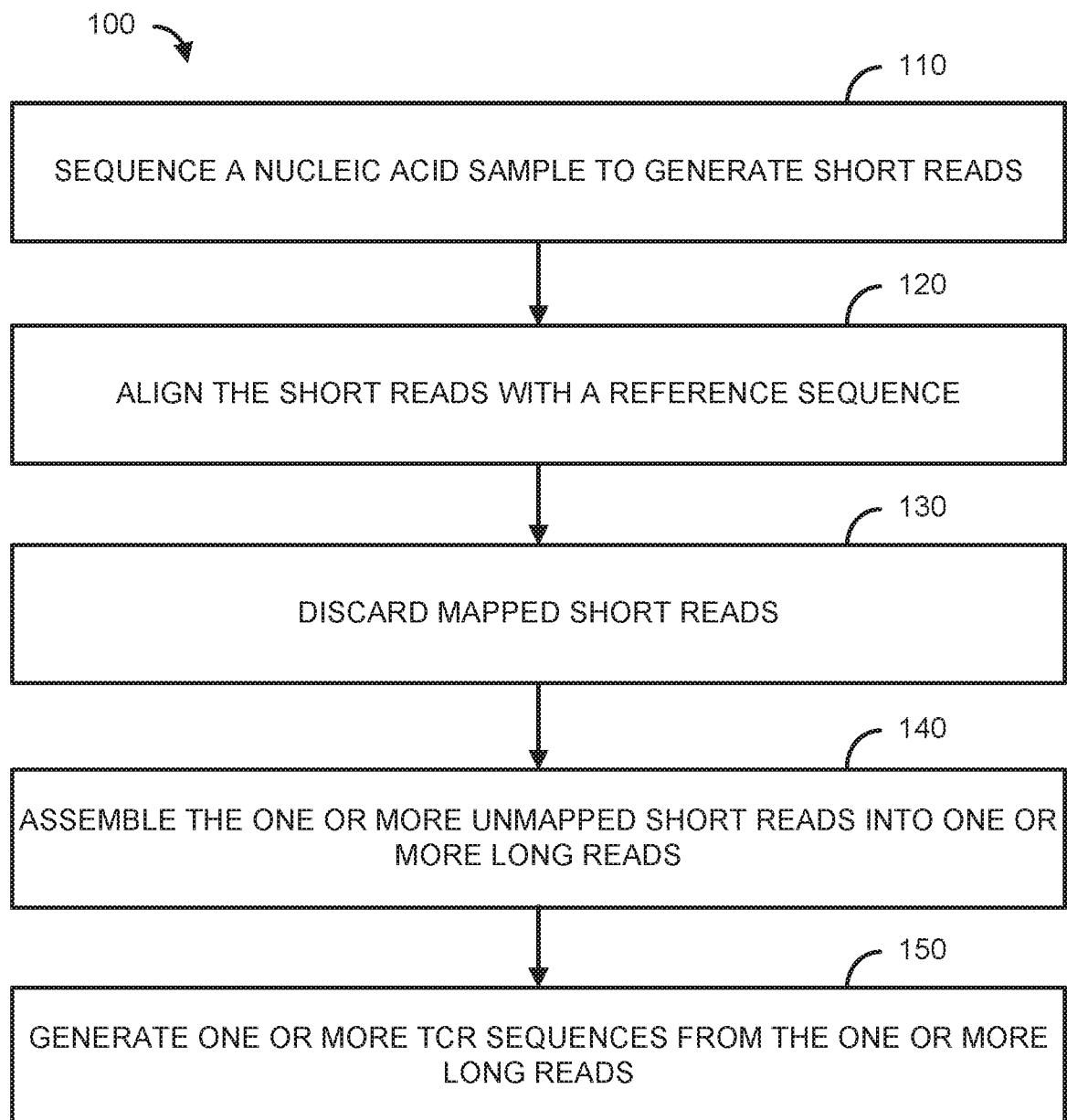


FIG. 1



| CDR3                                   | Tumor          |           |                |             |               |            |           |              |             |            | Tumor bearing spleen |           |           |           |            |           |       |        |       |         |           |       |        |       |         |        |       |        |       |         |      |  |  |  |  |         |  |  |  |  |
|----------------------------------------|----------------|-----------|----------------|-------------|---------------|------------|-----------|--------------|-------------|------------|----------------------|-----------|-----------|-----------|------------|-----------|-------|--------|-------|---------|-----------|-------|--------|-------|---------|--------|-------|--------|-------|---------|------|--|--|--|--|---------|--|--|--|--|
|                                        | aGTR+aPD1      |           |                |             |               | aPD1       |           |              |             |            | aGTR                 |           |           |           |            | Isotype   |       |        |       |         | aGTR+aPD1 |       |        |       |         | aGTR   |       |        |       |         | aPD1 |  |  |  |  | Isotype |  |  |  |  |
|                                        | 11 day         | 8 day     | 11 day         | 8 day       | Isotype       | 11 day     | 8 day     | 11 day       | 8 day       | Isotype    | 11 day               | 8 day     | 11 day    | 8 day     | Isotype    | 11 day    | 8 day | 11 day | 8 day | Isotype | 11 day    | 8 day | 11 day | 8 day | Isotype | 11 day | 8 day | 11 day | 8 day | Isotype |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 1                         | 7              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 2                         | 7              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 3                         | 6              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 4                         | 5              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 5                         | 5              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 6                         | 3              | 0         |                | 1           | 0             | 0          | 0         | 0            | 2           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 7                         | 3              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 8                         | 3              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 9                         | 3              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 10                        | 3              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 11                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 12                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 13                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 14                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 15                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 16                        | 1              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 17                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 18                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 10          | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 19                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 3           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 20                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 3           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 21                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 22                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| TCR Sequence 23                        | 0              | 0         |                | 0           | 0             | 0          | 0         | 0            | 0           | 0          | 0                    | 0         | 0         | 0         | 0          | 0         | 0     | 0      | 0     | 0       | 0         | 0     | 0      | 0     | 0       | 0      | 0     | 0      | 0     | 0       |      |  |  |  |  |         |  |  |  |  |
| % of cells with the same clones (n>=3) | 31.9% (45/141) | 0% (0/81) | 26.7% (32/120) | 4.8% (3/63) | 20.3% (16/79) | 0% (0/127) | 0% (3/47) | 5.7% (6/105) | 6.4% (3/47) | 0% (0/113) | 0% (0/72)            | 0% (0/86) | 0% (0/46) | 0% (0/42) | 0% (0/128) | 0% (0/51) |       |        |       |         |           |       |        |       |         |        |       |        |       |         |      |  |  |  |  |         |  |  |  |  |

