FIG. 1

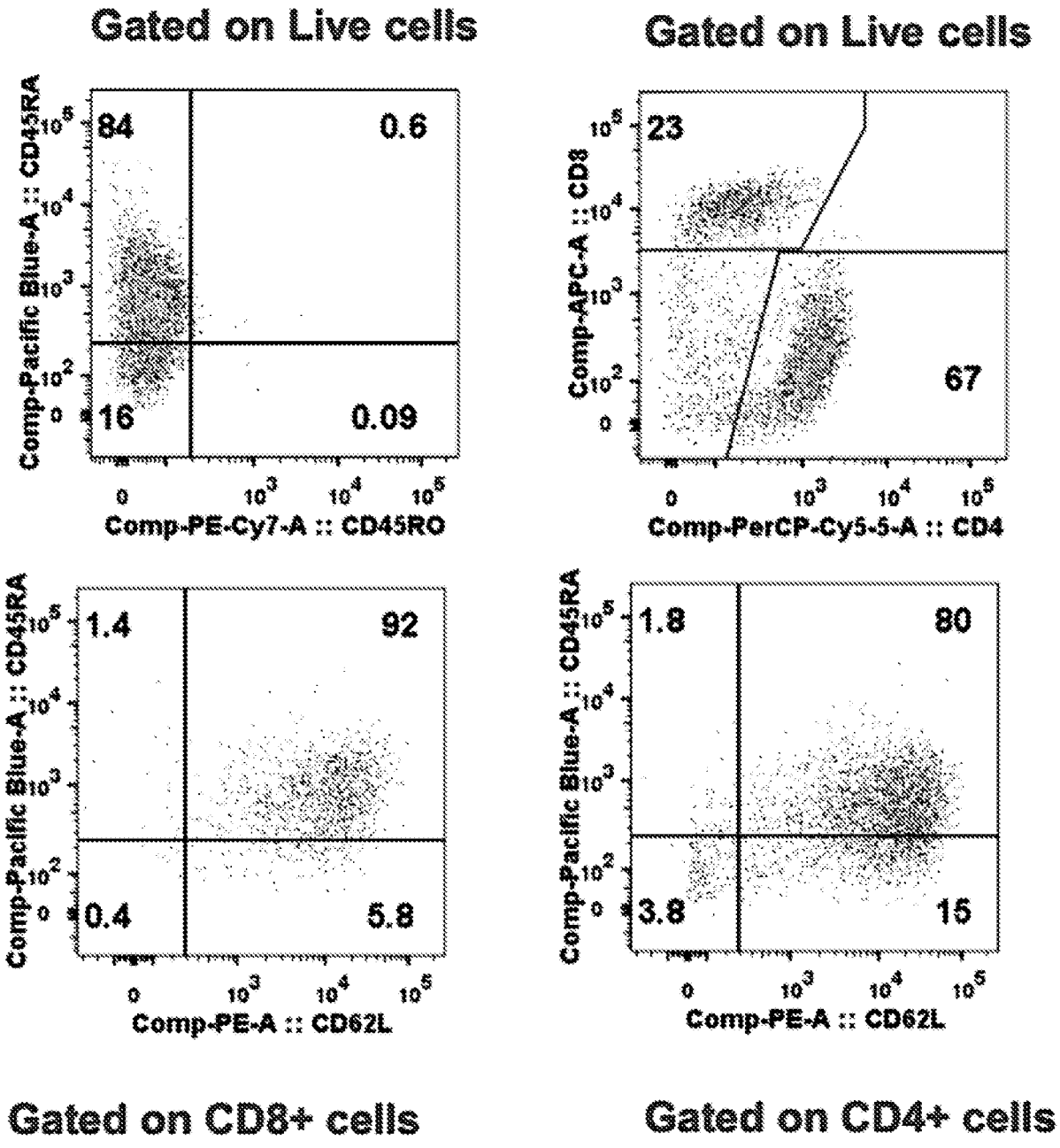

Gated on Live cells
Comp-Pacific Blue-A :: CD45RA
Comp-PE-Cy7-A :: CD45RO
84
0.6
16
0.09
Gated on Live cells
Comp-APC-A :: CD8
Comp-PerCP-Cy5-5-A :: CD4
23
67
Comp-Pacific Blue-A :: CD45RA
Comp-PE-A :: CD62L
1.4
92
0.4
5.8
Comp-Pacific Blue-A :: CD45RA
Comp-PE-A :: CD62L
1.8
80
3.8
15
Gated on CD8+ cells
Gated on CD4+ cells

FIG. 2

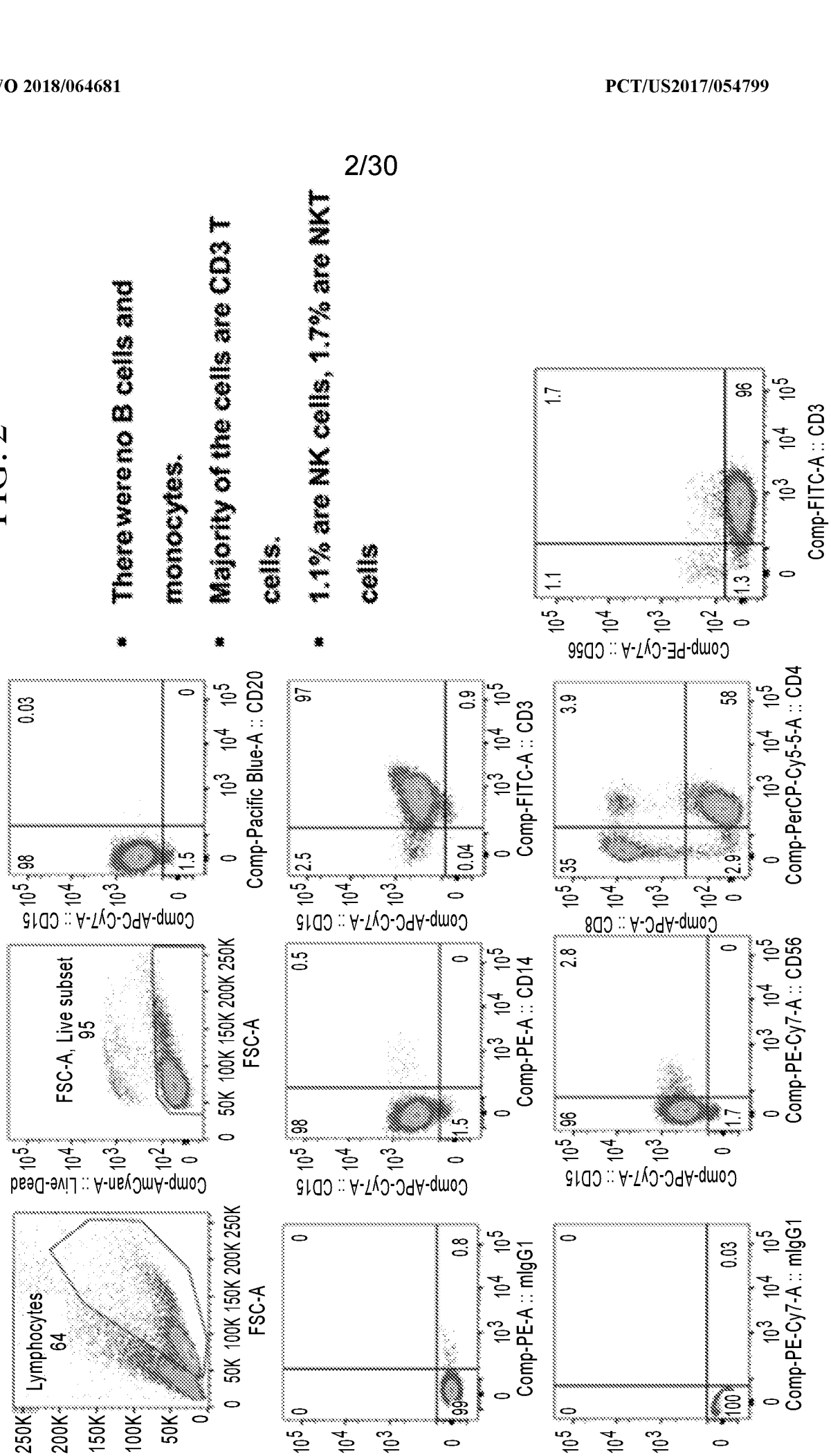

There were no B cells and monocytes.
Majority of the cells are CD3 T cells.
1.1% are NK cells, 1.7% are NKT cells
Lymphocytes
64
FSC-A, Live subset
95
Comp-AmCyan-A :: Live-Dead
FSC-A
Comp-APC-Cy7-A :: CD15
Comp-Pacific Blue-A :: CD20
Comp-FITC-A :: CD3
Comp-PE-A :: CD14
Comp-APC-A :: CD8
Comp-PerCP-Cy5-5-A :: CD4
Comp-PE-Cy7-A :: CD56
Comp-PE-A :: mIgG1
Comp-PE-Cy7-A :: mIgG1
Comp-FITC-A :: CD3

FIG. 3

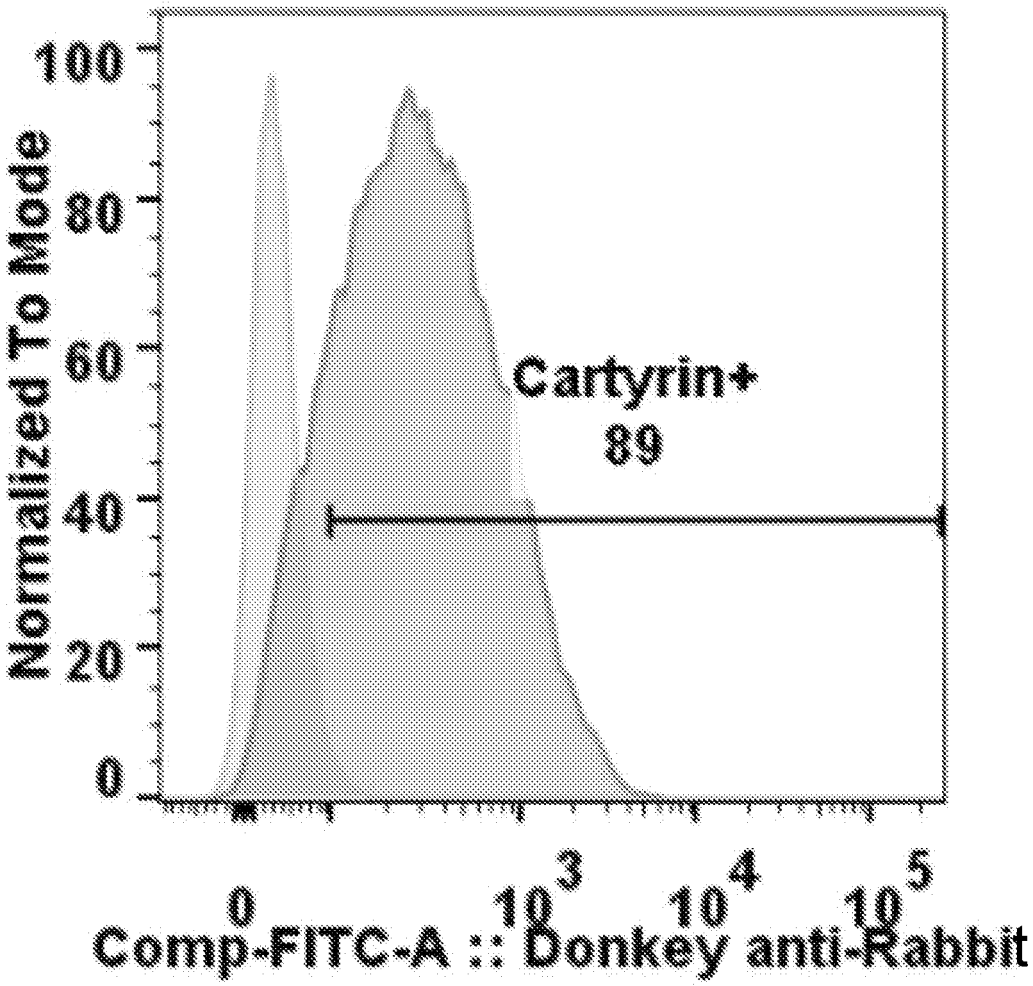

Normalized To Mode
100
80
60
40
20
0
Cartyrin+
89
0
10^3
10^4
10^5
Comp-FITC-A :: Donkey anti-Rabbit

