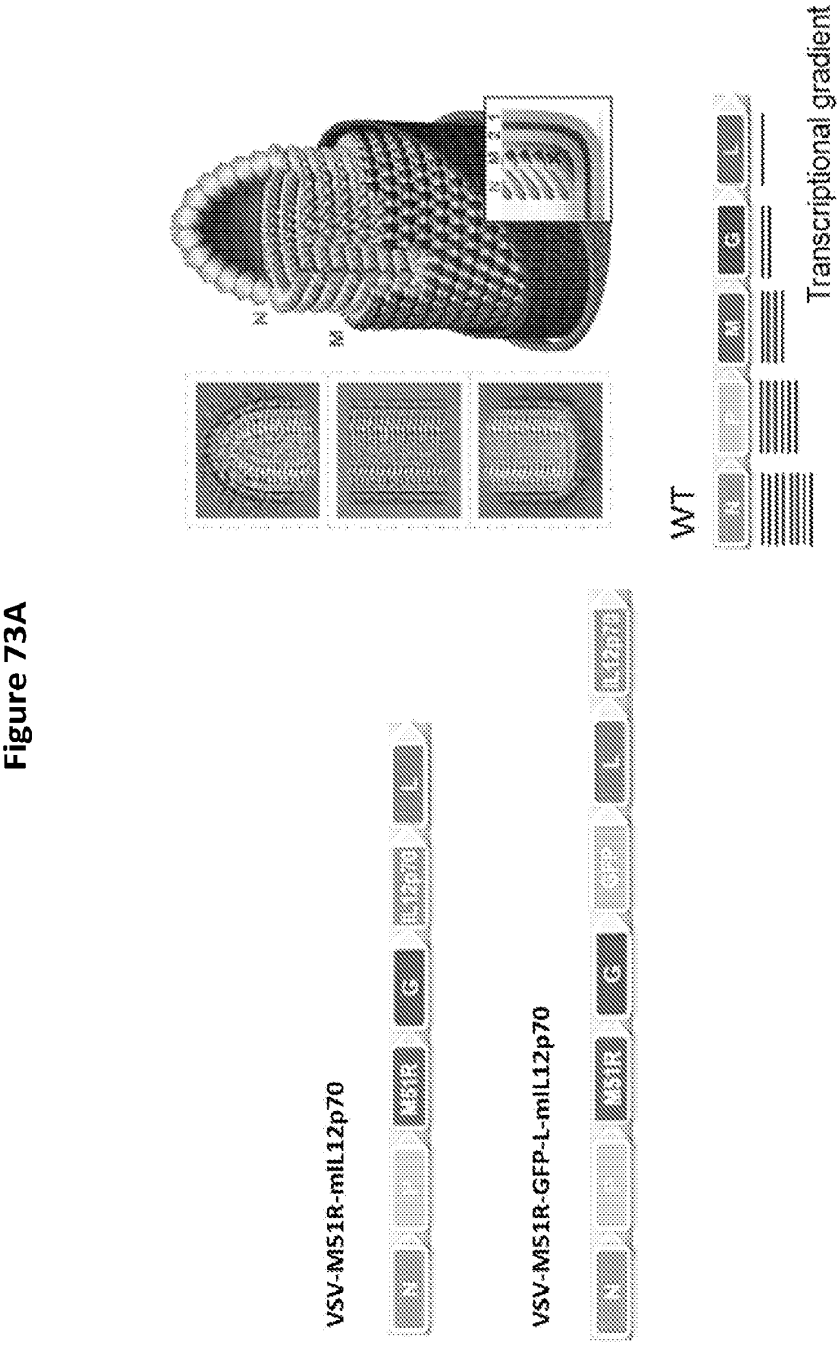

WT
Transcriptional gradient
VSV-M51R-mIL12p70
VSV-M51R-GFP-L-mIL12p70

Figure 73B

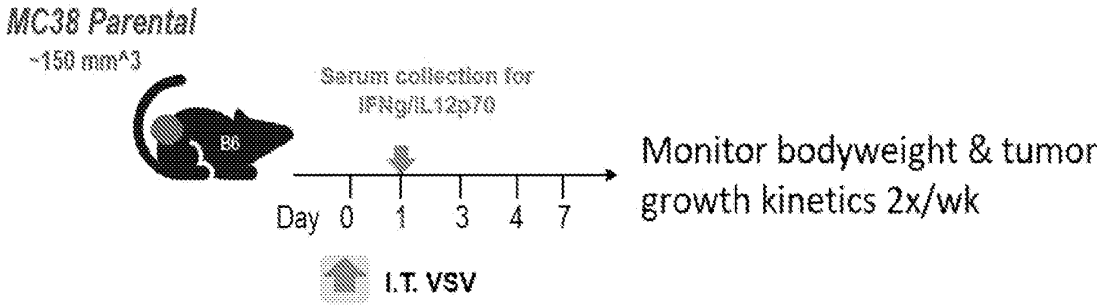


Figure 73C