FIG. 2

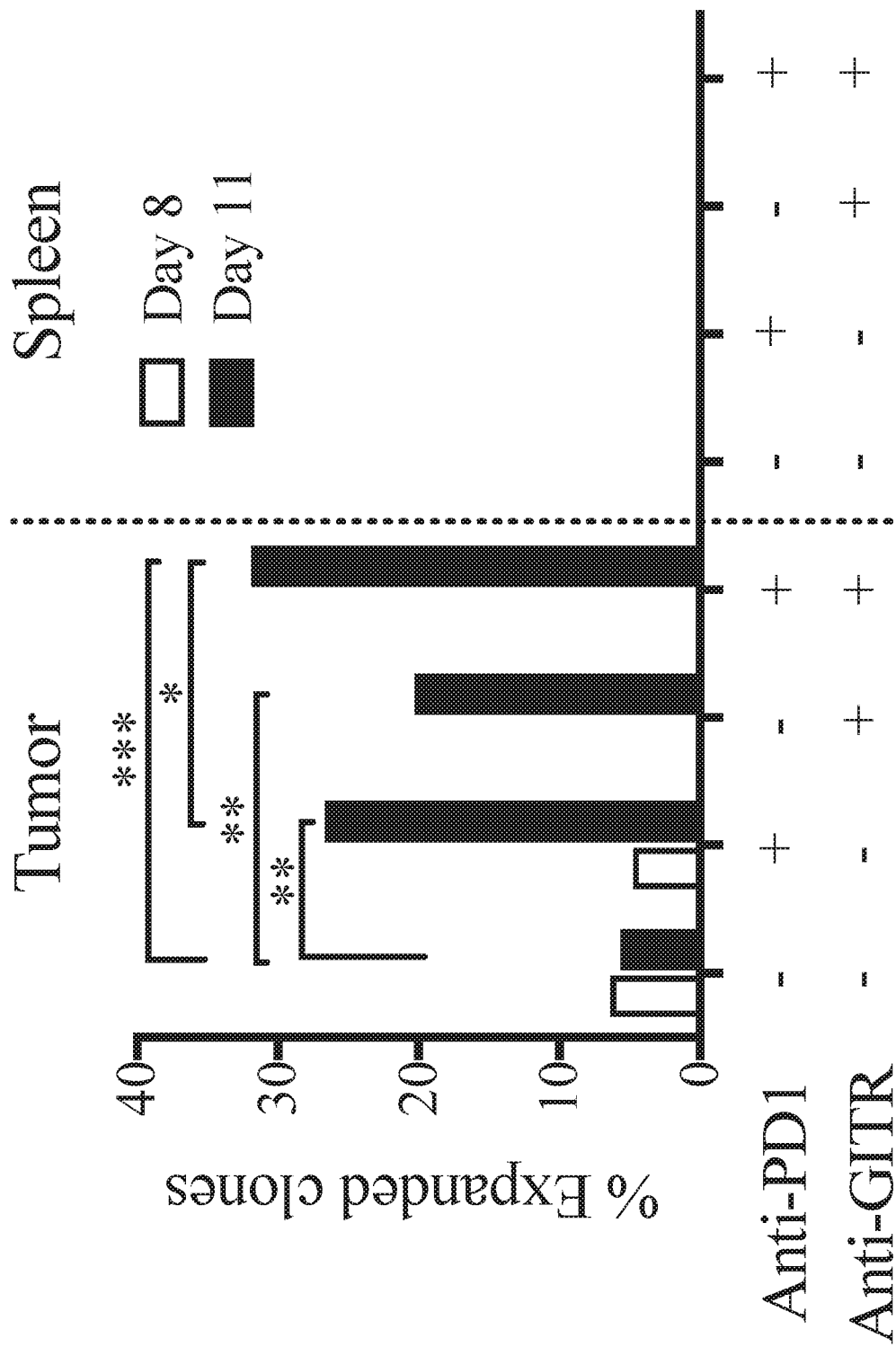


FIG. 3

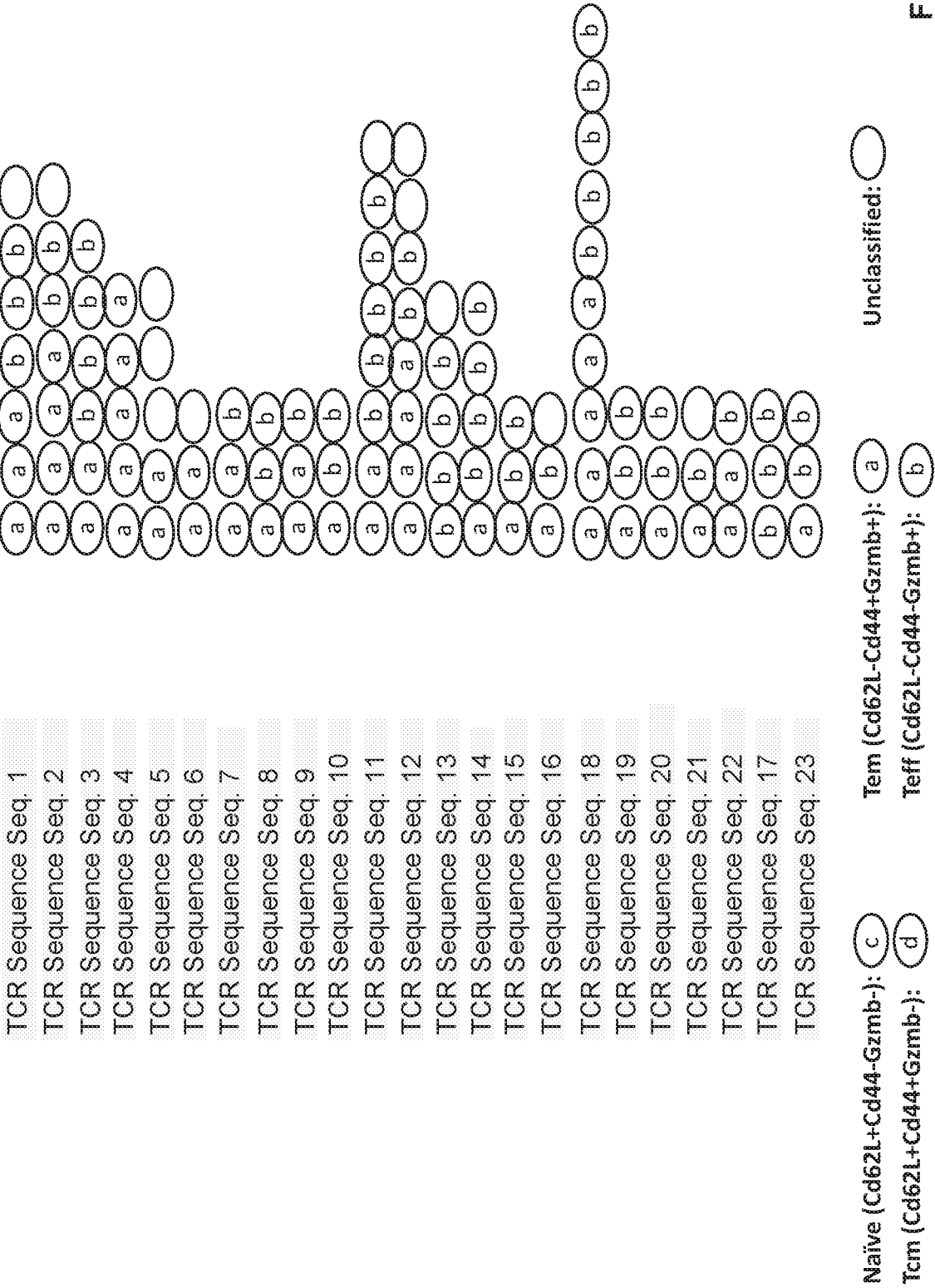


FIG. 4

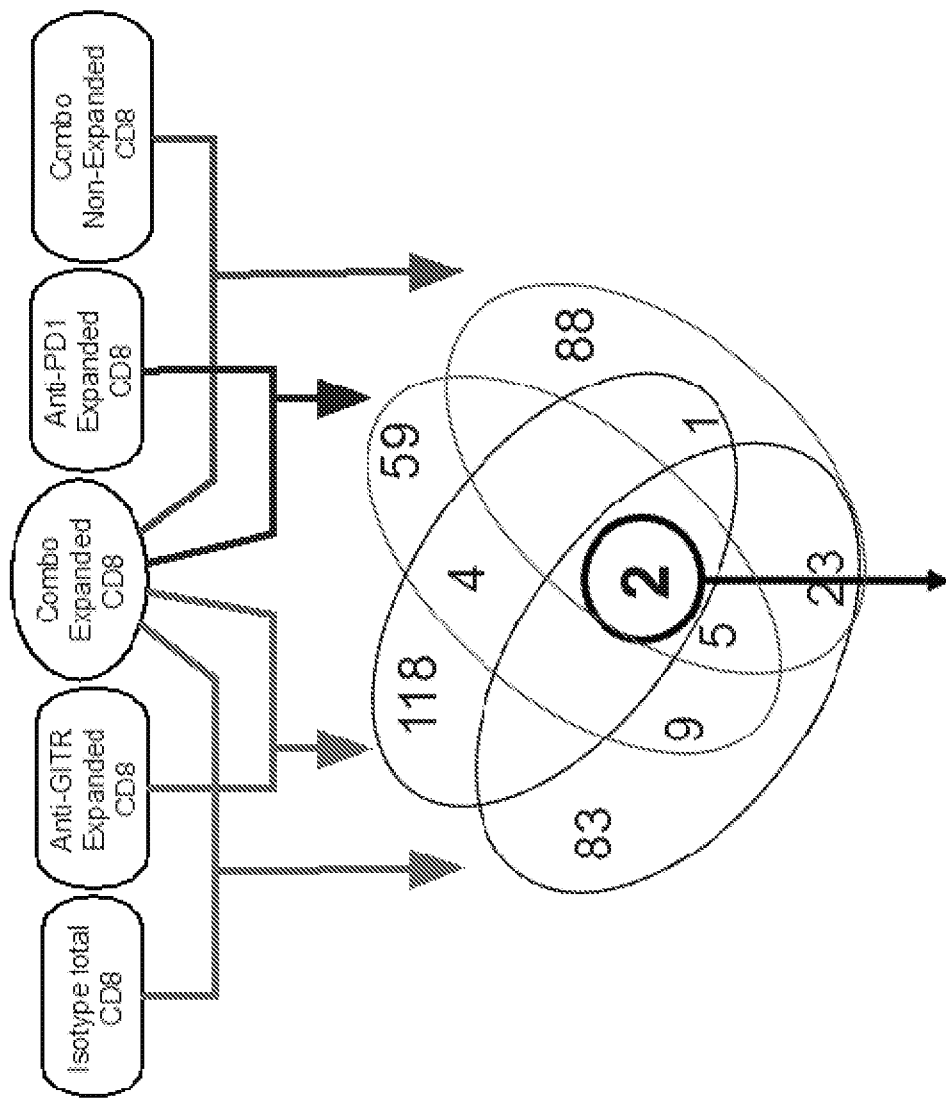
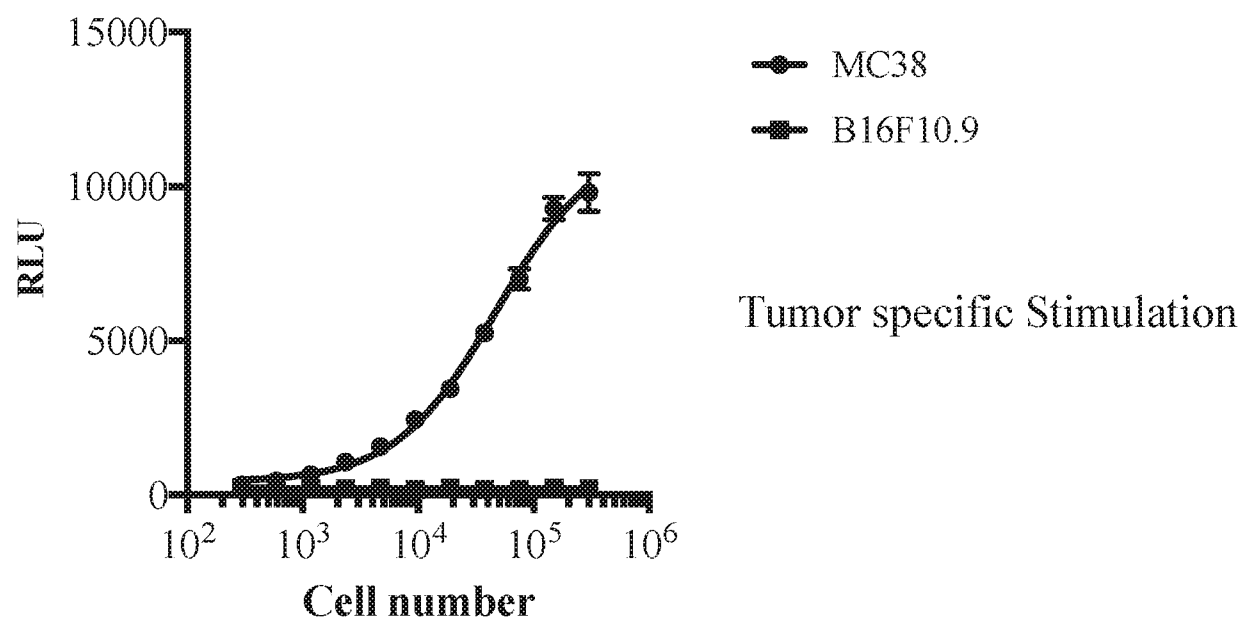


FIG. 5

|       | Combo expanded<br>vs Isotype | Combo expanded<br>vs Non-expanded | Combo expanded<br>vs anti-GITR<br>expanded | Combo expanded<br>vs anti-PD1<br>expanded |
|-------|------------------------------|-----------------------------------|--------------------------------------------|-------------------------------------------|
| CD226 | 10.7                         | 5.0                               | 9.2                                        | 6.5                                       |
| Pde4d | 4.8                          | 3.6                               | 6.9                                        | 4.9                                       |