FIG. 4

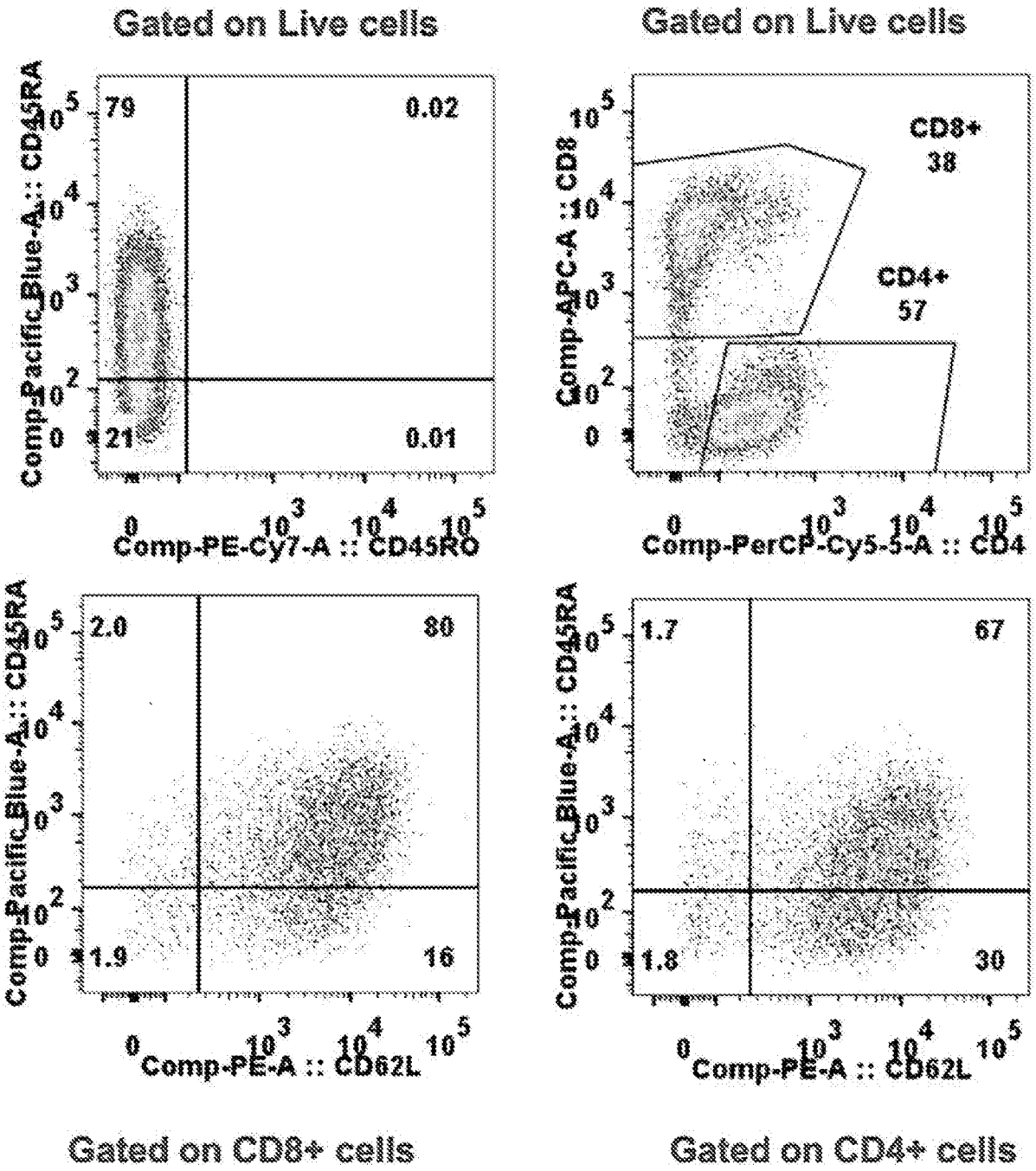

Gated on Live cells
Comp-Pacific Blue-A :: CD45RA
Comp-PE-Cy7-A :: CD45RO
79
0.02
21
0.01
Gated on Live cells
Comp-APC-A :: CD8
Comp-PerCP-Cy5-5-A :: CD4
CD8+
38
CD4+
57
Comp-Pacific Blue-A :: CD45RA
Comp-PE-A :: CD62L
2.0
80
1.9
16
Comp-Pacific Blue-A :: CD45RA
Comp-PE-A :: CD62L
1.7
67
1.8
30
Gated on CD8+ cells
Gated on CD4+ cells

FIG. 5

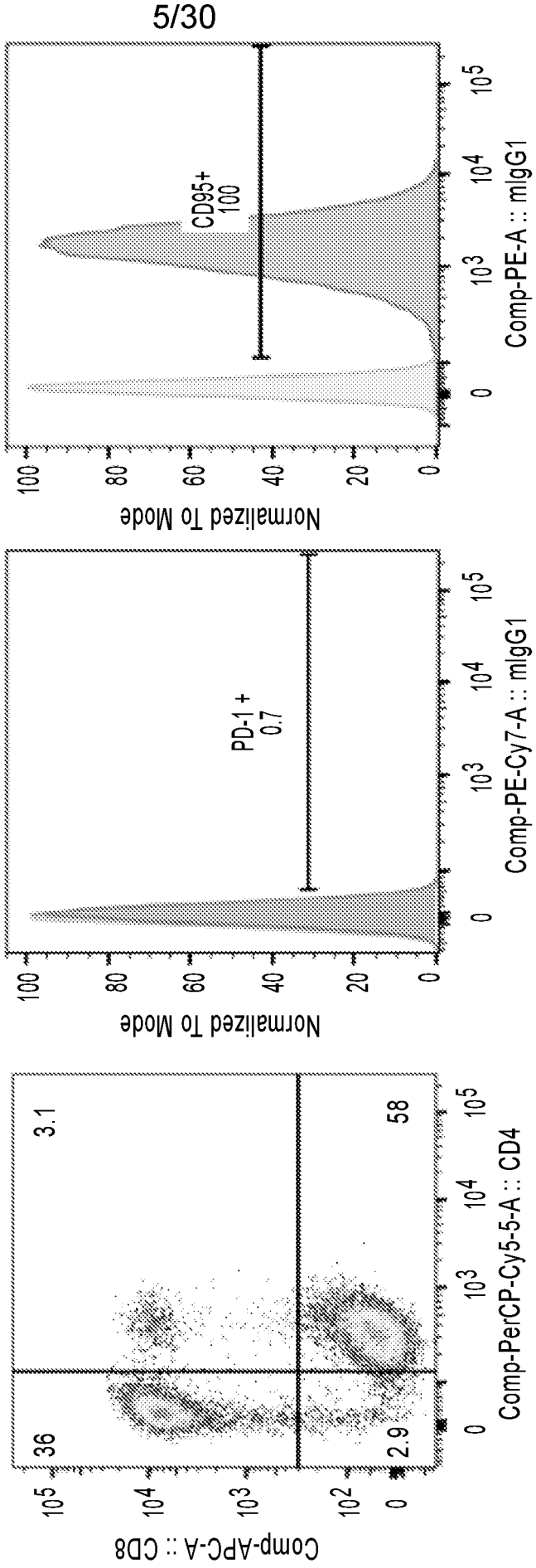

Comp-APC-A :: CD8
Comp-PerCP-Cy5-5-A :: CD4
36
3.1
2.9
58
Normalized To Mode
Comp-PE-Cy7-A :: mIgG1
PD-1 +
0.7
Normalized To Mode
Comp-PE-A :: mIgG1
CD95+
100

FIG. 6A

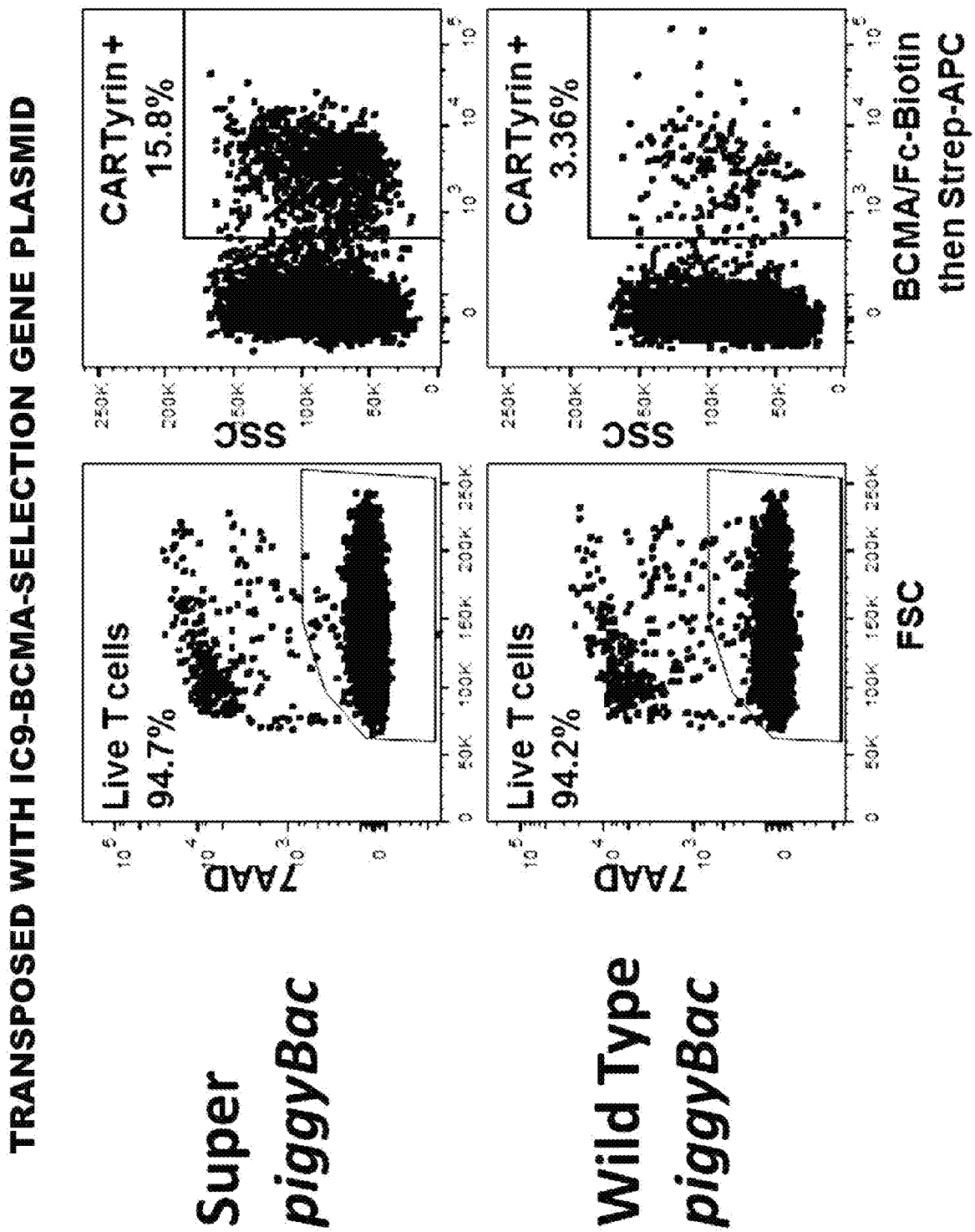

TRANSPOSED WITH IC9-BCMA-SELECTION GENE PLASMID
Super piggyBac
Wild Type piggyBac
Live T cells
94.7%
Live T cells
94.2%
CARTyrin+
15.8%
CARTyrin+
3.36%
7AAD
SSC
FSC
BCMA/Fc-Biotin
then Strep-APC

FIG. 6B

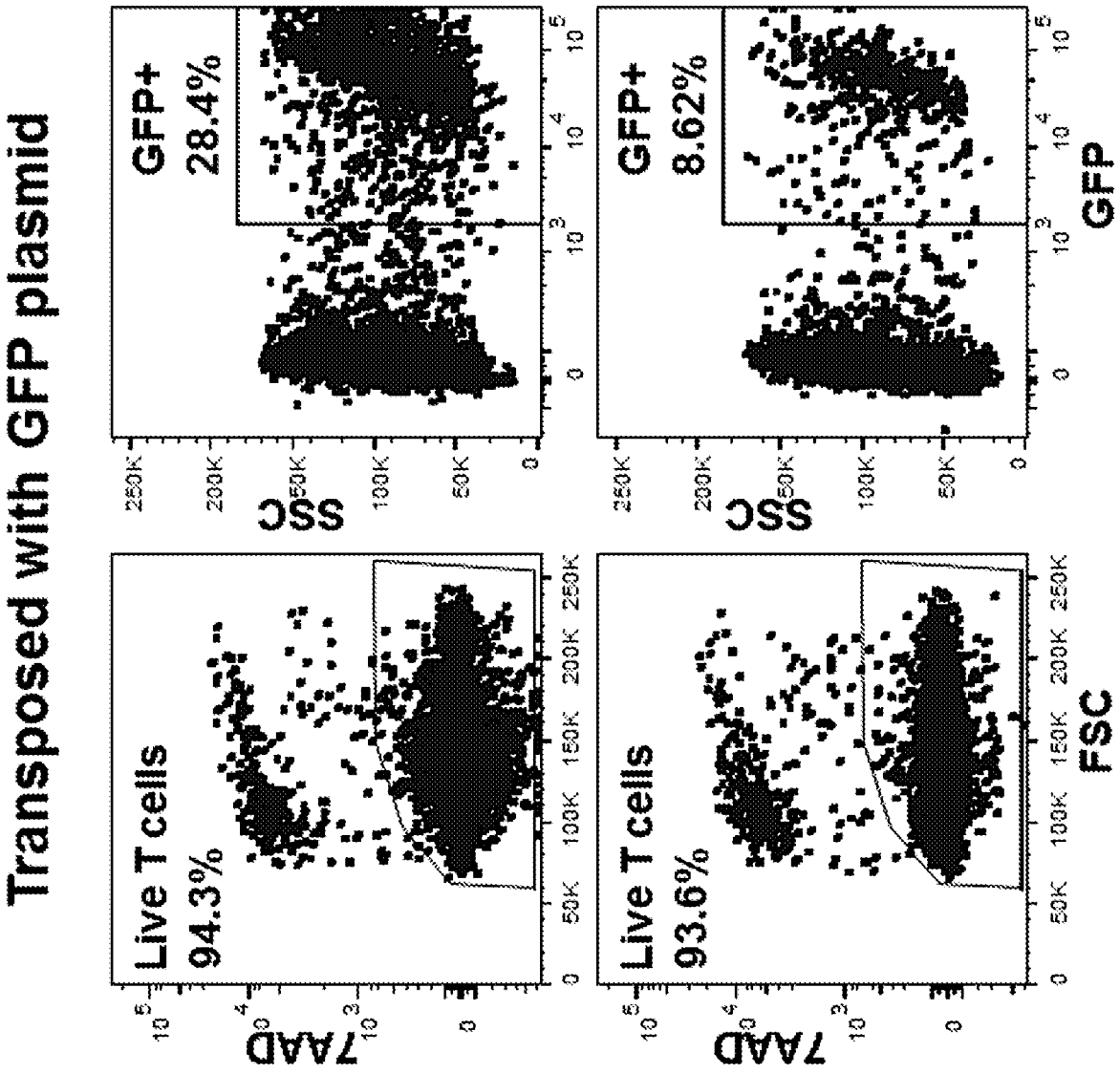

Transposed with GFP plasmid
Live T cells
94.3%
GFP+
28.4%
Live T cells
93.6%
GFP+
8.62%
7AAD
SSC
FSC
GFP