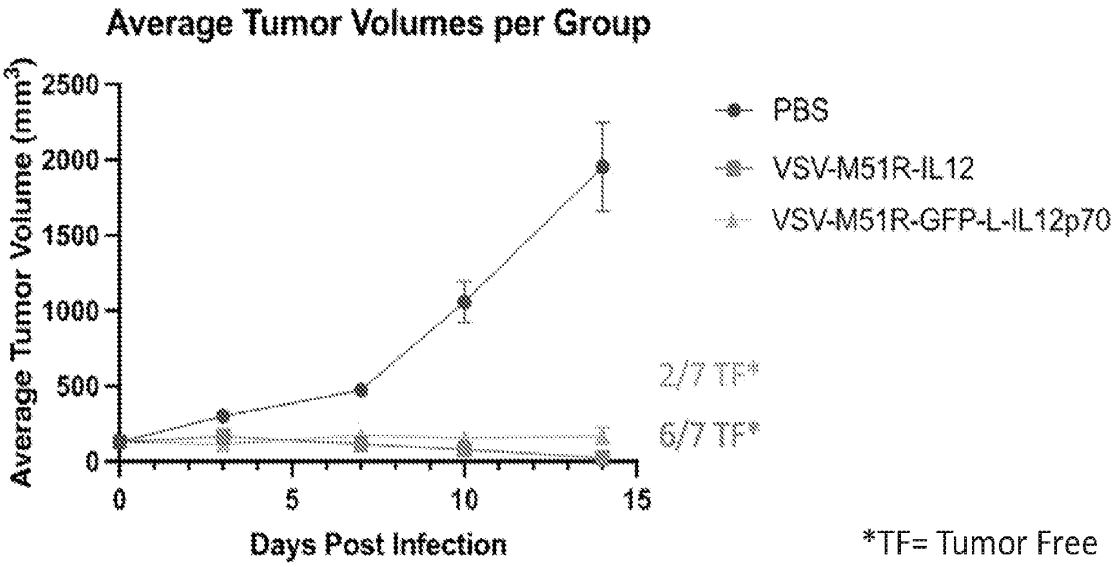


Figure 73D

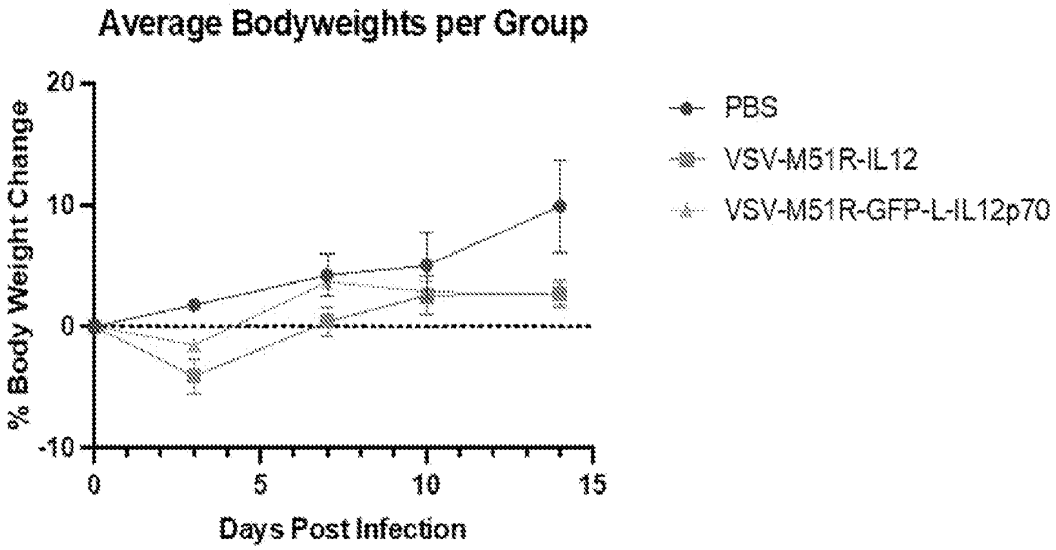


Figure 74

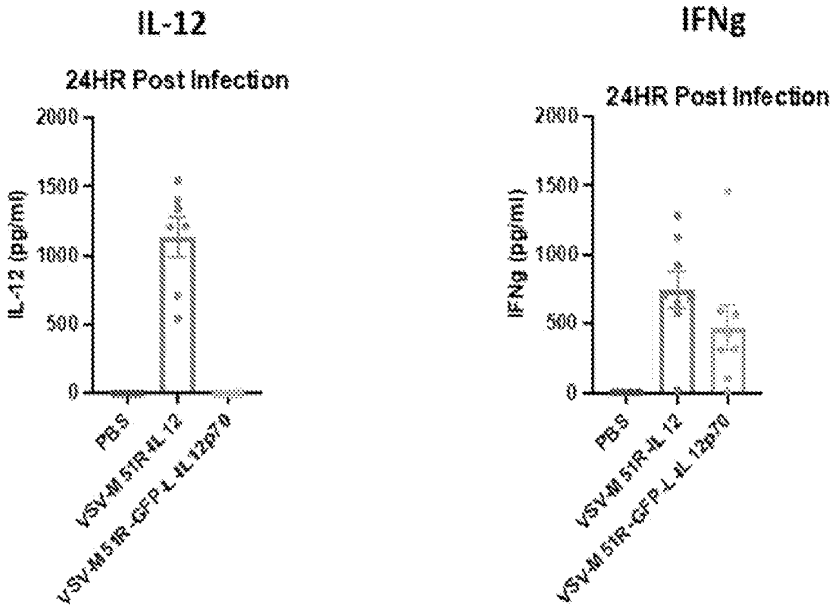


Figure 75

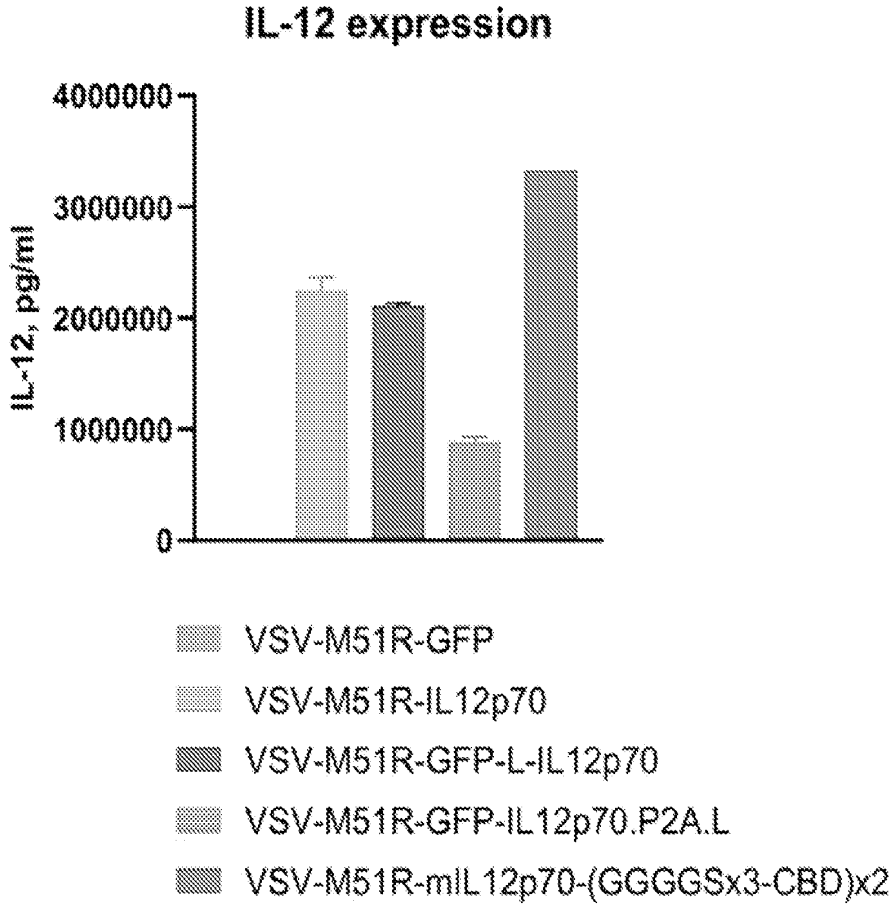

IL-12 expression
IL-12, pg/ml
4000000
3000000
2000000
1000000
0
VSV-M51R-GFP
VSV-M51R-IL12p70
VSV-M51R-GFP-L-IL12p70
VSV-M51R-GFP-IL12p70.P2A.L
VSV-M51R-mIL12p70-(GGGGSx3-CBD)x2