FIG. 6A



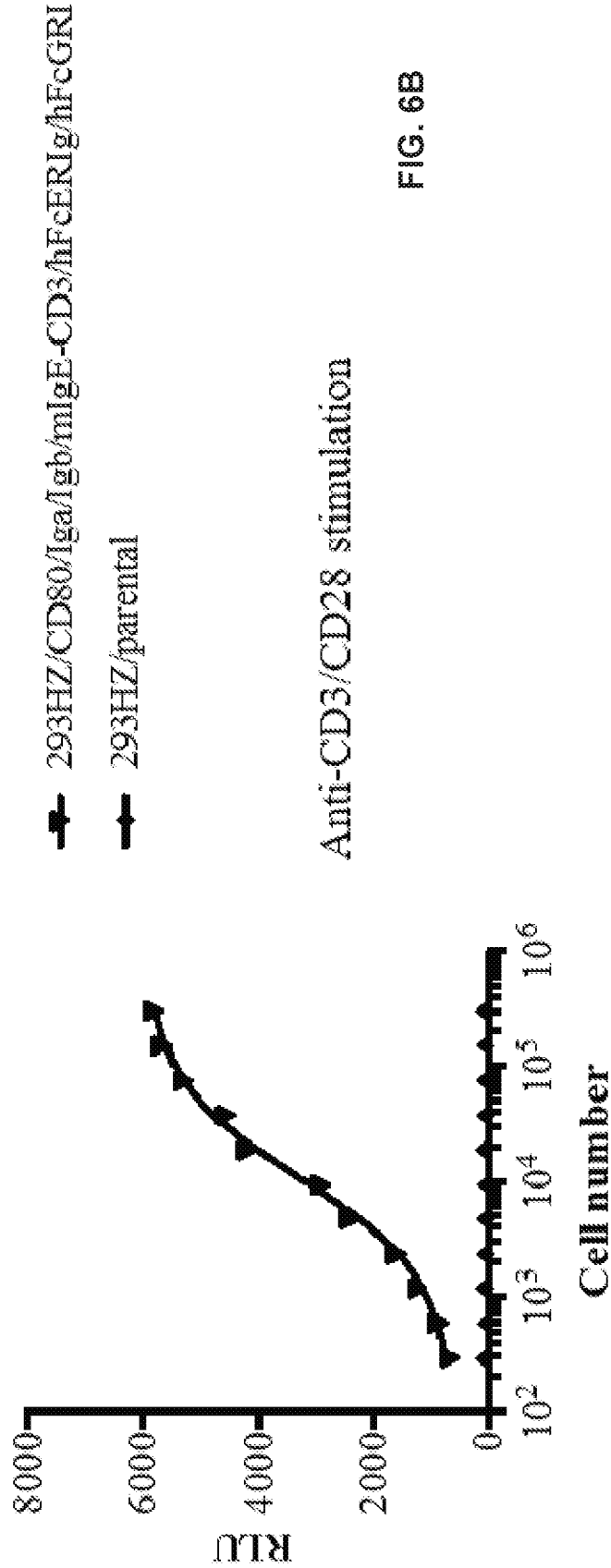
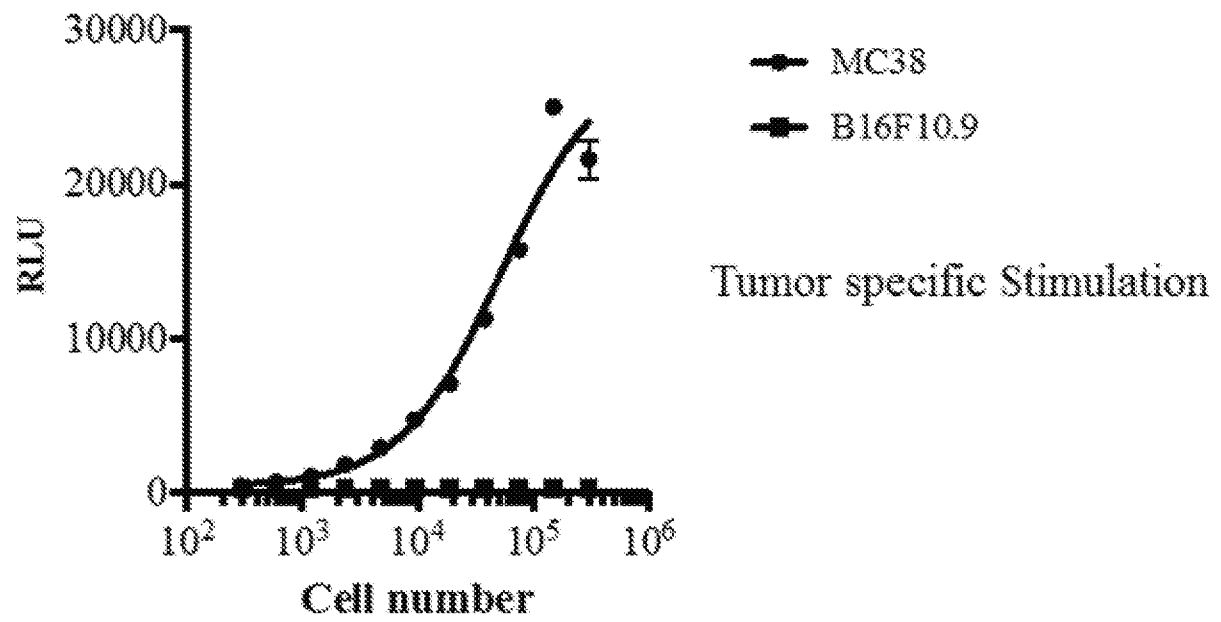


FIG. 6B

FIG. 6C



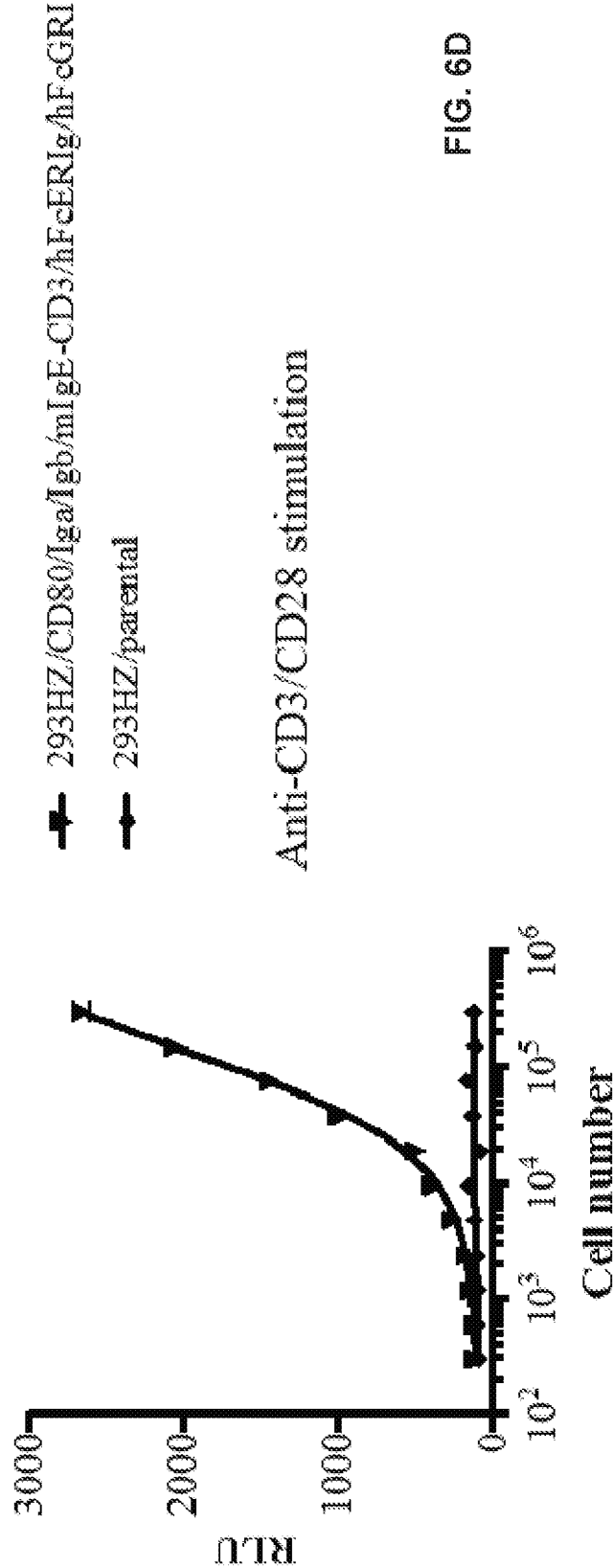
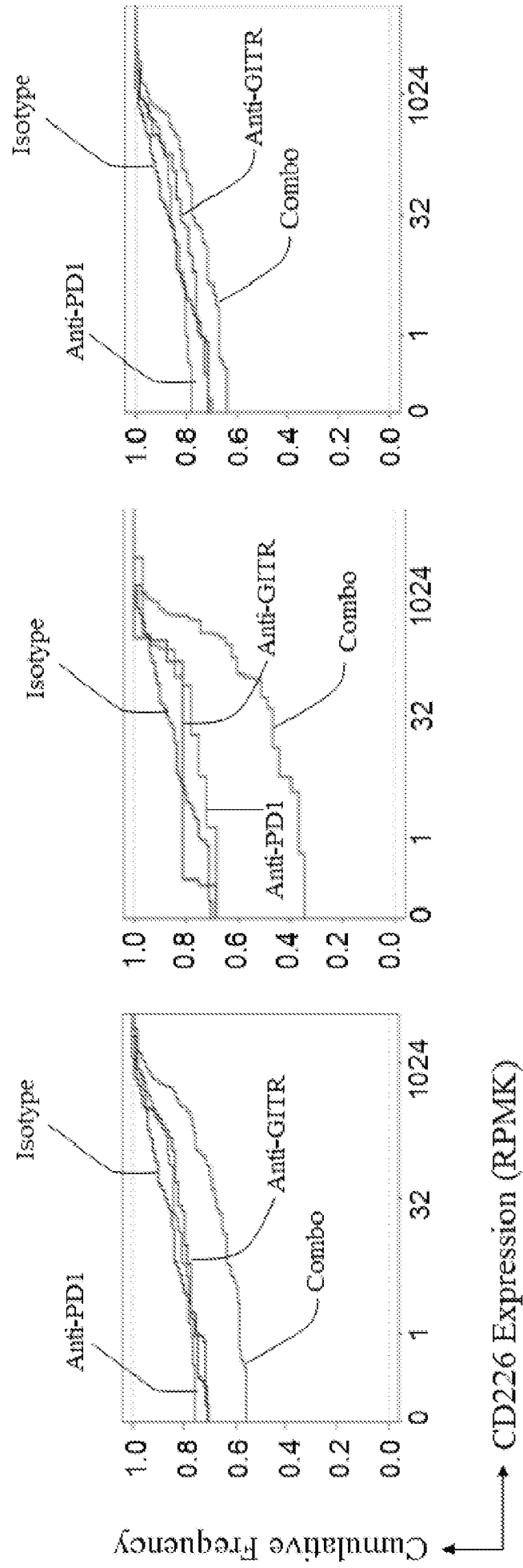