FIG. 6C

| | CARTyrin+ | GFP+ |
|---|---|---|
| WT *piggyBac* | 3.4% | 8.6% |
| Super *piggyBac* | 15.8% | 28.4% |
| Fold Increase | 4.7 | 3.3 |

FIG. 6D

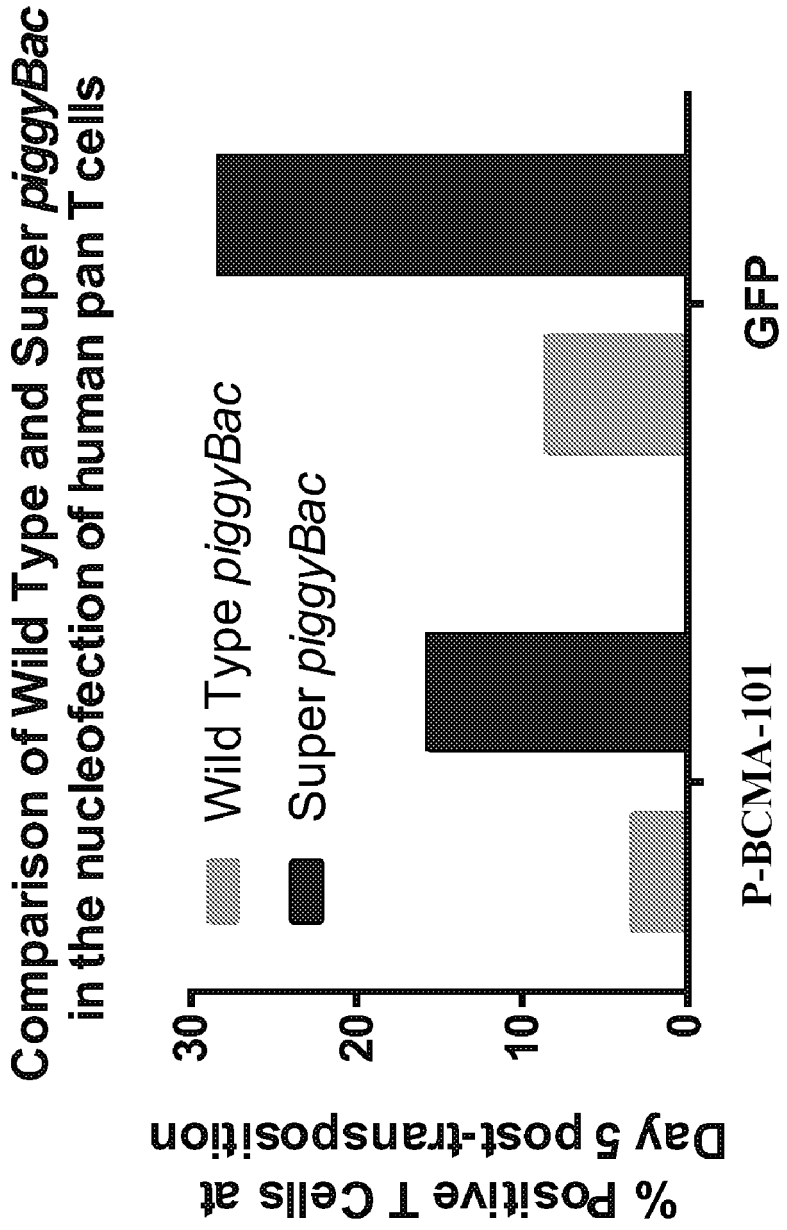

Comparison of Wild Type and Super piggyBac in the nucleofection of human pan T cells
% Positive T Cells at Day 5 post-transposition
30
20
10
0
Wild Type piggyBac
Super piggyBac
P-BCMA-101
GFP

FIG. 7

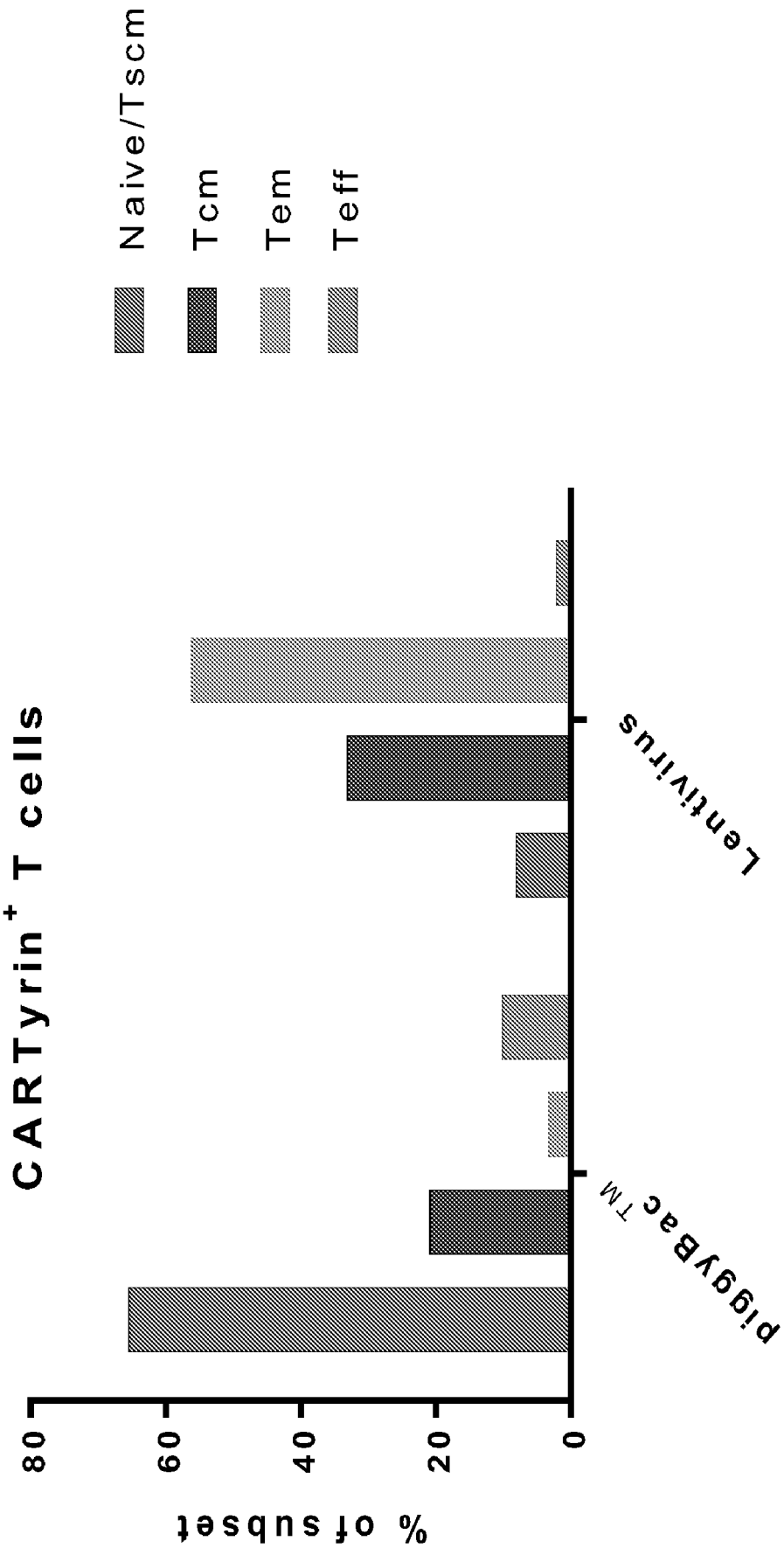

Naive/Tscm
Tcm
Tem
Teff
CARTyrin+ T cells
% of subset
0
20
40
60
80
piggyBac™
Lentivirus

FIG. 8A

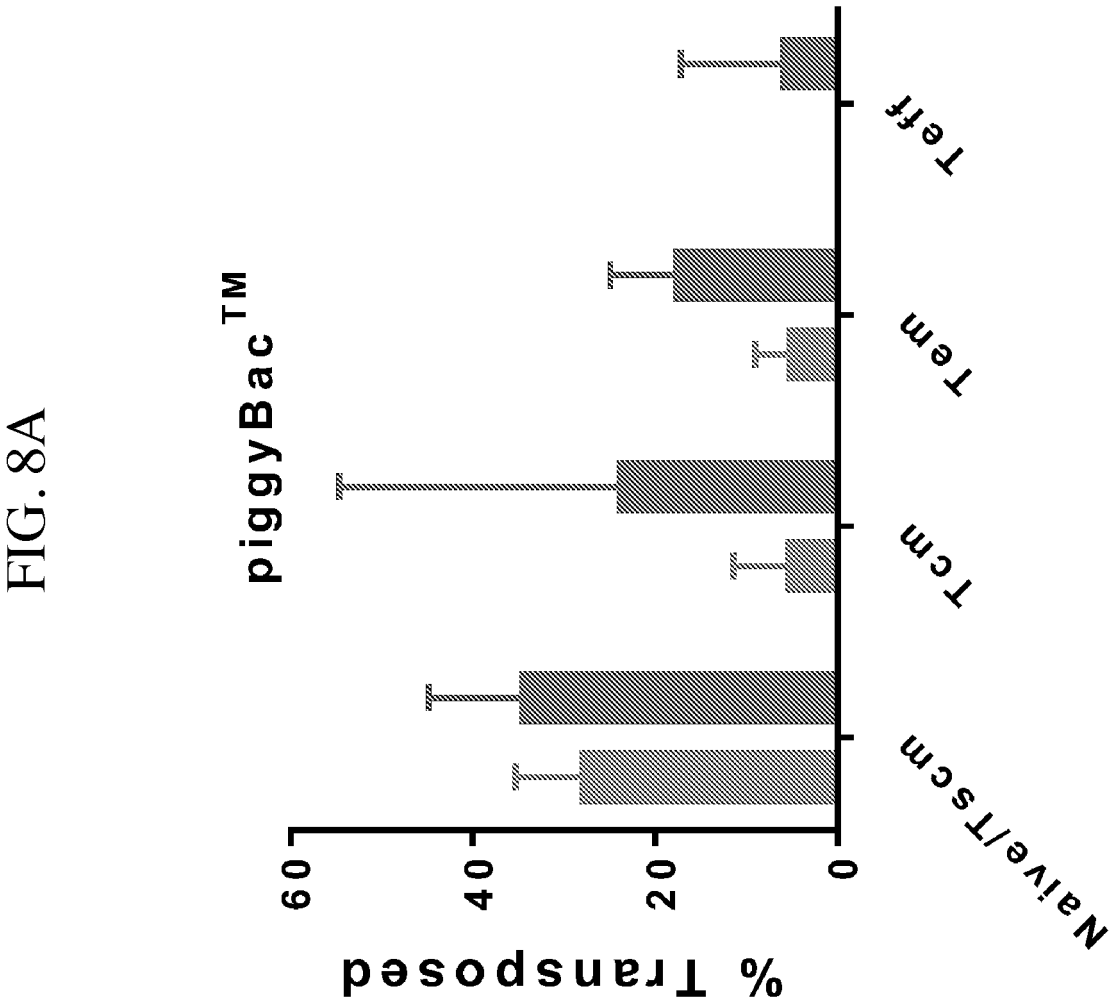


FIG. 8B

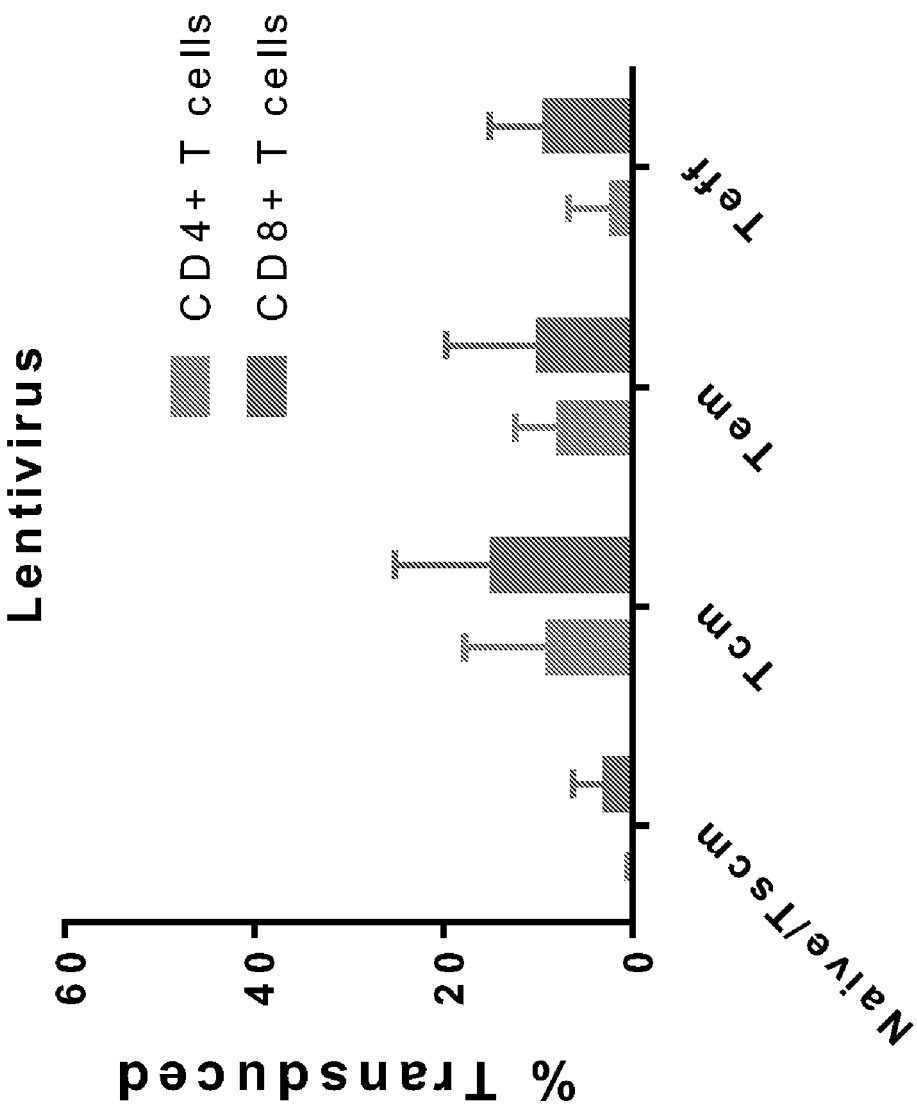

Lentivirus
CD4+ T cells
CD8+ T cells
% Transduced
60
40
20
0
Naive/Tscm
Tcm
Tem
Teff