Figure 76A

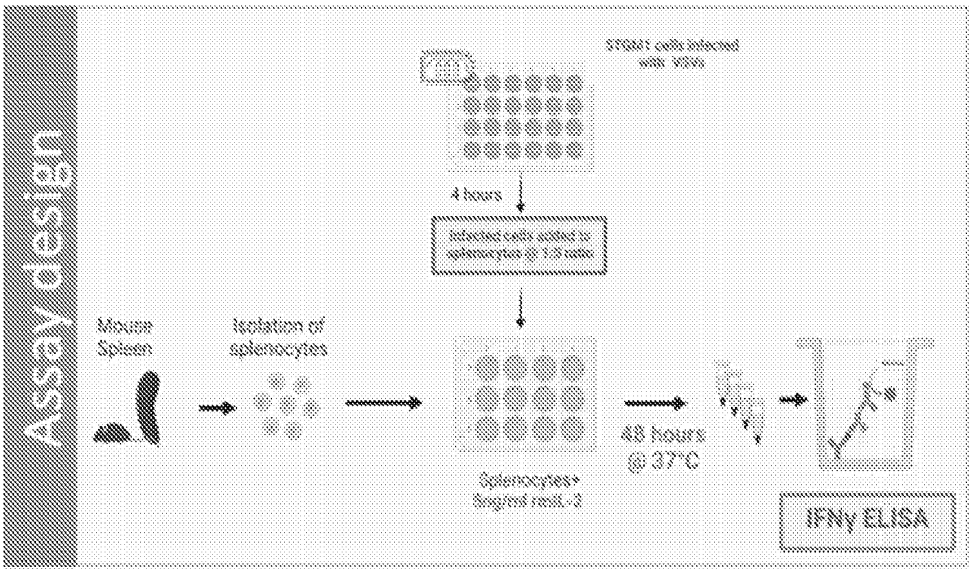


Figure 76B

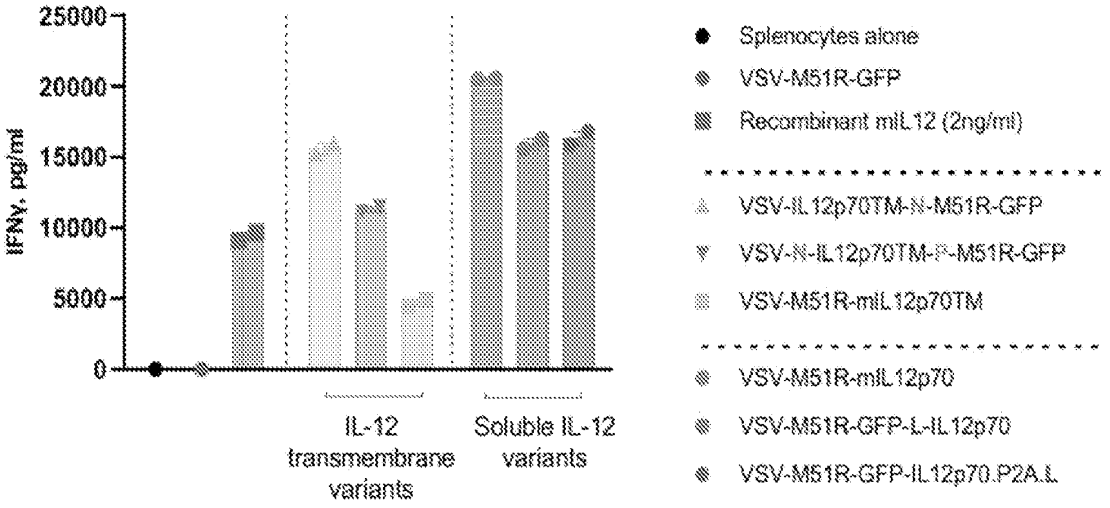


Figure 77A

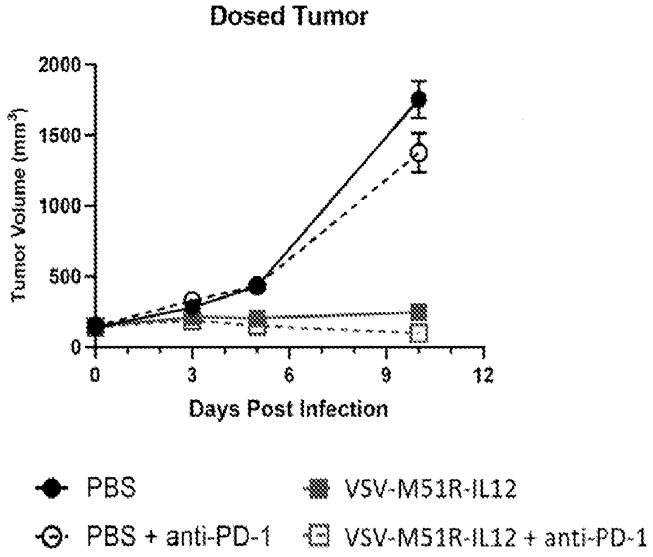


Figure 77B

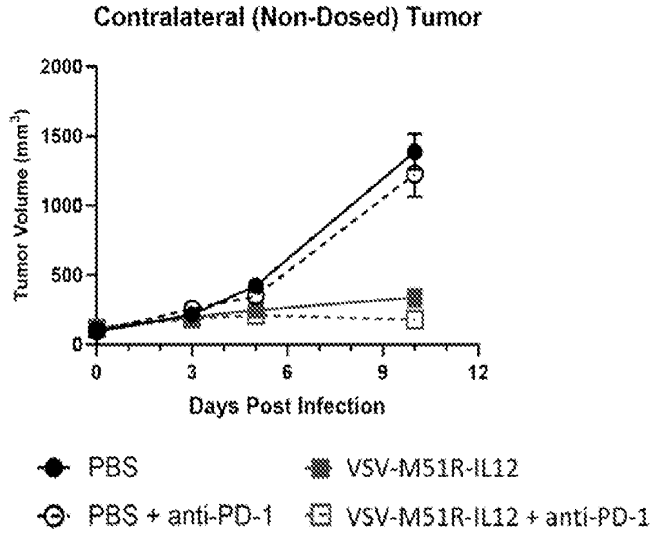