FIG. 6D

FIG. 7A



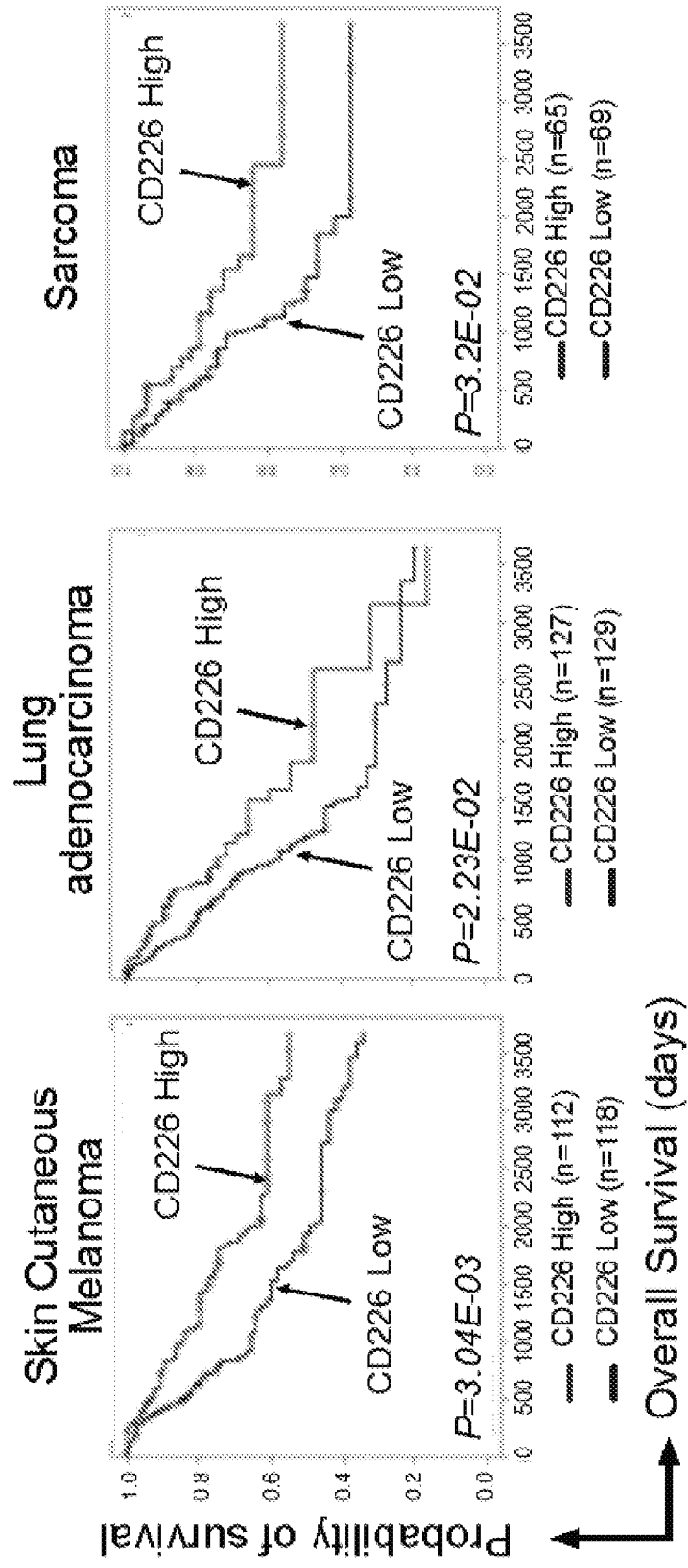


FIG. 7B

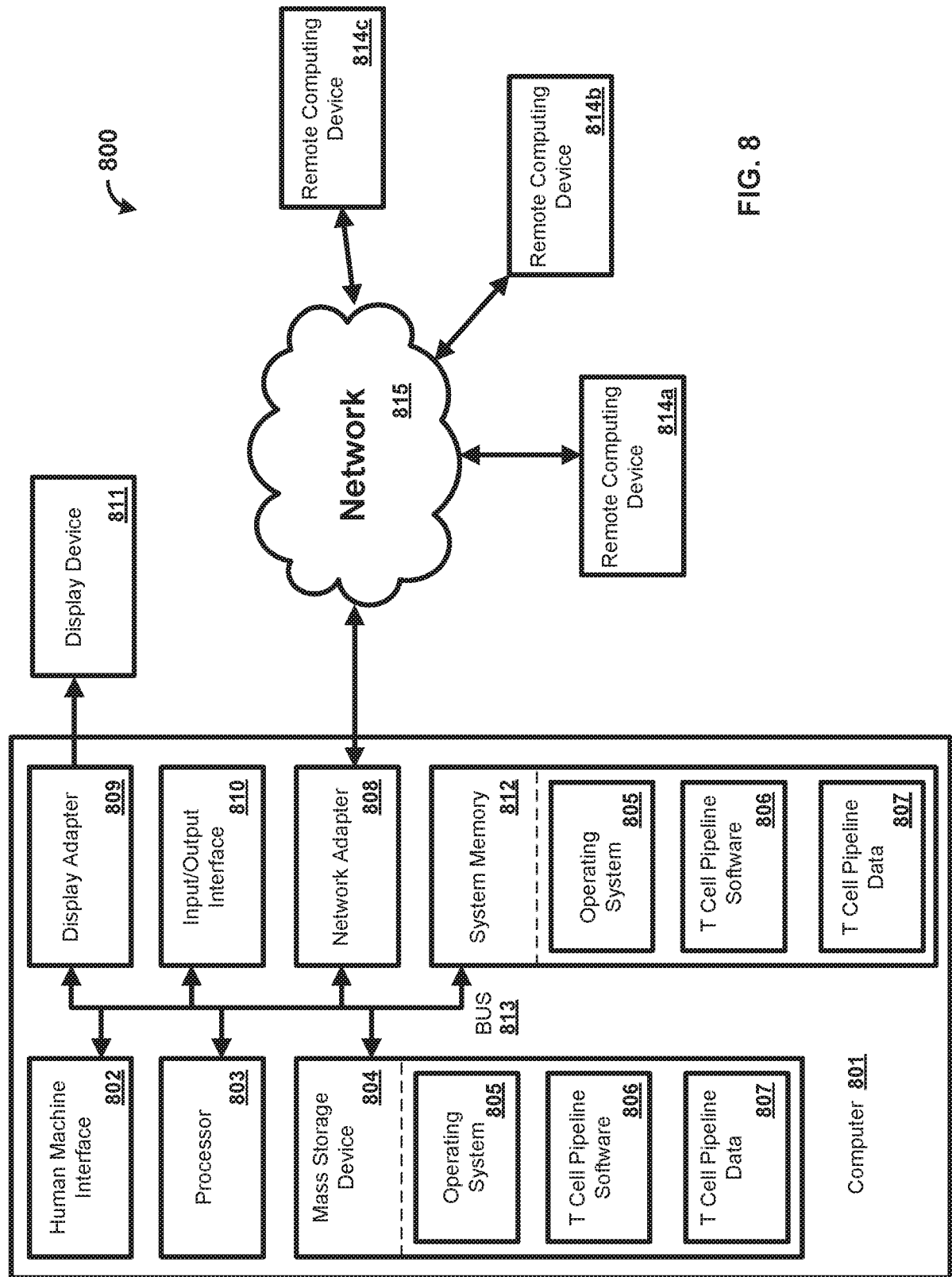
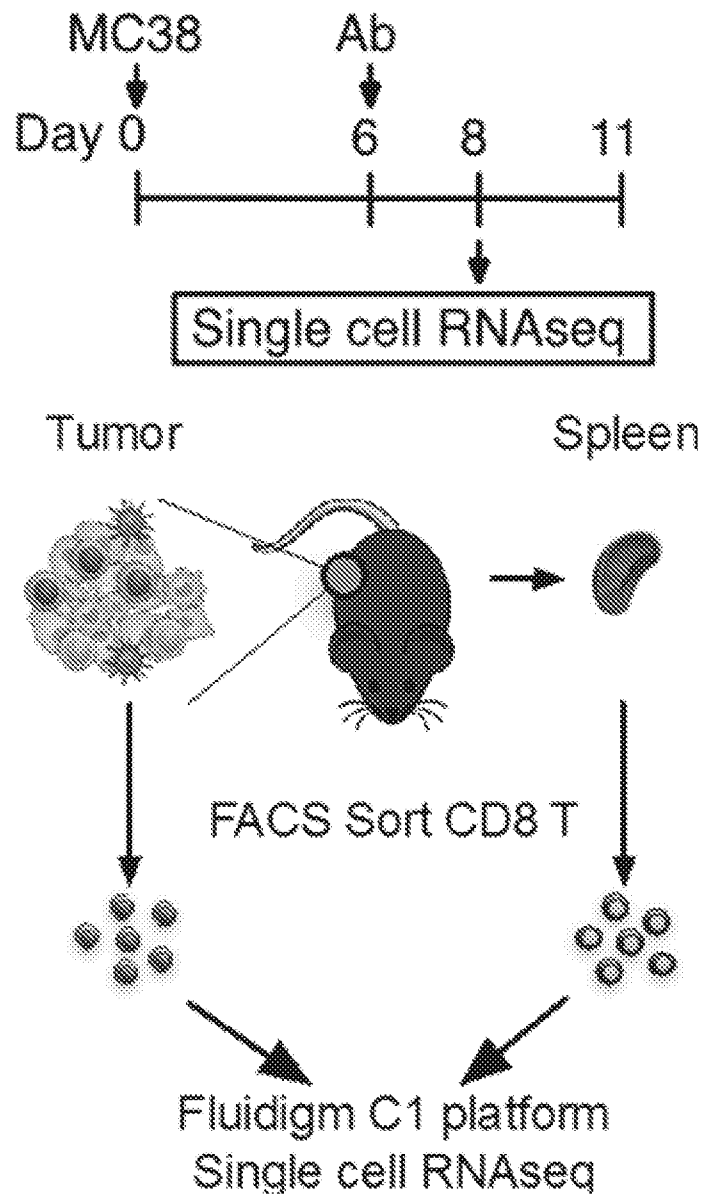