FIG. 9

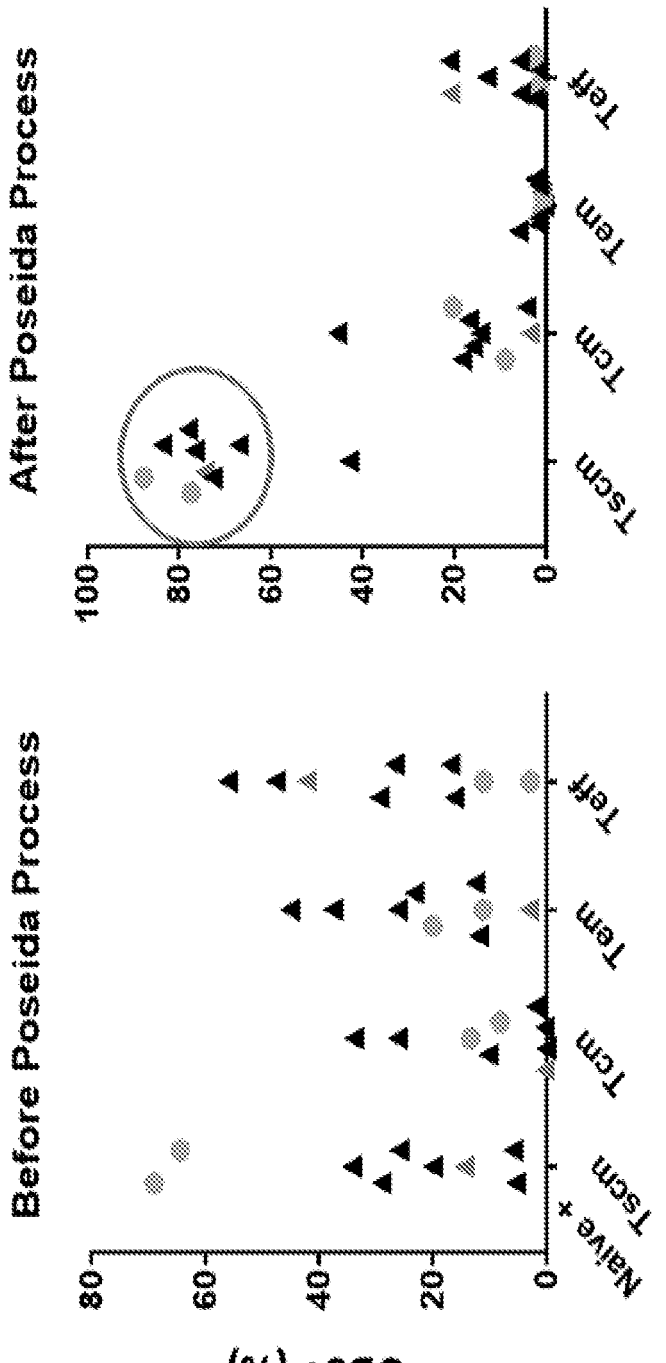

Before Poseida Process
After Poseida Process
Healthy Donors
MM Patients
MM Patient currently undergoing treatment
- Velcade/Dex, Zometa/1 mo
- Bortezomib/3 wks
Naïve +
Tscm
Tcm
Tem
Teff
0
20
40
60
80
100

FIG. 10

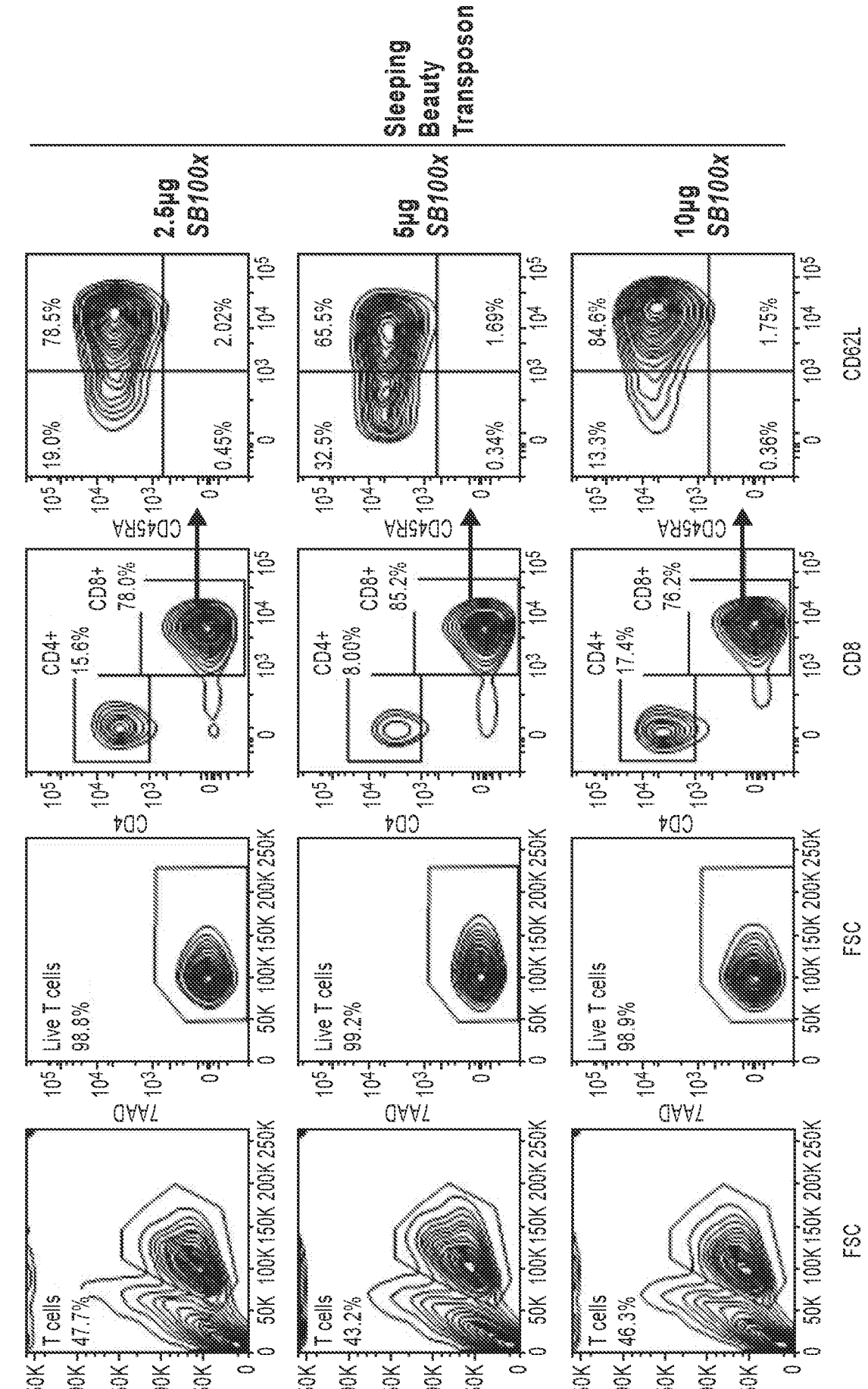

Sleeping Beauty Transposon
2.5µg SB100x
5µg SB100x
10µg SB100x
T cells
47.7%
43.2%
46.3%
7AAD
Live T cells
98.8%
99.2%
98.9%
CD4
CD4+
15.6%
8.00%
17.4%
CD8+
78.0%
85.2%
76.2%
CD45RA
19.0%
0.45%
2.02%
32.5%
0.34%
1.69%
13.3%
0.36%
1.75%
78.5%
65.5%
84.6%
CD62L
FSC
CD8
0
50K
100K
150K
200K
250K

FIG. 10 Cont.

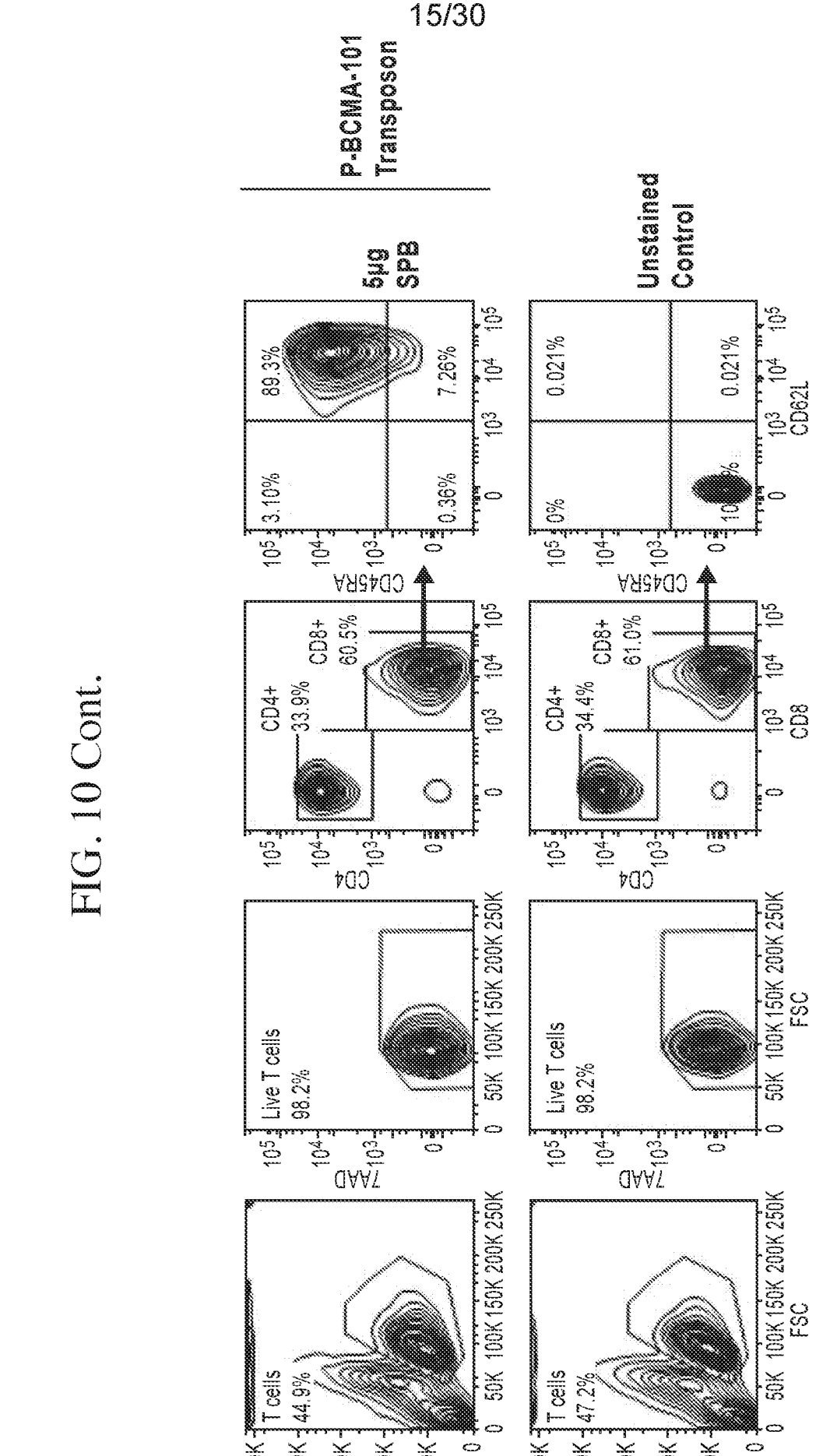

P.BCMA-101 Transposon
5µg SPB
Unstained Control
T cells
44.9%
47.2%
Live T cells
98.2%
7AAD
FSC
CD4
CD8
CD4+
33.9%
34.4%
CD8+
60.5%
61.0%
CD45RA
CD62L
3.10%
89.3%
0.36%
7.26%
0%
0.021%