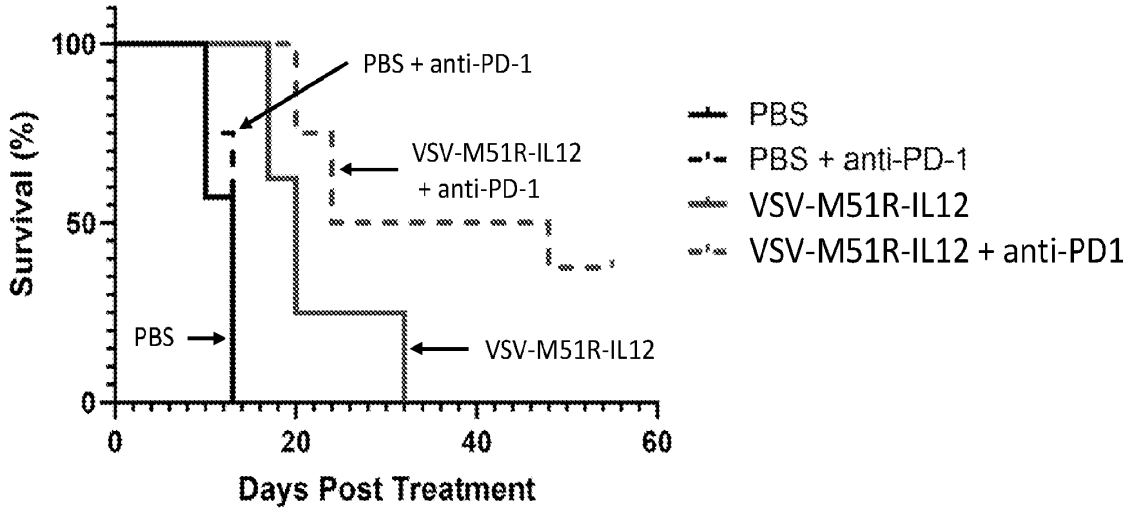


Figure 78


100
50
0
Survival (%)
0
20
40
60
Days Post Treatment
PBS + anti-PD-1
VSV-M51R-IL12
+ anti-PD-1
PBS
VSV-M51R-IL12
PBS
PBS + anti-PD-1
VSV-M51R-IL12
VSV-M51R-IL12 + anti-PD1