FIG. 8

FIG. 9A



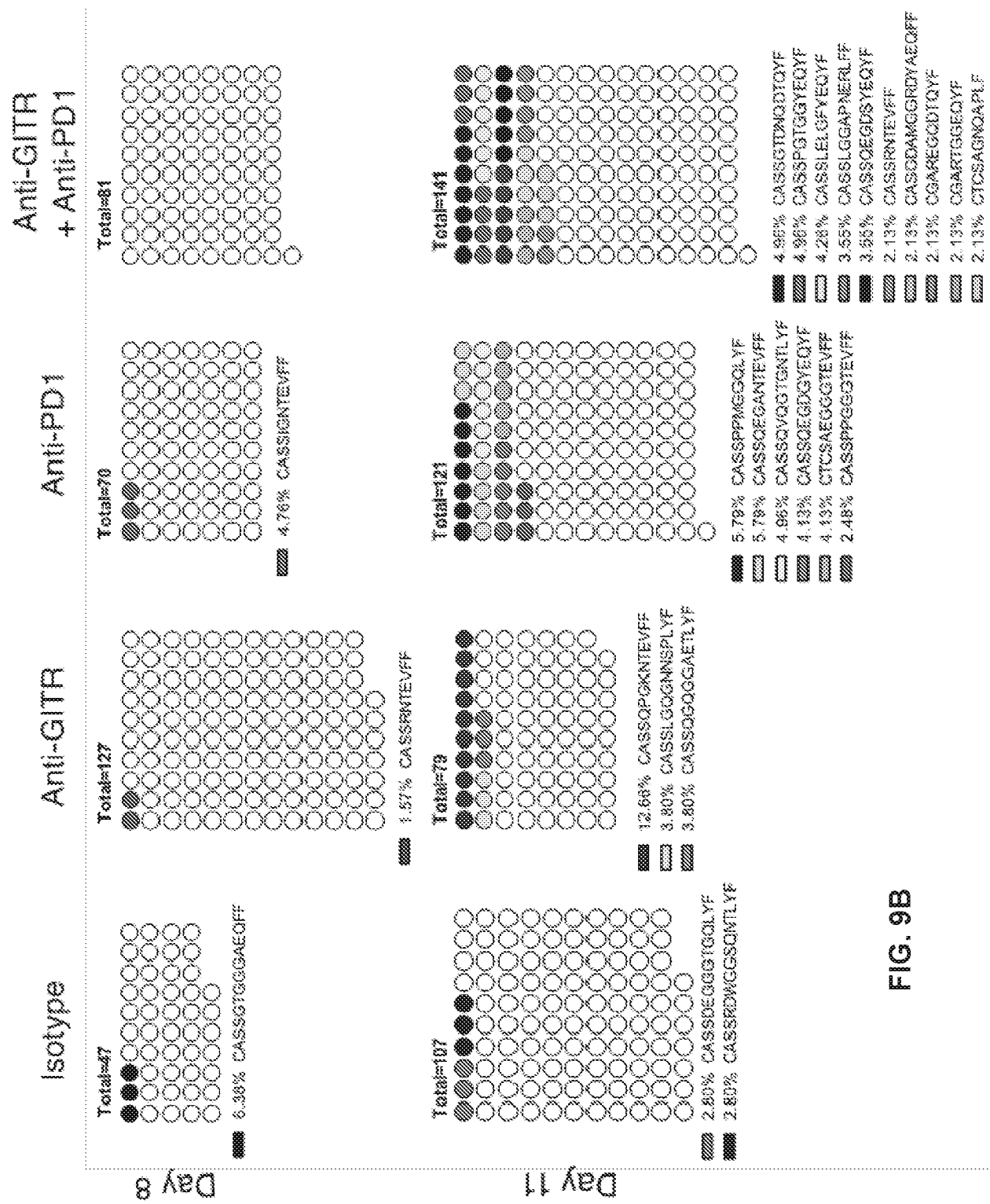


FIG. 9B

FIG. 9C

Lentiviral transduction of  
TCR pairs into  
reporter T cell line

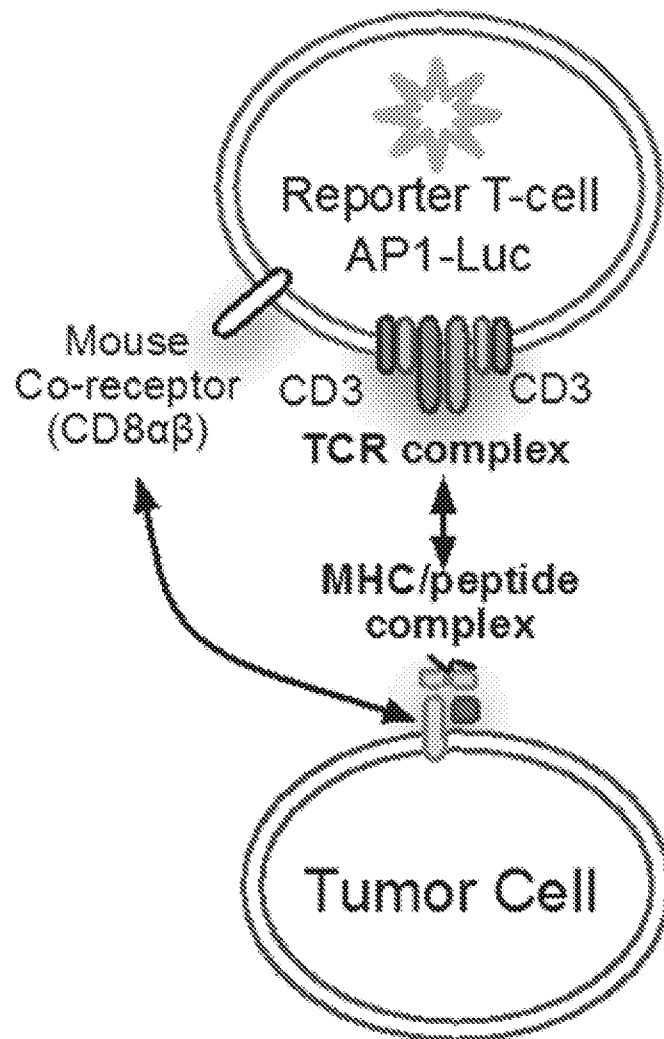


FIG. 9D

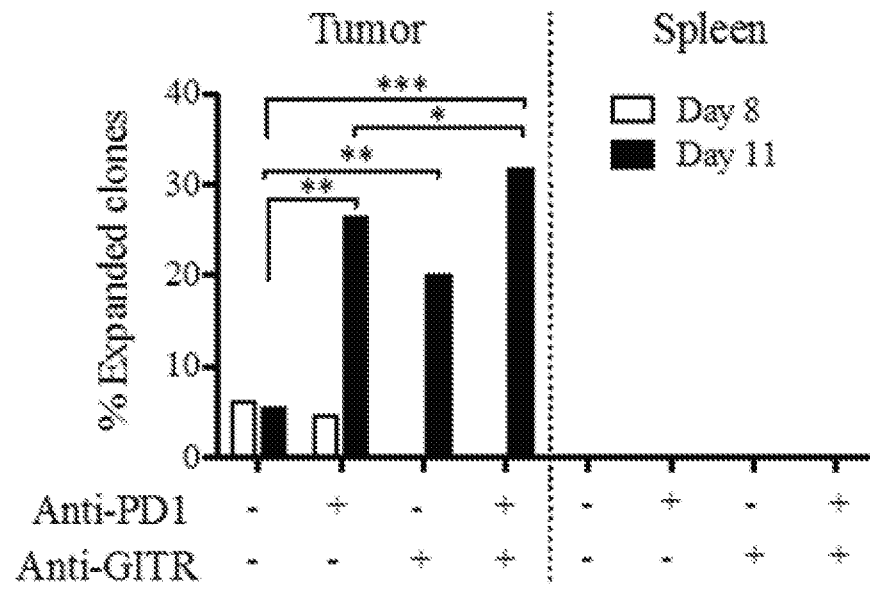
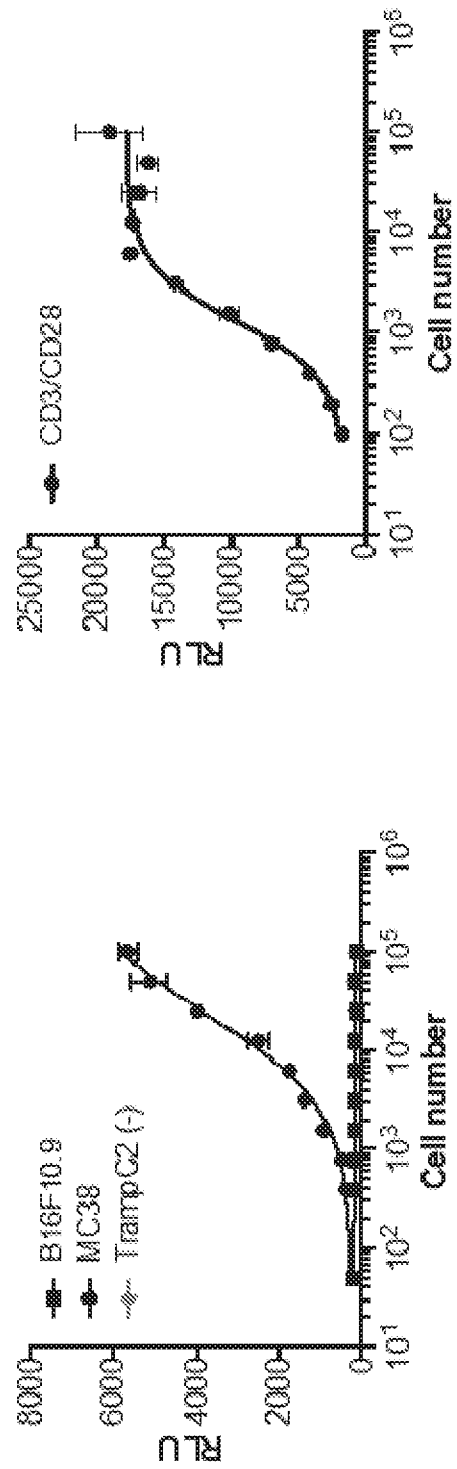


FIG. 9E



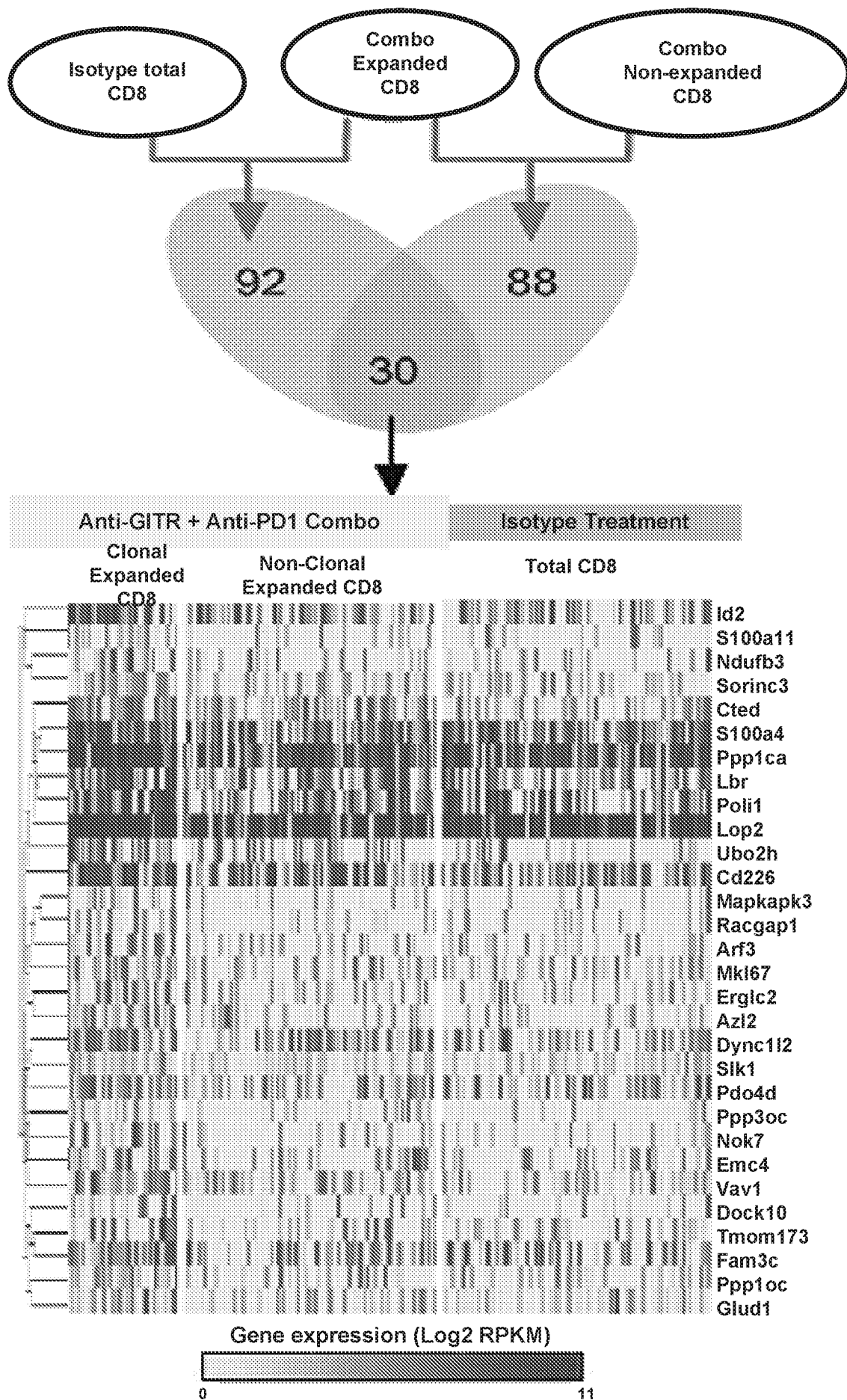
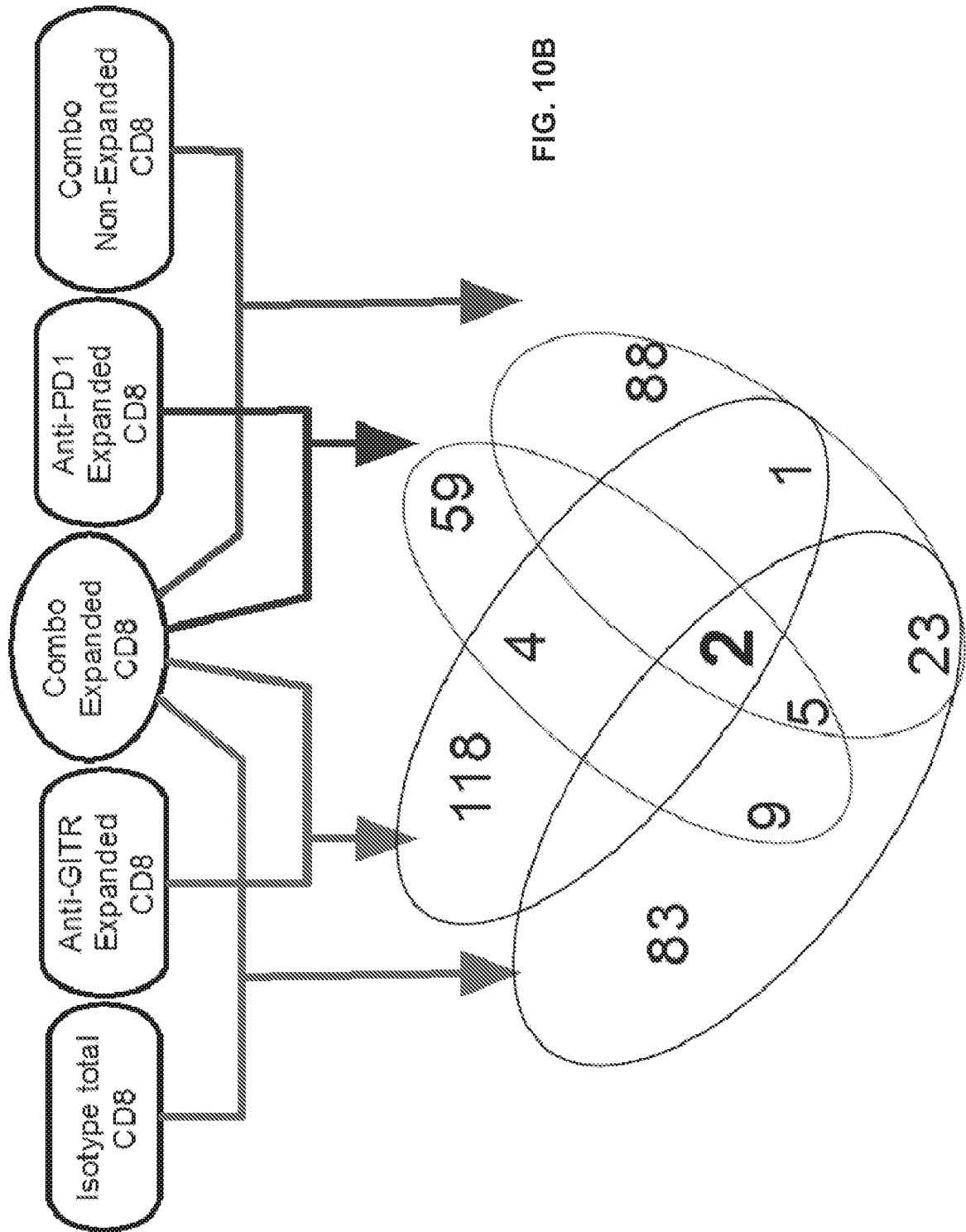