FIG. 11

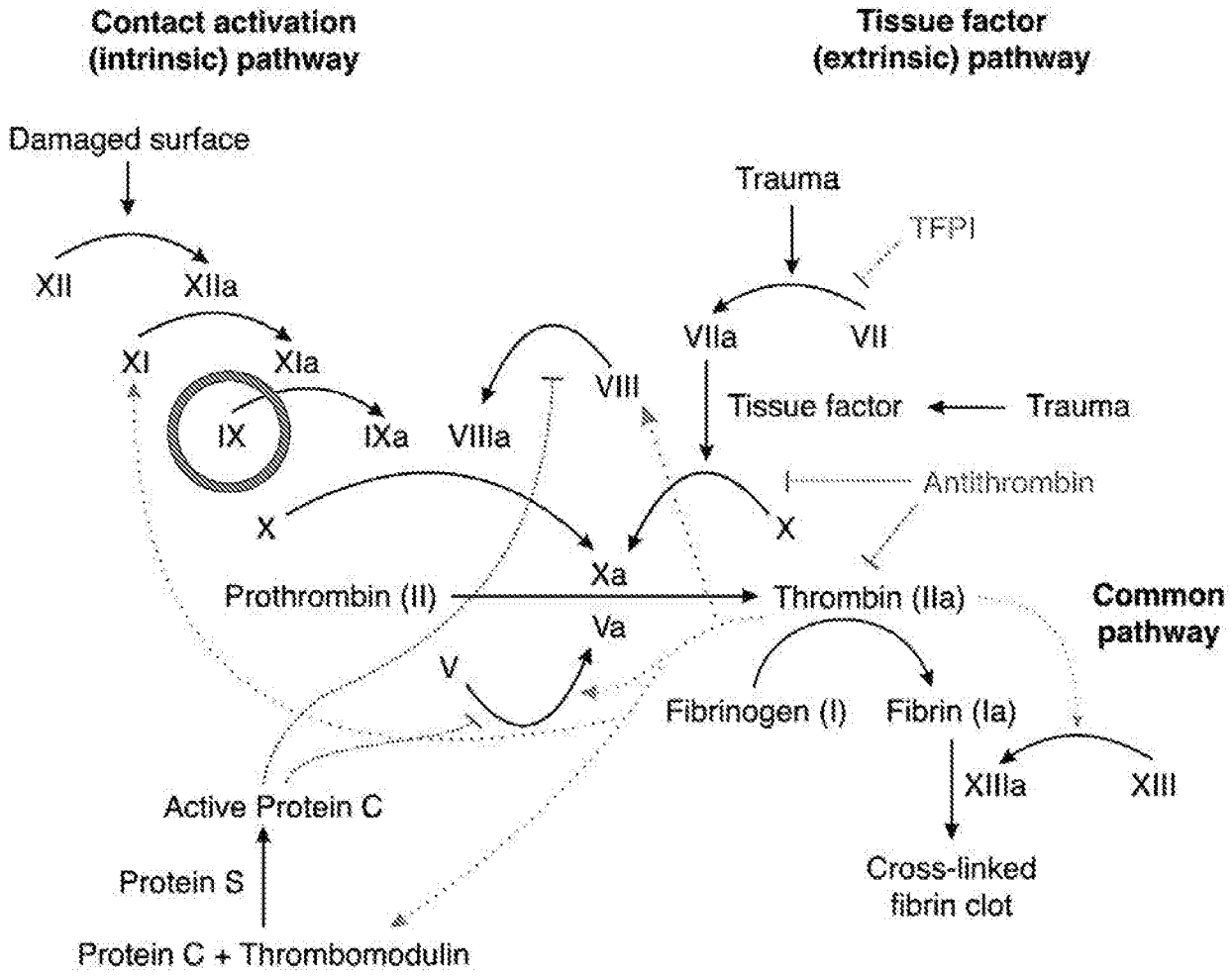

Contact activation
(intrinsic) pathway
Tissue factor
(extrinsic) pathway
Damaged surface
XII
XIIa
XI
XIa
IX
IXa
VIIIa
VIII
X
Xa
Prothrombin (II)
Thrombin (IIa)
Va
V
Active Protein C
Protein S
Protein C + Thrombomodulin
Trauma
TFPI
VIIa
VII
Tissue factor
Trauma
Antithrombin
X
Fibrinogen (I)
Fibrin (Ia)
XIIIa
XIII
Cross-linked
fibrin clot
Common
pathway

FIG. 12

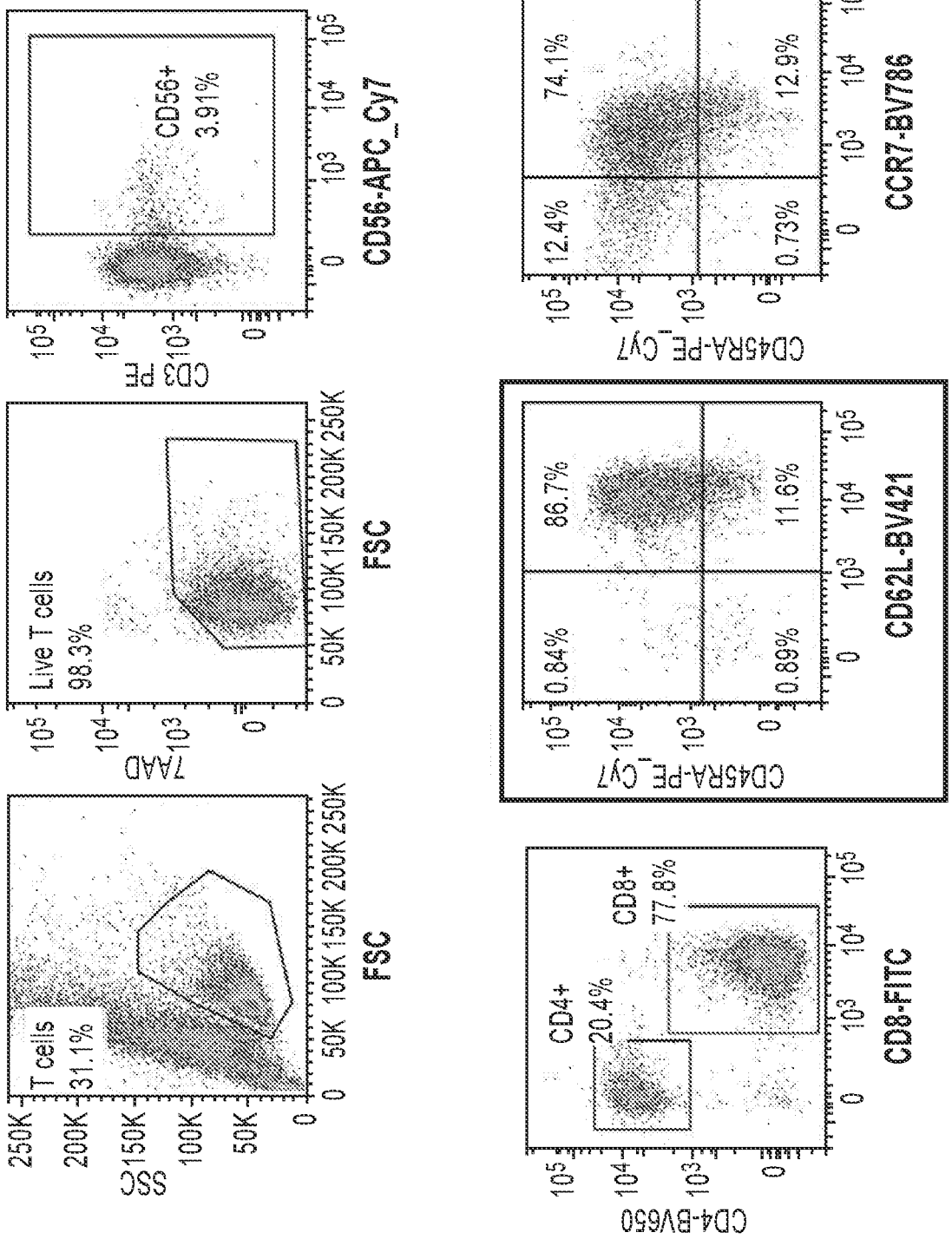

T cells
31.1%
SSC
FSC
Live T cells
98.3%
7AAD
FSC
CD3 PE
CD56+
3.91%
CD56-APC_Cy7
CD4+
20.4%
CD8+
77.8%
CD4-BV650
CD8-FITC
0.84%
86.7%
0.89%
11.6%
CD45RA-PE_Cy7
CD62L-BV421
12.4%
74.1%
0.73%
12.9%
CD45RA-PE_Cy7
CCR7-BV786

FIG. 13A

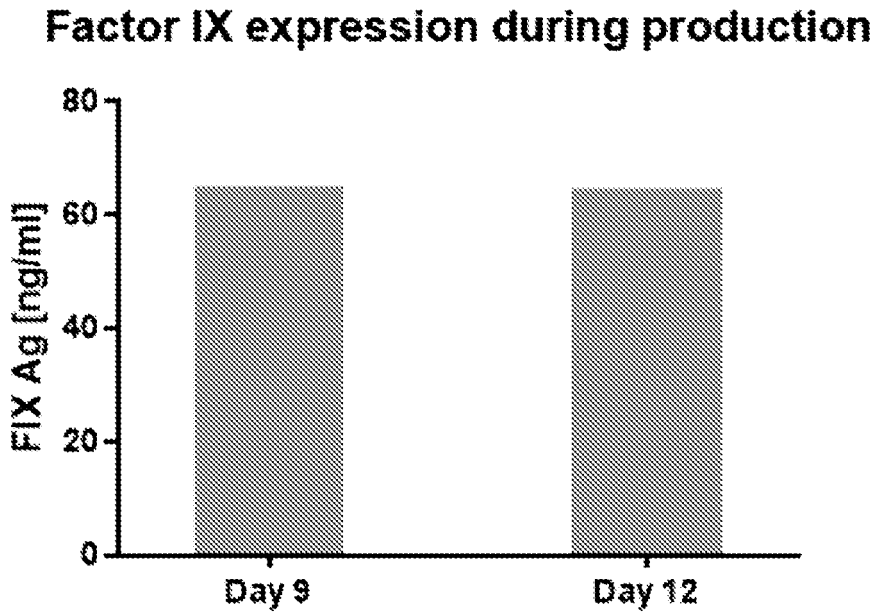

Factor IX expression during production
FIX Ag [ng/ml]
80
60
40
20
0
Day 9
Day 12

FIG. 13B

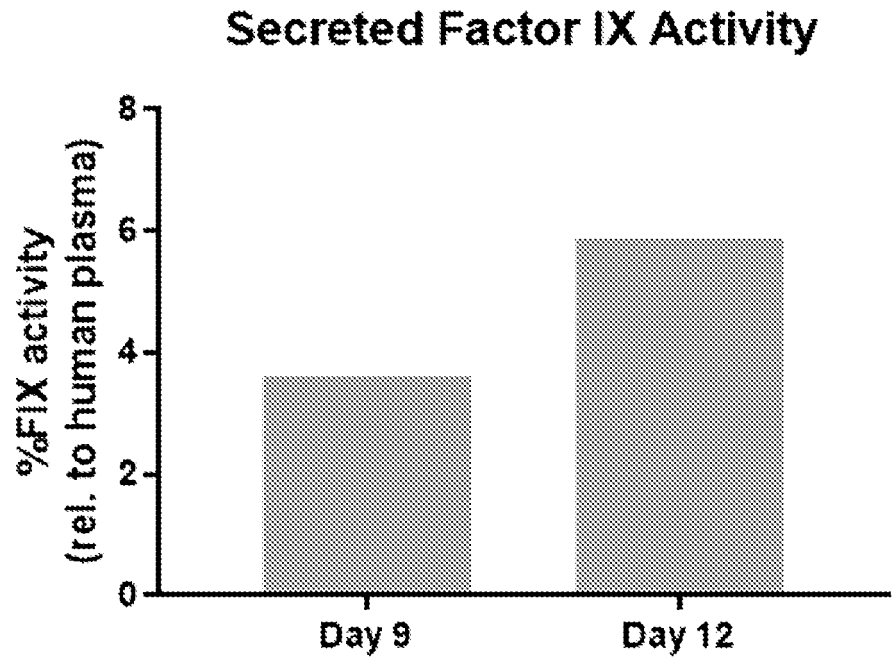

Secreted Factor IX Activity
%dFIX activity
(rel. to human plasma)
0
2
4
6
8
Day 9
Day 12

FIG. 14A

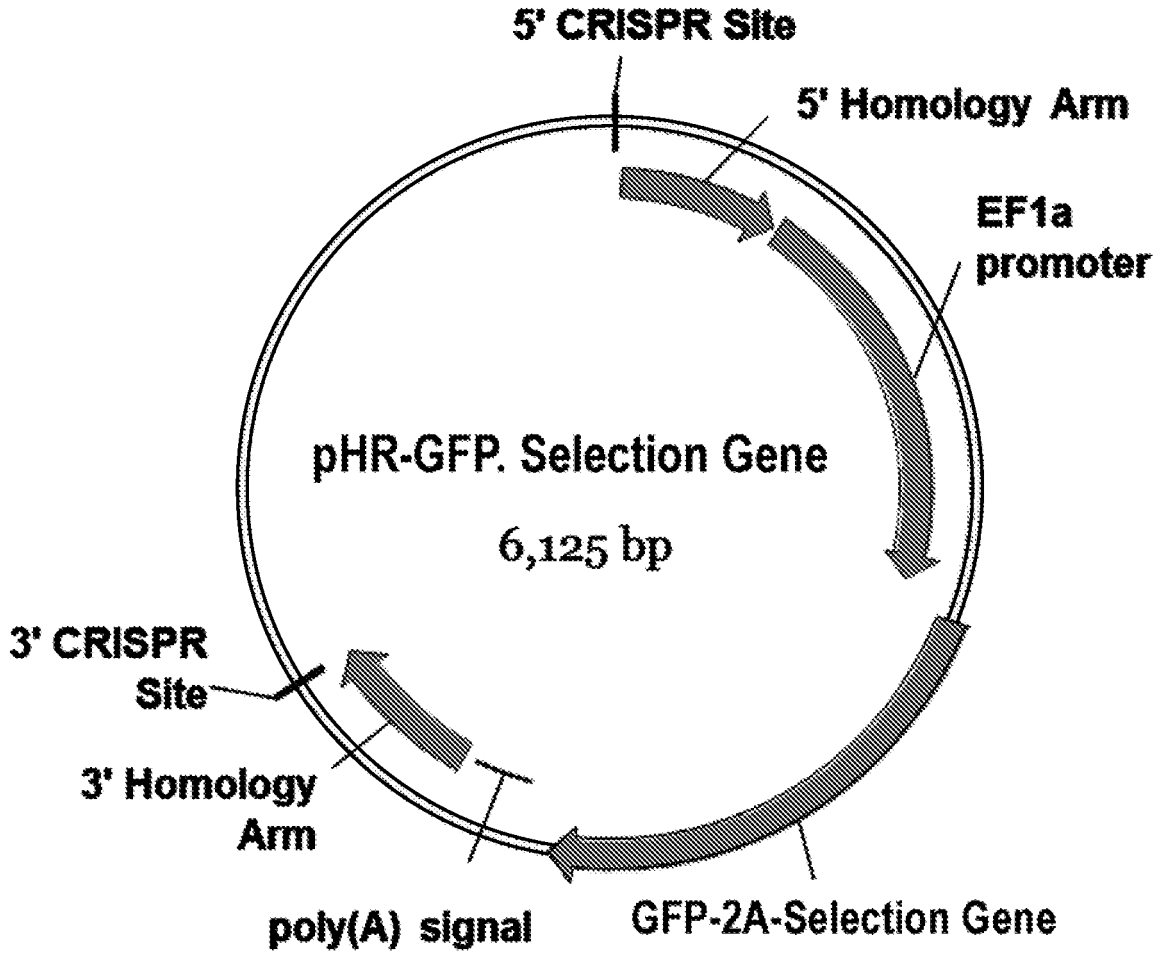

5' CRISPR Site
5' Homology Arm
EF1a promoter
pHR-GFP. Selection Gene
6,125 bp
3' CRISPR Site
3' Homology Arm
poly(A) signal
GFP-2A-Selection Gene

FIG. 14B

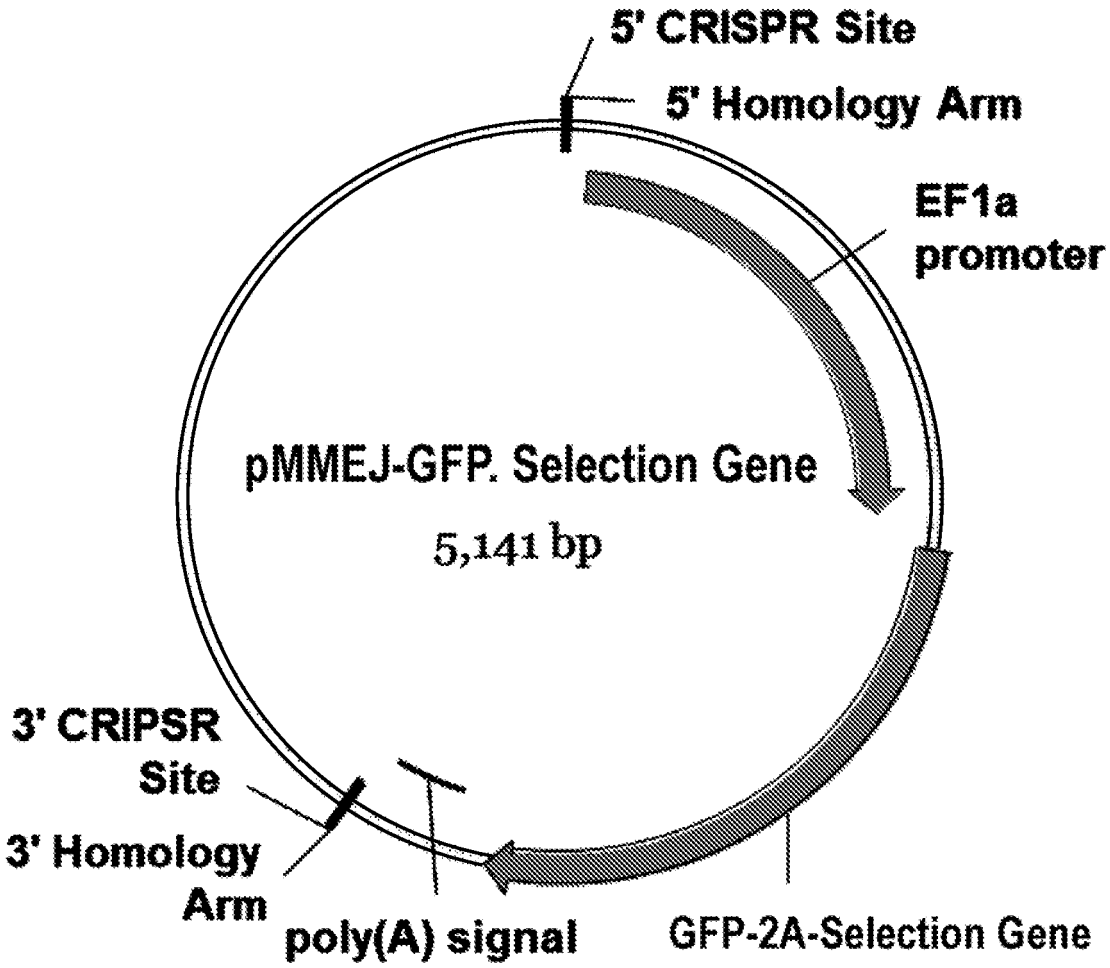
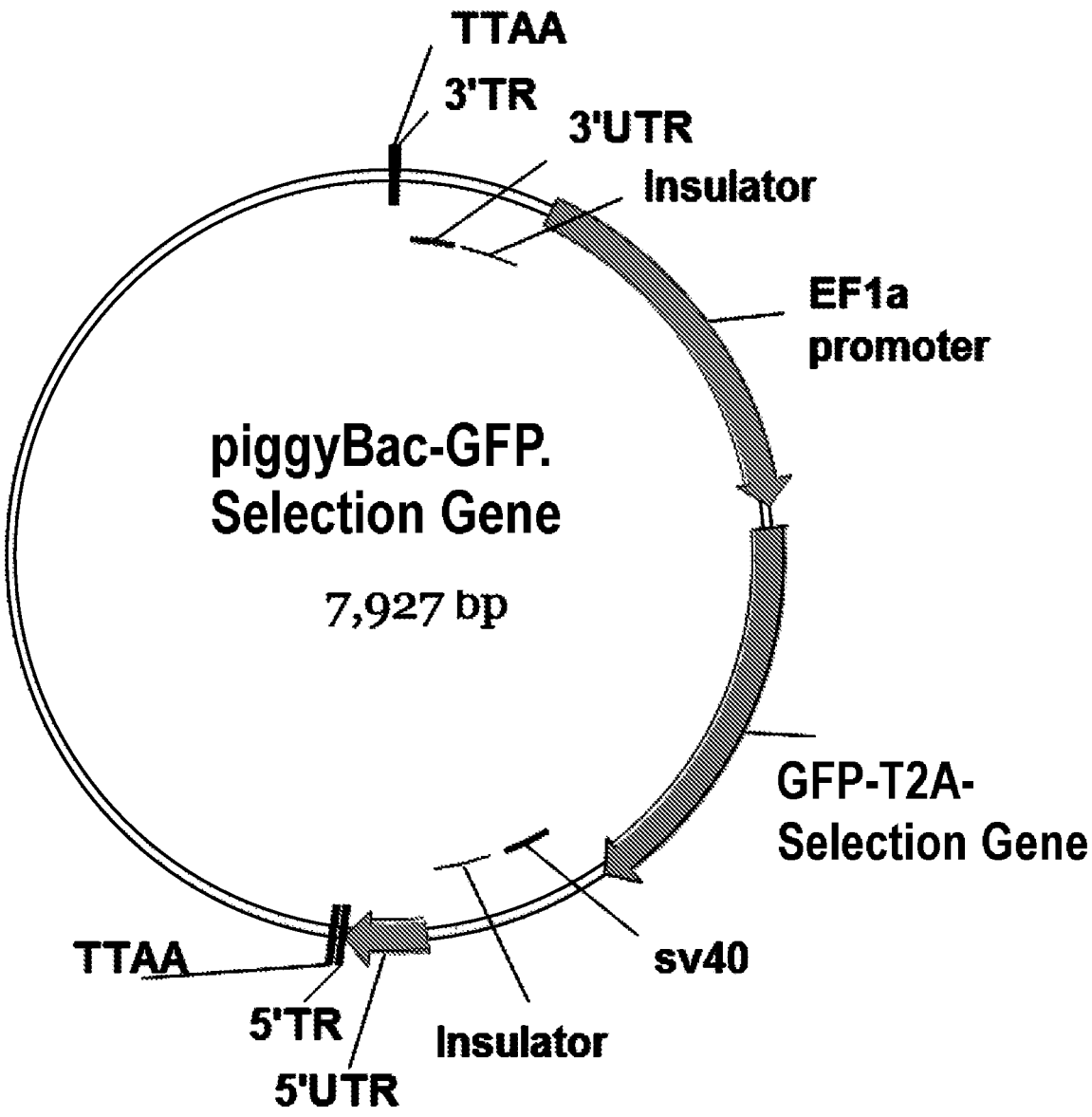

5' CRISPR Site
5' Homology Arm
EF1a promoter
pMMEJ-GFP. Selection Gene
5,141 bp
3' CRIPSR Site
3' Homology Arm
poly(A) signal
GFP-2A-Selection Gene

FIG. 14C


TTAA
3'TR
3'UTR
Insulator
EF1a
promoter
piggyBac-GFP.
Selection Gene
7,927 bp
GFP-T2A-
Selection Gene
sv40
Insulator
TTAA
5'TR
5'UTR

# FIG. 14D

pHR-GFP.Selection Gene: (between 5′ and 3′ CRISPR Sites)

ggggccactagggacaggatcggcgtcttcactcgctgggttccctttttccttctccttctggggcctgtgccat
ctctcgtttcttaggatggccttctccgacggatgtctcccttgcgtcccgcctccccttcttgtaggcctgcat
catcaccgtttttctggacaaccccaaagtaccccgtctccctggctttagccacctctccatcctcttgctttc
tttgcctggacaccccgttctcctgtggattcgggtcacctctcactcctttcatttgggcagctcccctacccc
ccttacctctctagtctgtgctagctcttccagccccctgtcatggcatcttccaggggtccgagagctcagcta
gtcttcttcctccaacccgggcccctatgtccacttcaggacagcatgtttgctgcctccagggatcctgtgtcc
ccgagctgggaccaccttatattcccagggccggttaatgtggctctggttctgggtacttttatctgtcccgac
gtccgatcgaaccatggacagttagctttgcaaagatggataaagttttaaacagagaggaatctttgcagctaa
tggaccttctaggtcttgaaaggagtgggaattggctccggtgcccgtcagtgggcagagcgcacatcgcccaca
gtccccgagaagttgggggggagggtcggcaattgaaccggtgcctagagaaggtggcgcggggtaaactgggaa
agtgatgtcgtgtactggctccgccttttttcccgagggtgggggagaaccgtatataagtgcagtagtcgccgtg
aacgttctttttcgcaacgggtttgccgccagaacacaggtaagtgccgtgtgtggttcccgcgggcctggcctc
tttacgggttatggcccttgcgtgccttgaattacttccacctggctgcagtacgtgattcttgatcccgagctt
cgggttggaagtgggtgggagagttcgaggccttgcgcttaaggagccccttcgcctcgtgcttgagttgaggcc
tggcctgggcgctggggccgccgcgtgcgaatctggtggcaccttcgcgcctgtctcgctgctttcgataagtct
ctagccatttaaaatttttgatgacctgctgcgacgctttttttctggcaagatagtcttgtaaatgcgggccaa
gatctgcacactggtatttcggttttggggccgcgggcggcgacggggcccgtgcgtcccagcgcacatgttcg
gcgaggcggggcctgcgagcgcggccaccgagaatcggacgggggtagtctcaagctggccggcctgctctggtg
cctggcctcgcgccgccgtgtatcgccccgccctgggcggcaaggctggcccggtcggcaccagttgcgtgagcg
gaaagatggccgcttcccggccctgctgcagggagctcaaaatggaggacgcggcgctcgggagagcgggcgggt
gagtcacccacacaaaggaaaagggcctttccgtcctcagccgtcgcttcatgtgactccacggagtaccgggcg
ccgtccaggcacctcgattagttctcgagcttttggagtacgtcgtctttaggttgggggggagggggttttatgcg
atggagtttccccacactgagtgggtggagactgaagttaggccagcttggcacttgatgtaattctccttggaa
tttgccctttttgagtttggatcttggttcattctcaagcctcagacagtggttcaaagttttttttcttccattt
caggtgtcgtgagaattctaatacgactcactatagggtgtgctgtctcatcattttggcaaagattggccacca
agcttaccgccatggtgagcaagggcgaggagctgttcaccggggtggtgcccatcctggtcgagctggacggcg
acgtaaacggccacaagttcagcgtgtccggcgagggcgagggcgatgccacctacggcaagctgaccctgaagt
tcatctgcaccaccggcaagctgcccgtgccctggcccaccctcgtgaccaccctgacctacggcgtgcagtgct
tcagccgctaccccgaccacatgaagcagcacgacttcttcaagtccgccatgcccgaaggctacgtccaggagc
gcaccatcttcttcaaggacgacggcaactacaagacccgcgccgaggtgaagttcgagggcgacaccctggtga
accgcatcgagctgaagggcatcgacttcaaggaggacggcaacatcctggggcacaagctggagtacaactaca
acagccacaacgtctatatcatggccgacaagcagaagaacggcatcaaggtgaacttcaagatccgccacaaca
tcgaggacggcagcgtgcagctcgccgaccactaccagcagaacaccccccatcggcgacggccccgtgctgctgc
ccgacaaccactacctgagcacccagtccgccctgagcaaagaccccaacgagaagcgtgatcacatggtcctgc
tggagttcgtgaccgccgccgggatcactctcggcatggacgagctgtacaaggaaggaagaggcagcctgctga
catgtggcgacgtggaggagaaccctggcccaatggtgggcagcctgaattgtatcgtggccgtgtcccagaaca
tgggcatcggcaagaatggcgattttccttggccccctctgagaaatgagtccagatactttcagaggatgacca
caaccagctccgtggagggcaagcagaacctggtcatcatgggcaagaagacatggttctctatcccagagaaga
accgcccccctgaagggccggatcaatctggtgctgagcagggagctgaaggagccaccccagggagcacactttc
tgtccaggtctctggacgatgccctgaagctgaccgagcagcctgagctggccaacaaggtggacatggtgtgga
tcgtgggcggctctagcgtgtataaggaggccatgaatcaccctggccacctgaagctgttcgtgacacggatca
tgcaggactttgagtccgataccttctttccagagatcgacctggagaagtacaagctgctgcccgagtatcctg
gcgtgctgtctgatgtgcaggaggagaagggcatcaagtacaagttcgaggtgtatgagaagaacgattgataac
atatgcctttaattaaacactagttctatagtgtcacctaaattccctttagtgagggttaatggccgtaggccg
ccagaattgggtccagacatgataagatacattgatgagtttggacaaaccacaactagaatgcagtgaaaaaaa
tgctttatttgtgaaatttgtgatgctattgctttatttgtaaccattataagctgcaataaacaagttaacaac
aacaattgcattcattttatgtttcaggttcaggggaggtgtgggaggtttttcggactctaggacctgcgca
tgcgcttggggtacctaggatatcgacagaaaagccccatccttaggcctcctccttcctagtctcctgatattg
ggtctaaccccacctcctgttaggcagattccttatctggtgacacaccccatttcctggagccatctctctc
cttgccagaacctctaaggtttgcttacgatggagccagagaggatcctgggagggagagcttggcaggggtgg
gagggaaggggggatgcgtgacctgcccggttctcagtggccaccctgcgctaccctctcccagaacctgagct
gctctgacgcggccgtctggtgcgtttcactgatcctggtgctgcagcttccttacacttcccaagaggagaagc
agtttggaaaaacaaaatcagaataagttggtcctgagttctaactttggctcttcacctttctagtccccaatt
tatattgttcctccgtgcgtcagttttacctgtgagataaggccagtagccagccccgtcctggcagggctgtgc
ctctagggacaggattggtgacg