FIG. 10A



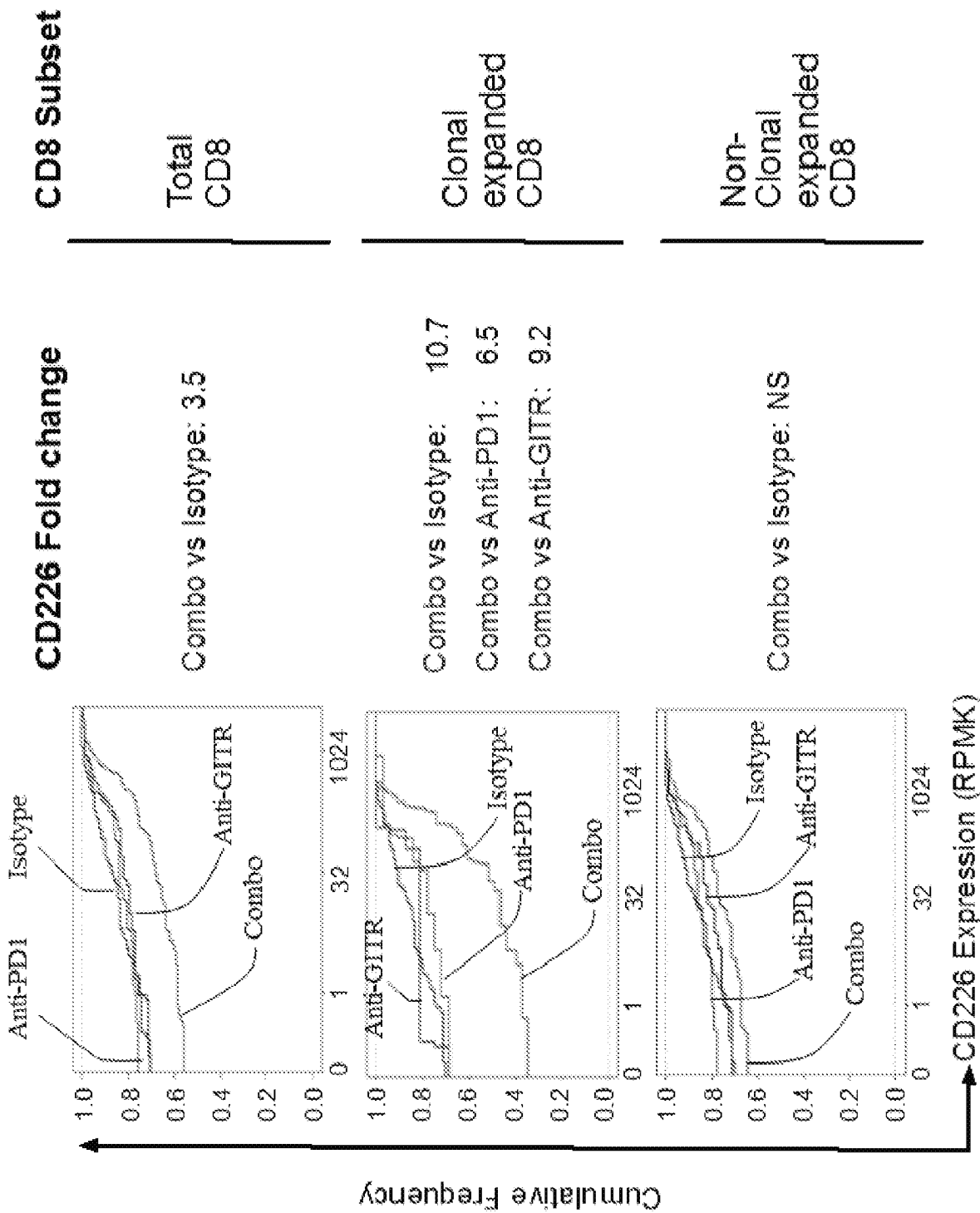


FIG. 10C

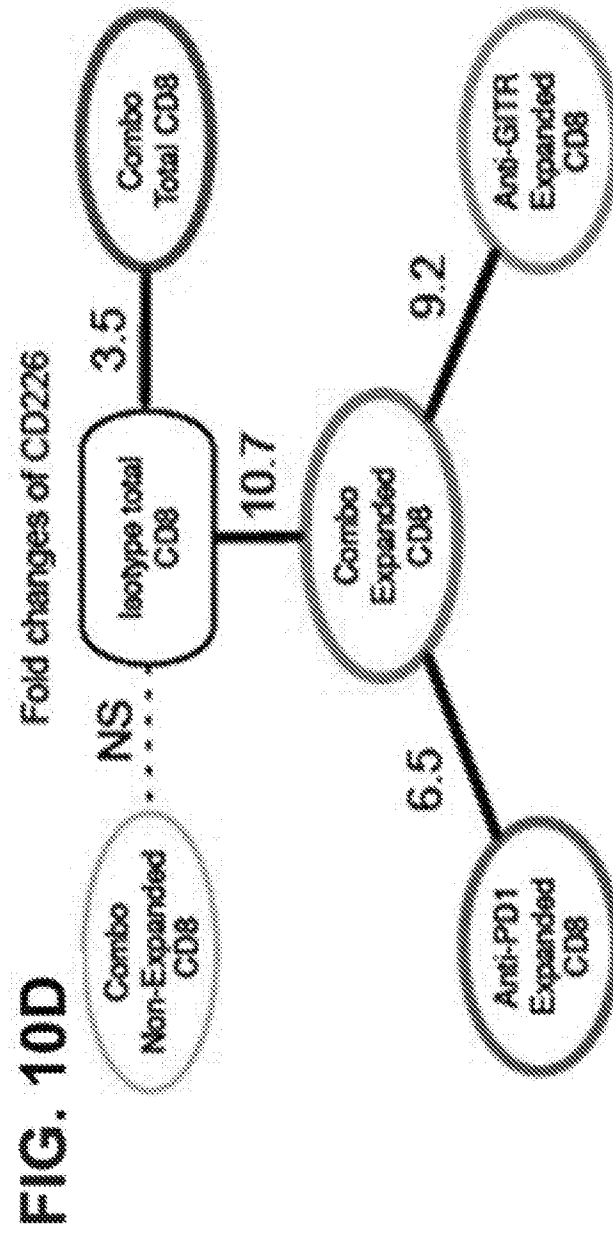


FIG. 11A

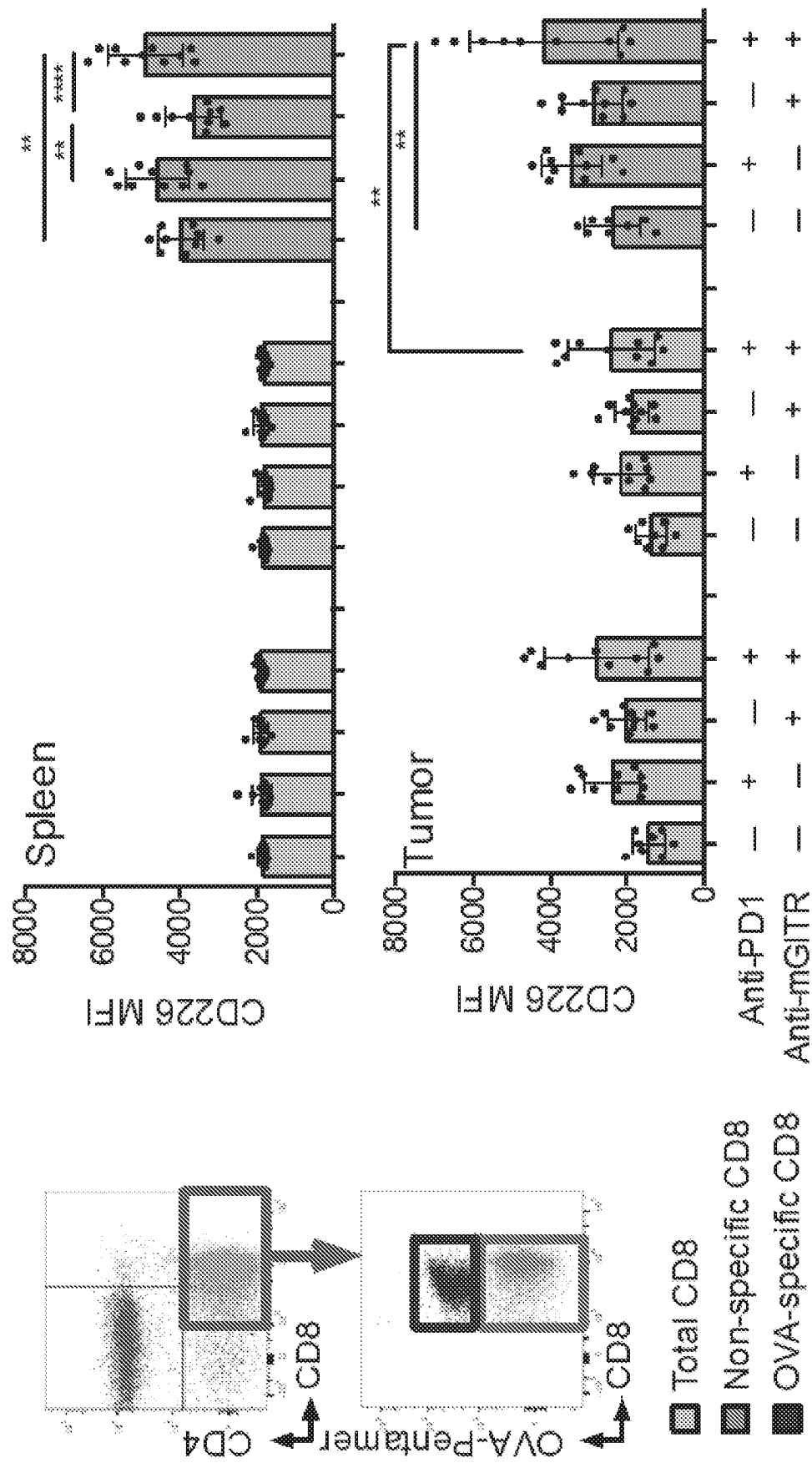


FIG. 11B

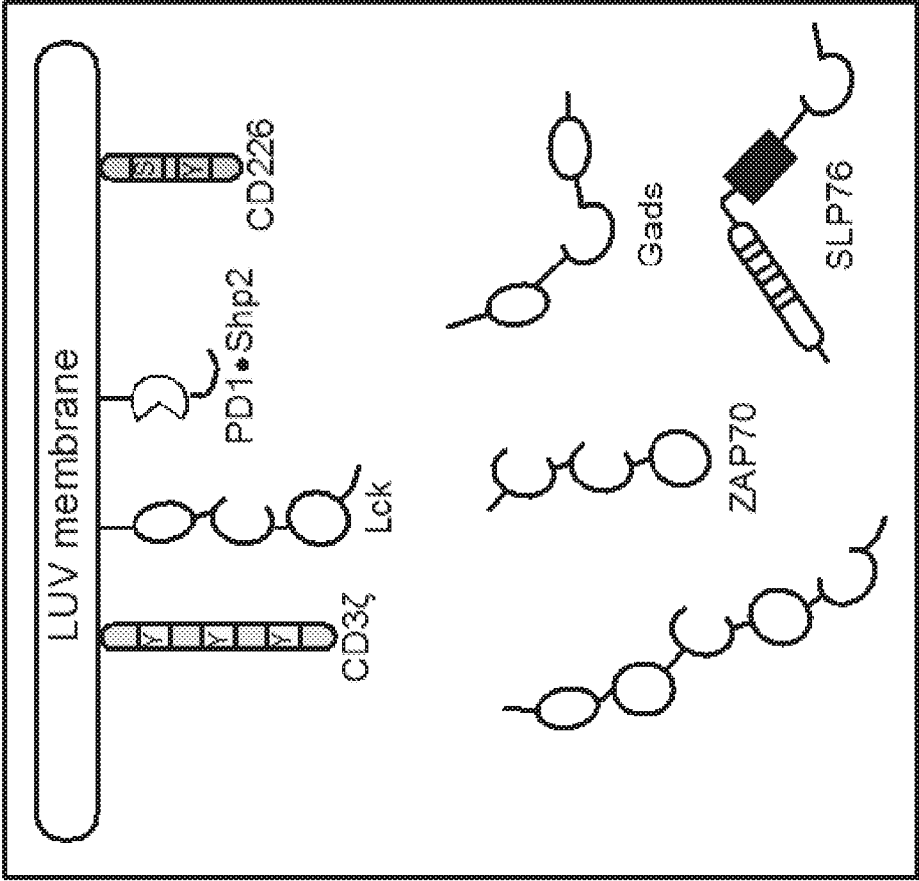
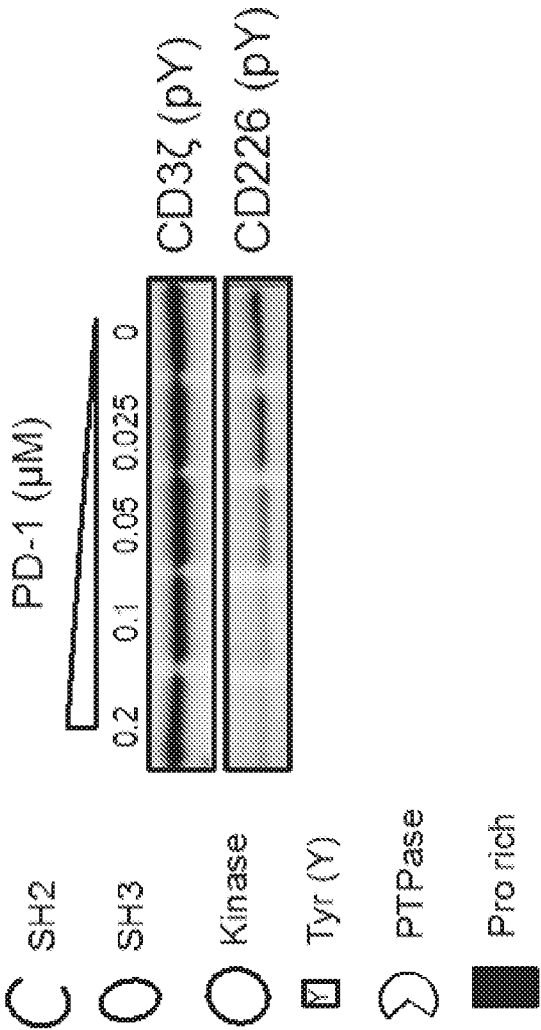
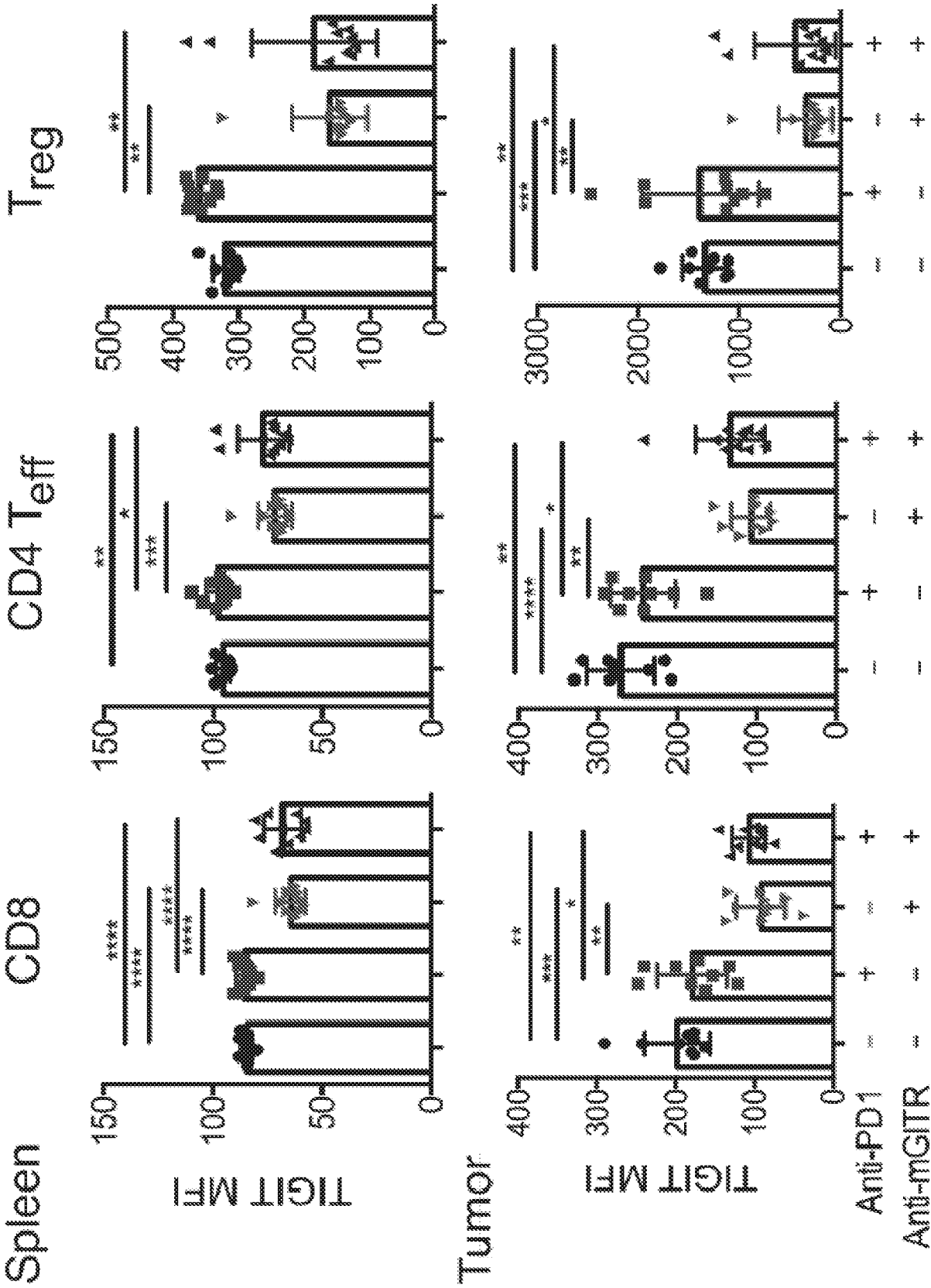