(SEQ ID NO: 41)

# FIG. 14E

pMMEJ-GFP.Selection Gene: (between 5′ and 3′ CRISPR Sites)

ccaatcctgtccctagtggccccactgtggggacgtccgatcgaaccatggacagttagctttgcaaagatggat
aaagttttaaacagagaggaatctttgcagctaatggaccttctaggtcttgaaaggagtgggaattggctccgg
tgcccgtcagtgggcagagcgcacatcgcccacagtccccgagaagttgggggggagggtcggcaattgaaccgg
tgcctagagaaggtggcgcggggtaaactgggaaagtgatgtcgtgtactggctccgccttttcccgagggtgg
gggagaaccgtatataagtgcagtagtcgccgtgaacgttcttttcgcaacgggtttgccgccagaacacaggt
aagtgccgtgtgtggttcccgcgggcctggcctctttacgggttatggcccttgcgtgccttgaattacttccac
ctggctgcagtacgtgattcttgatcccgagcttcgggttggaagtgggtgggagagttcgaggccttgcgctta
aggagccccttcgcctcgtgcttgagttgaggcctggcctgggcgctggggccgccgcgtgcgaatctggtggca
ccttcgcgcctgtctcgctgctttcgataagtctctagccatttaaaatttttgatgacctgctgcgacgctttt
tttctggcaagatagtcttgtaaatgcgggccaagatctgcacactggtatttcggttttttggggccgcgggcgg
cgacggggcccgtgcgtcccagcgcacatgttcggcgaggcggggcctgcgagcgcggccaccgagaatcggacg
ggggtagtctcaagctggccggcctgctctggtgcctggcctcgcgccgccgtgtatcgccccgccctgggcggc
aaggctggcccggtcggcaccagttgcgtgagcggaaagatggccgcttcccggccctgctgcagggagctcaaa
atggaggacgcggcgctcgggagagcgggcgggtgagtcacccacacaaaggaaaagggcctttccgtcctcagc
cgtcgcttcatgtgactccacggagtaccgggcgccgtccaggcacctcgattagttctcgagcttttggagtac
gtcgtctttaggttgggggagggggttttatgcgatggagtttccccacactgagtgggtggagactgaagttag
gccagcttggcacttgatgtaattctccttggaatttgccctttttgagtttggatcttggttcattctcaagcc
tcagacagtggttcaaagtttttttcttccatttcaggtgtcgtgagaattctaatacgactcactatagggtgt
gctgtctcatcattttggcaaagattggccaccaagcttaccgccatggtgagcaagggcgaggagctgttcacc
ggggtggtgcccatcctggtcgagctggacggcgacgtaaacggccacaagttcagcgtgtccggcgagggcgag
ggcgatgccacctacggcaagctgaccctgaagttcatctgcaccaccggcaagctgcccgtgccctggcccacc
ctcgtgaccaccctgacctacggcgtgcagtgcttcagccgctaccccgaccacatgaagcagcacgacttcttc
aagtccgccatgcccgaaggctacgtccaggagcgcaccatcttcttcaaggacgacggcaactacaagacccgc
gccgaggtgaagttcgagggcgacaccctggtgaaccgcatcgagctgaagggcatcgacttcaaggaggacggc
aacatcctggggcacaagctggagtacaactacaacagccacaacgtctatatcatggccgacaagcagaagaac
ggcatcaaggtgaacttcaagatccgccacaacatcgaggacggcagcgtgcagctcgccgaccactaccagcag
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agcctgaattgtatcgtggccgtgtcccagaacatgggcatcggcaagaatggcgattttccttggccccctctg
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ggcaagaagacatggttctctatcccagagaagaaccgccccctgaagggccggatcaatctggtgctgagcagg
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ctggagaagtacaagctgctgcccgagtatcctggcgtgctgtctgatgtgcaggaggagaagggcatcaagtac
aagttcgaggtgtatgagaagaacgattgataacatatgcctttaattaaacactagttctatagtgtcacctaa
attcccttagtgagggttaatggccgtaggccgccagaattgggtccagacatgataagatacattgatgagtt
tggacaaaccacaactagaatgcagtgaaaaaaatgctttatttgtgaaatttgtgatgctattgctttatttgt
aaccattataagctgcaataaacaagttaacaacaacaattgcattcattttatgtttcaggttcaggggggaggt
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caccaatcctgagg

(SEQ ID NO: 42)

FIG. 15

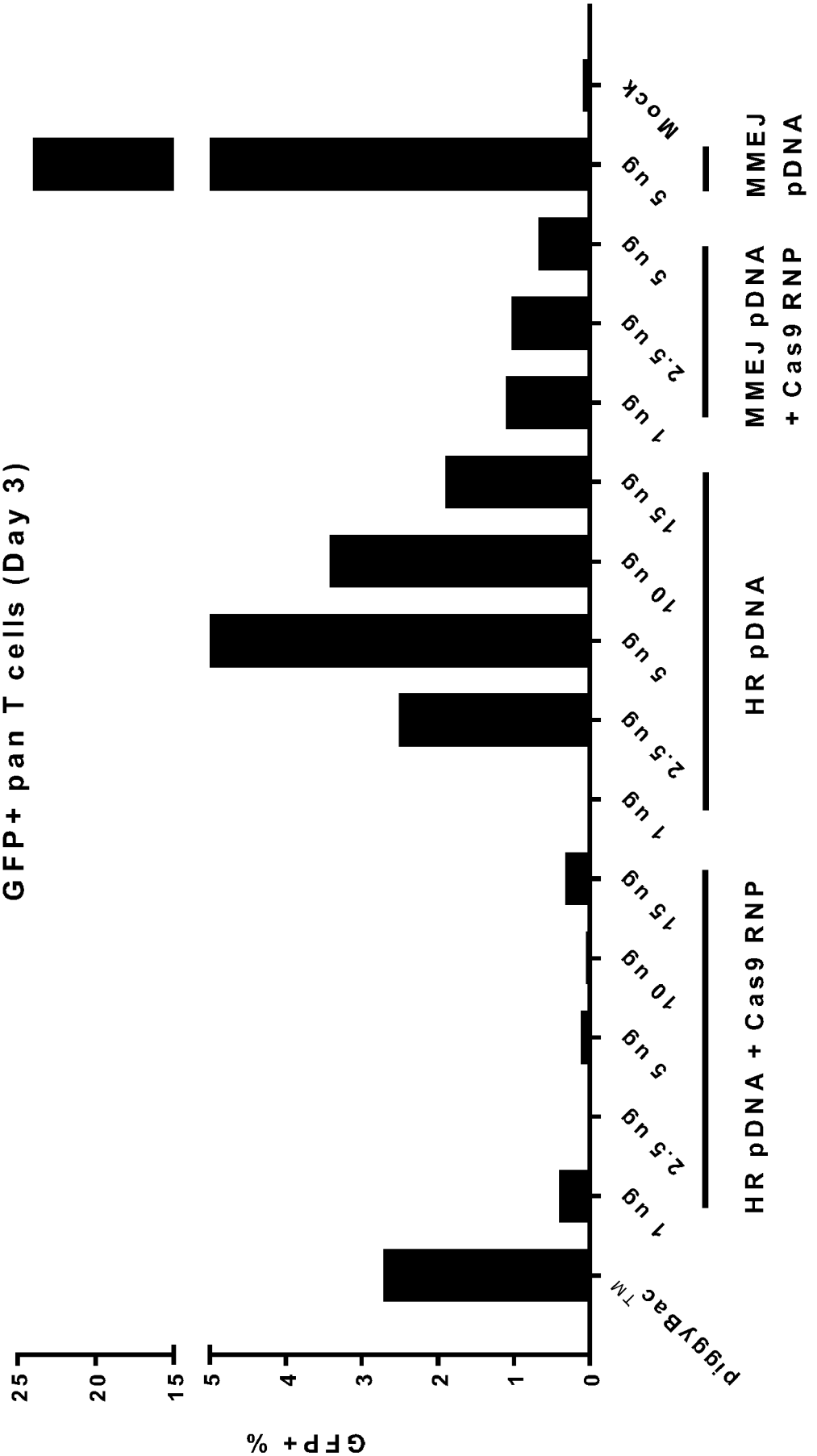

GFP+ pan T cells (Day 3)
GFP+ %
25
20
15
5
4
3
2
1
0
piggyBac™
1 ug
2.5 ug
5 ug
10 ug
15 ug
1 ug
2.5 ug
5 ug
10 ug
15 ug
1 ug
2.5 ug
5 ug
1 ug
2.5 ug
5 ug
Mock
HR pDNA + Cas9 RNP
HR pDNA
MMEJ pDNA + Cas9 RNP
MMEJ pDNA

FIG. 16

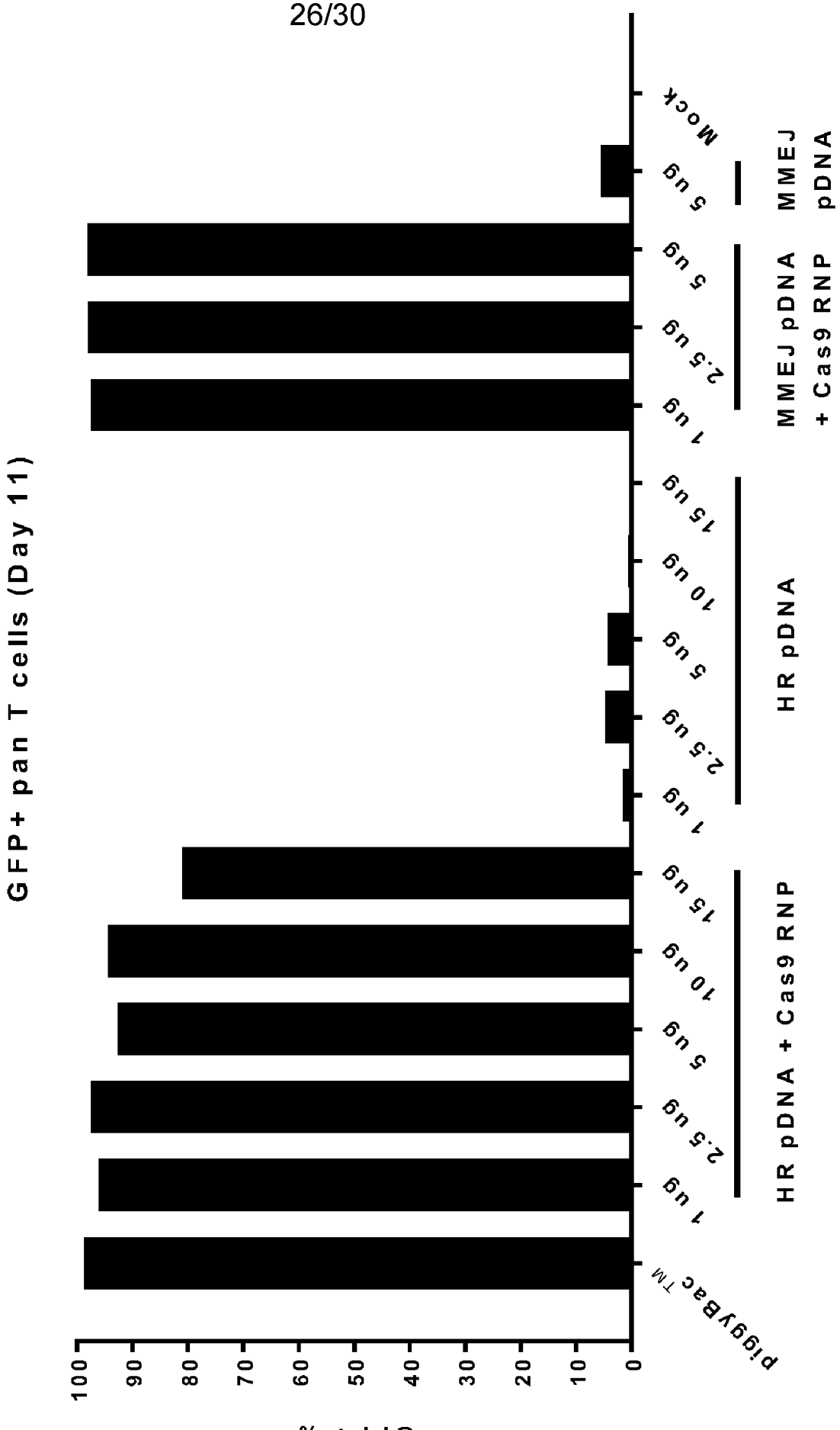

GFP+ pan T cells (Day 11)
% GFP+
100
90
80
70
60
50
40
30
20
10
0
piggyBac™
1 ug
2.5 ug
5 ug
10 ug
15 ug
HR pDNA + Cas9 RNP
1 ug
2.5 ug
5 ug
10 ug
15 ug
HR pDNA
1 ug
2.5 ug
5 ug
MMEJ pDNA + Cas9 RNP
5 ug
Mock
MMEJ pDNA

FIG. 17A

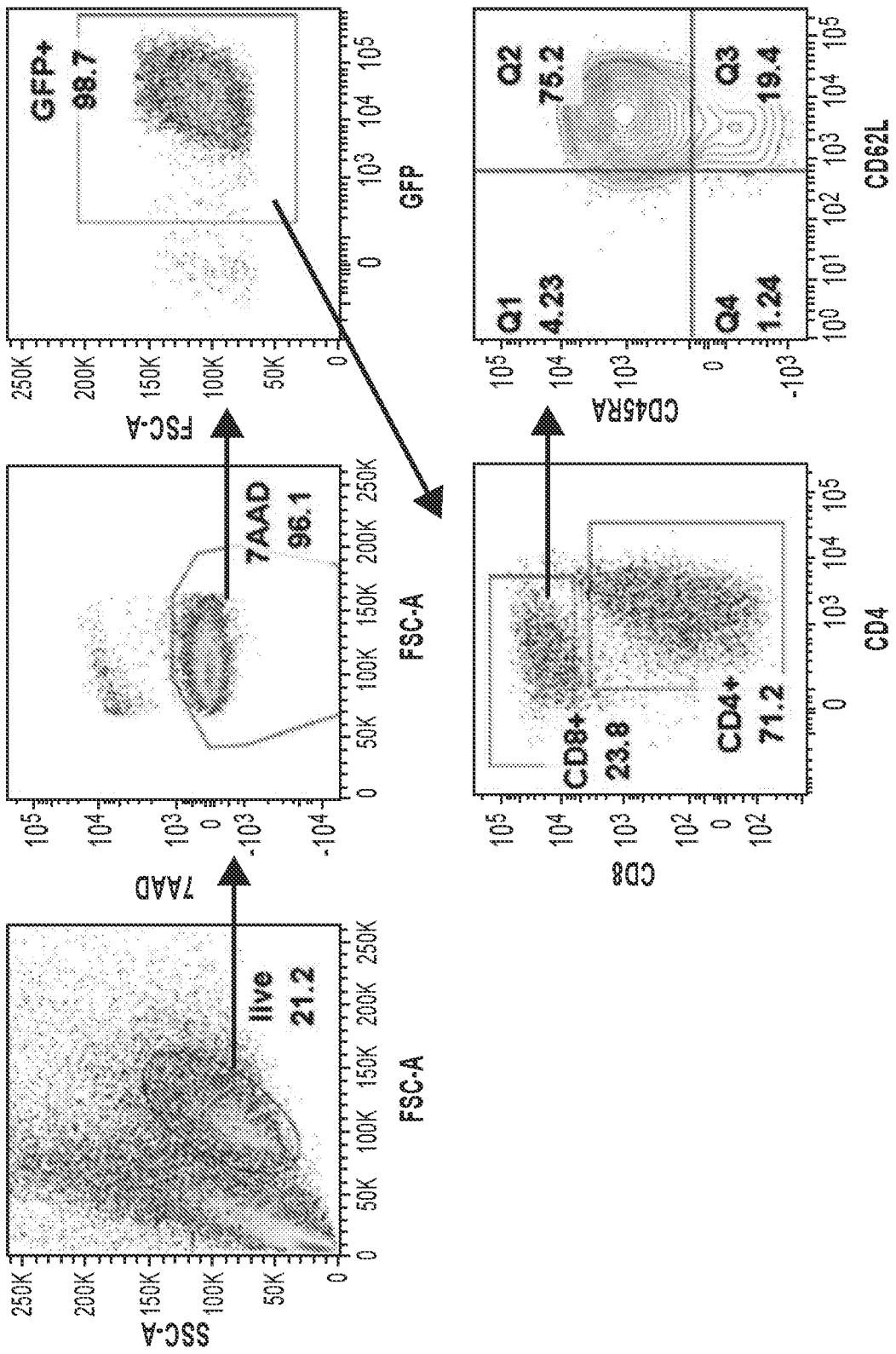

SSC-A
FSC-A
live
21.2
7AAD
FSC-A
7AAD
96.1
FSC-A
GFP
GFP+
98.7
CD8
CD4
CD8+
23.8
CD4+
71.2
CD45RA
CD62L
Q1
4.23
Q2
75.2
Q4
1.24
Q3
19.4

FIG. 17B

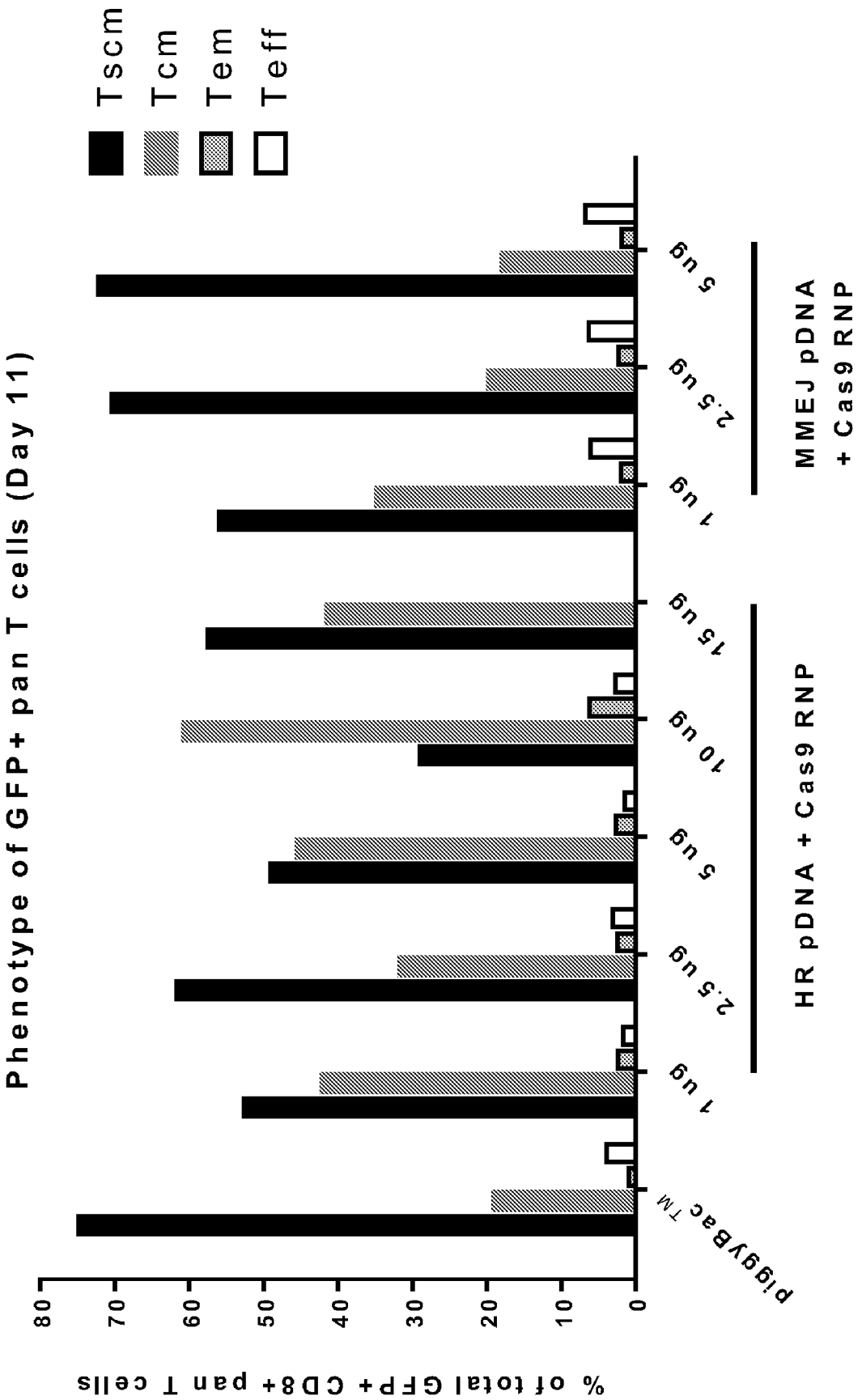

Phenotype of GFP+ pan T cells (Day 11)
% of total GFP+ CD8+ pan T cells
0
10
20
30
40
50
60
70
80
Tscm
Tcm
Tem
Teff
piggyBac™
1 ug
2.5 ug
5 ug
10 ug
15 ug
1 ug
2.5 ug
5 ug
HR pDNA + Cas9 RNP
MMEJ pDNA + Cas9 RNP

FIG. 17C

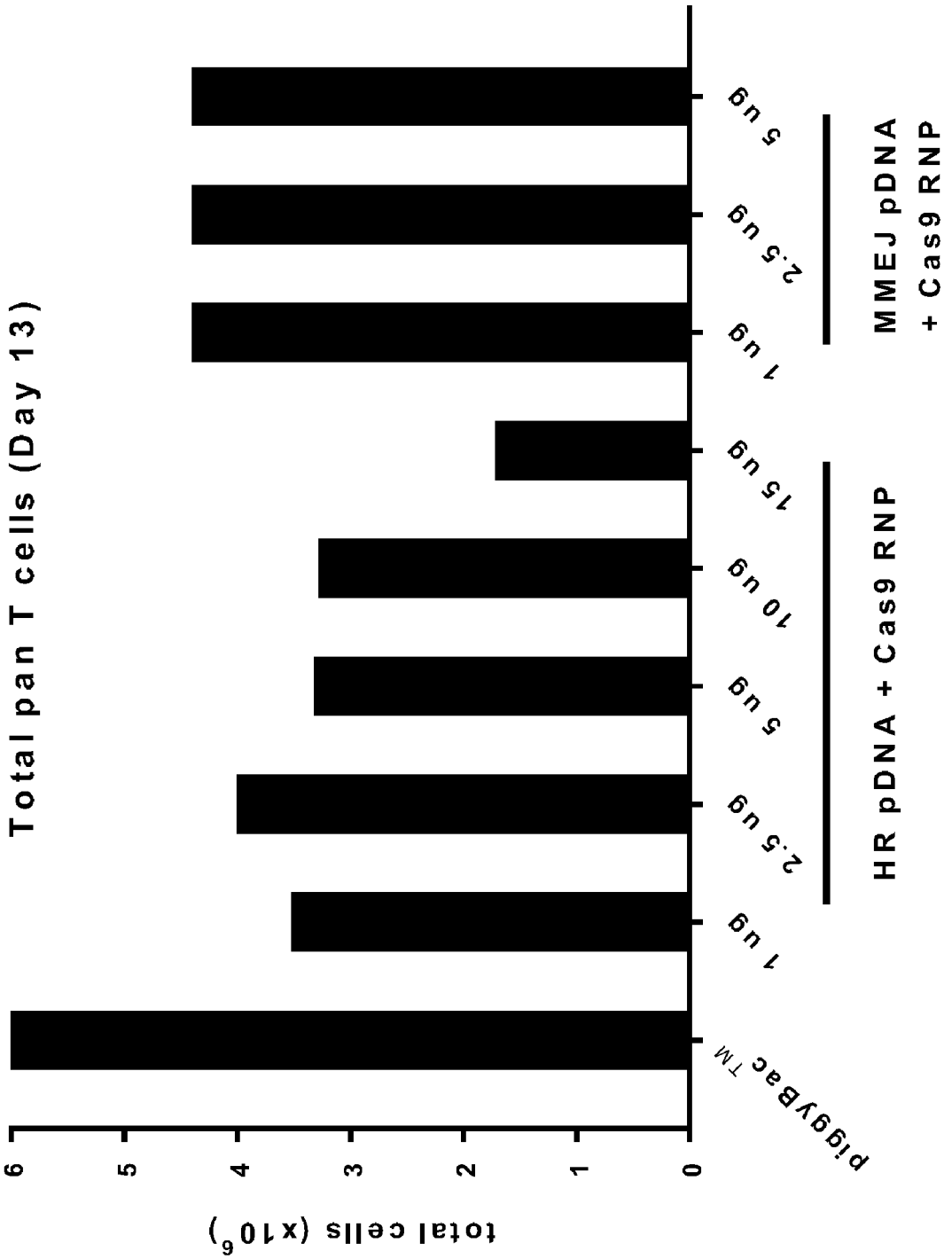

Total pan T cells (Day 13)
total cells (x10^6)
0
1
2
3
4
5
6
piggyBac ™
1 ug
2.5 ug
5 ug
10 ug
15 ug
1 ug
2.5 ug
5 ug
HR pDNA + Cas9 RNP
MMEJ pDNA
+ Cas9 RNP

FIG. 18B

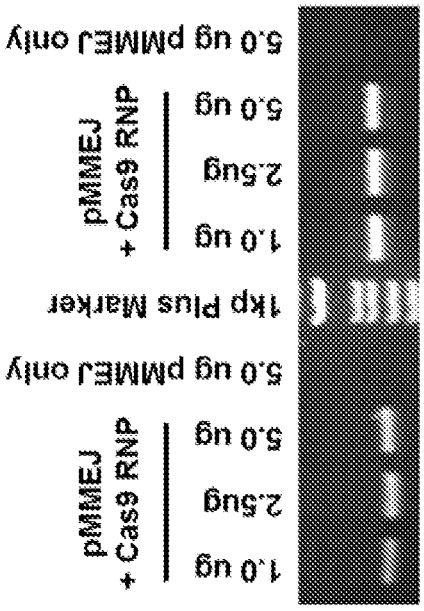



FIG. 18A