FIG. 11C





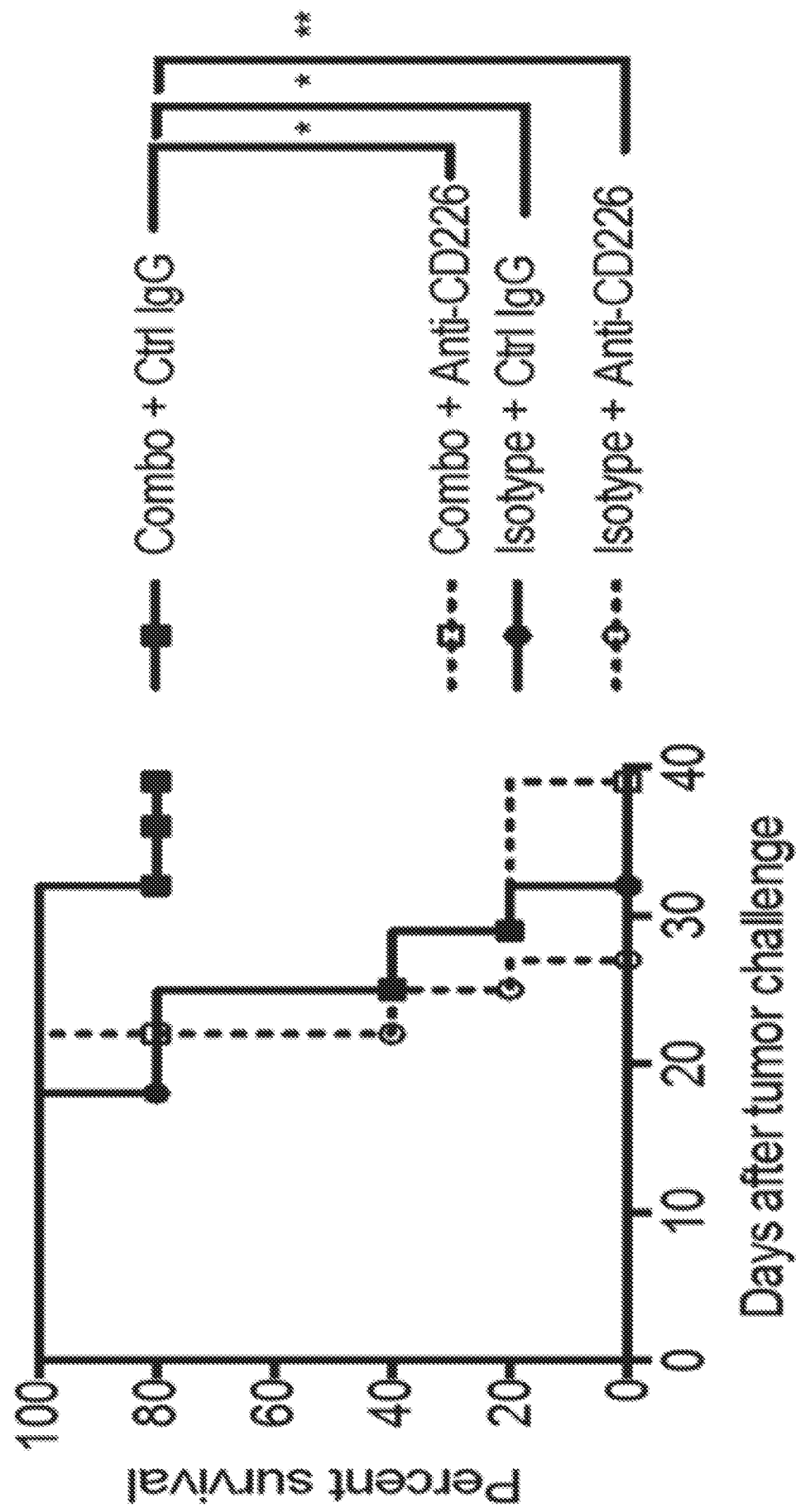


FIG. 12A

FIG. 12B

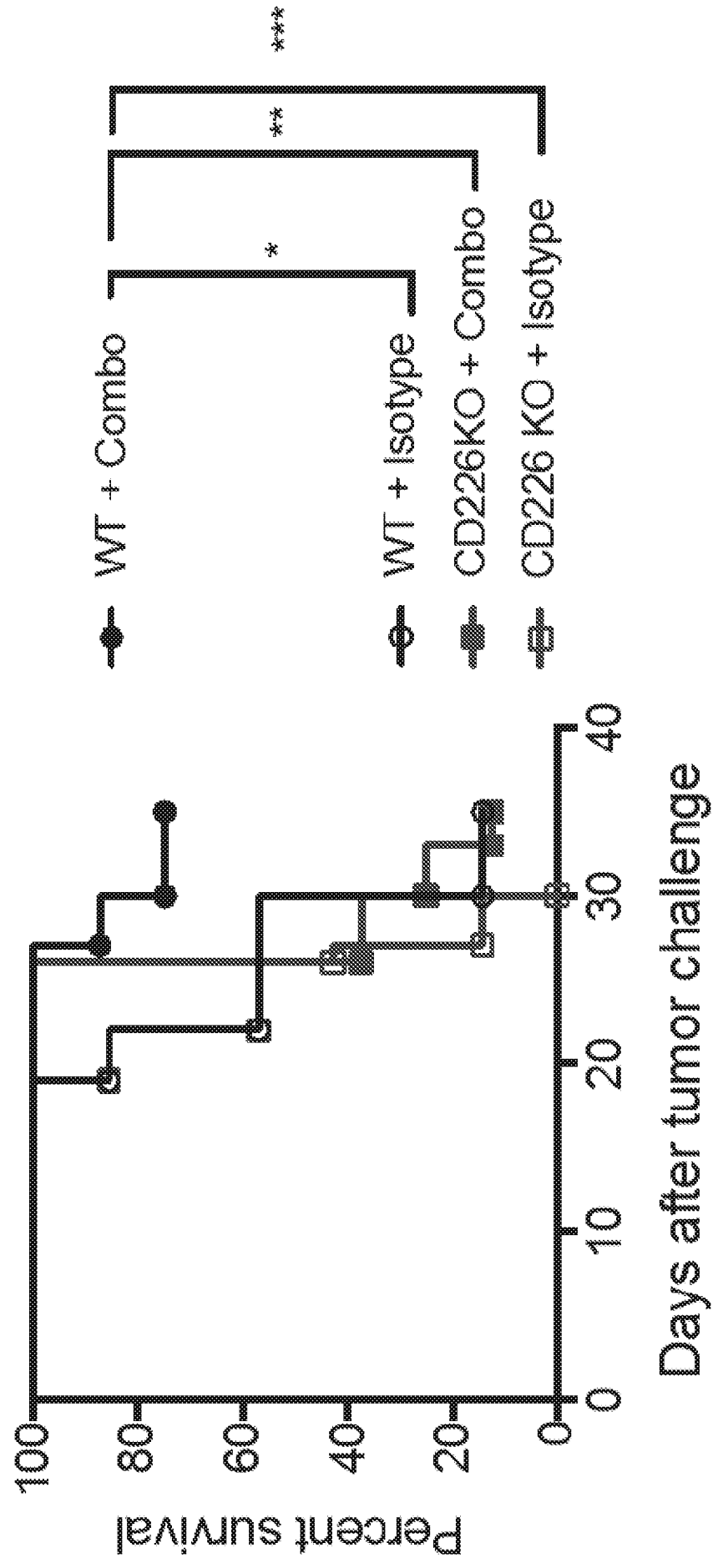


FIG. 12C

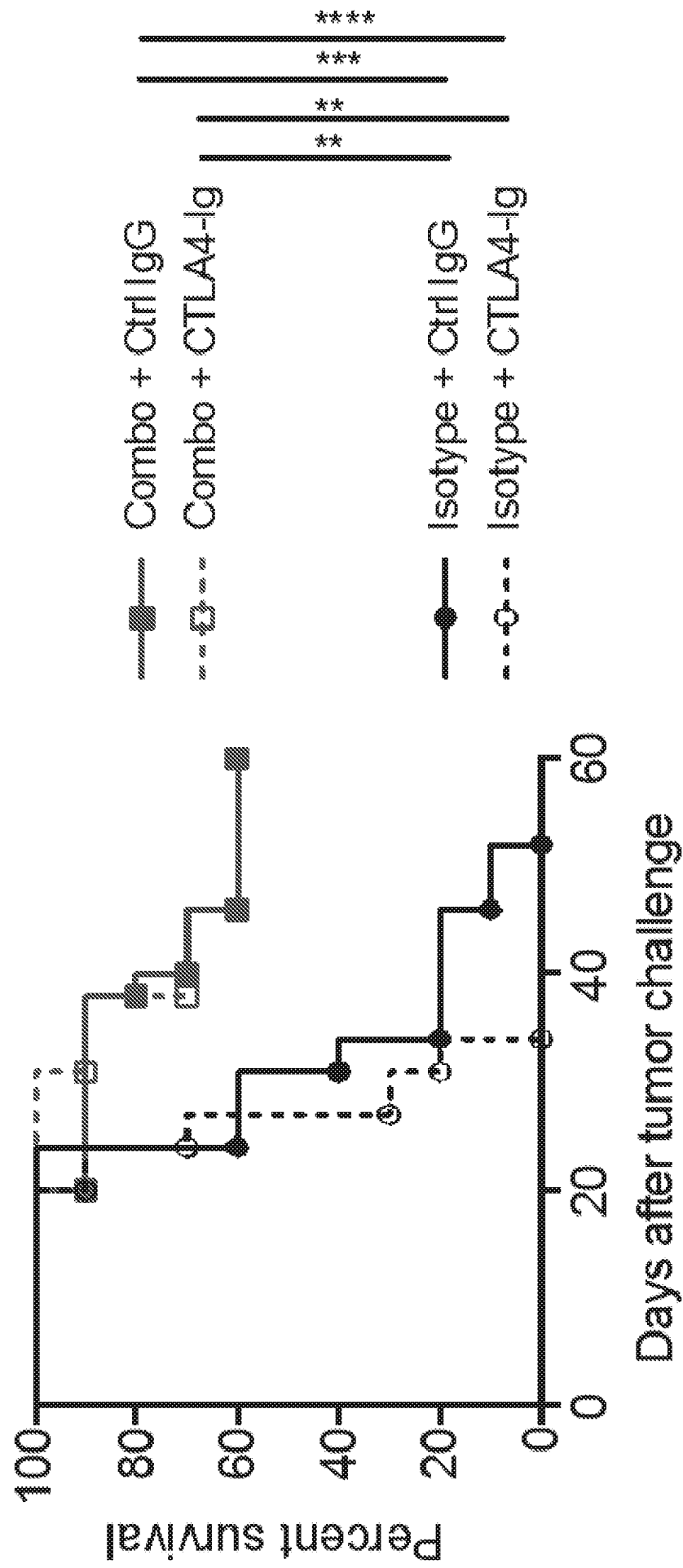


FIG. 12D

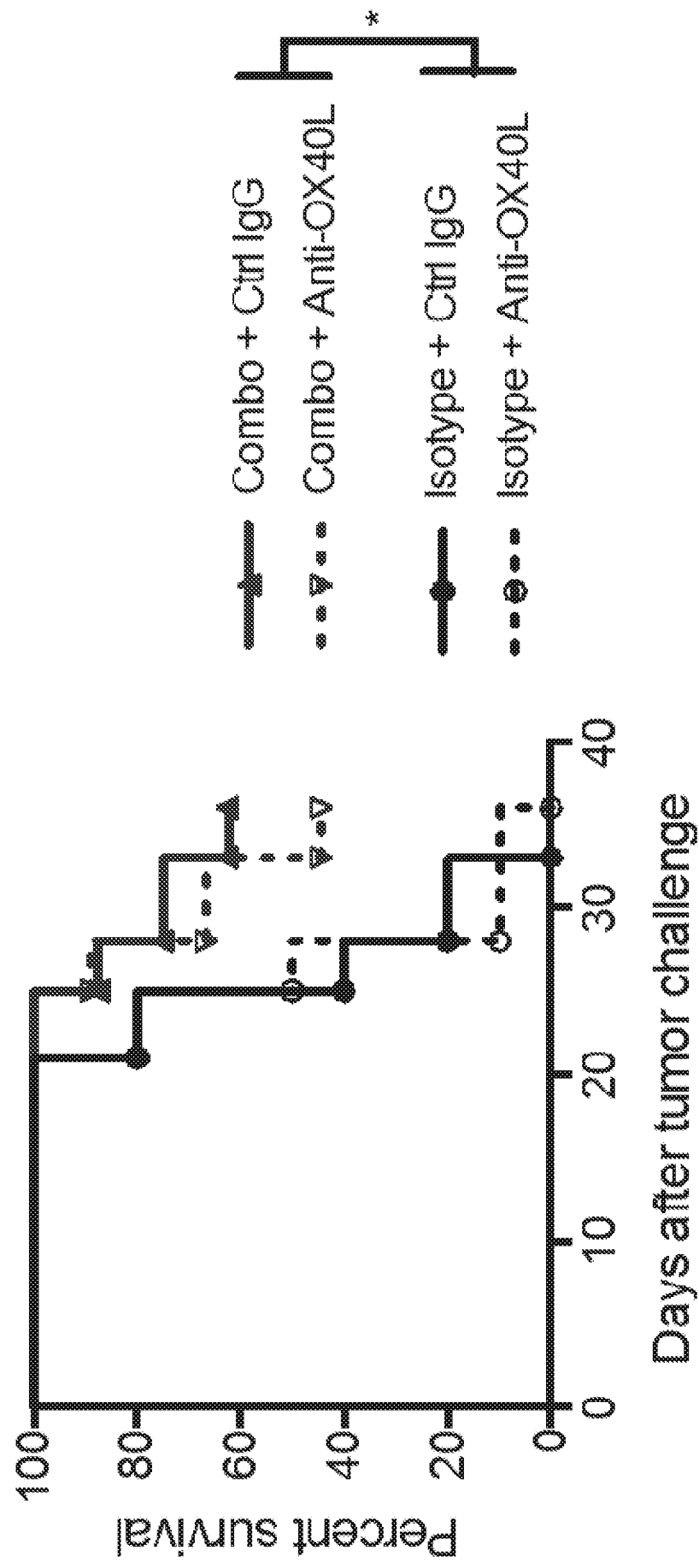


FIG. 12E

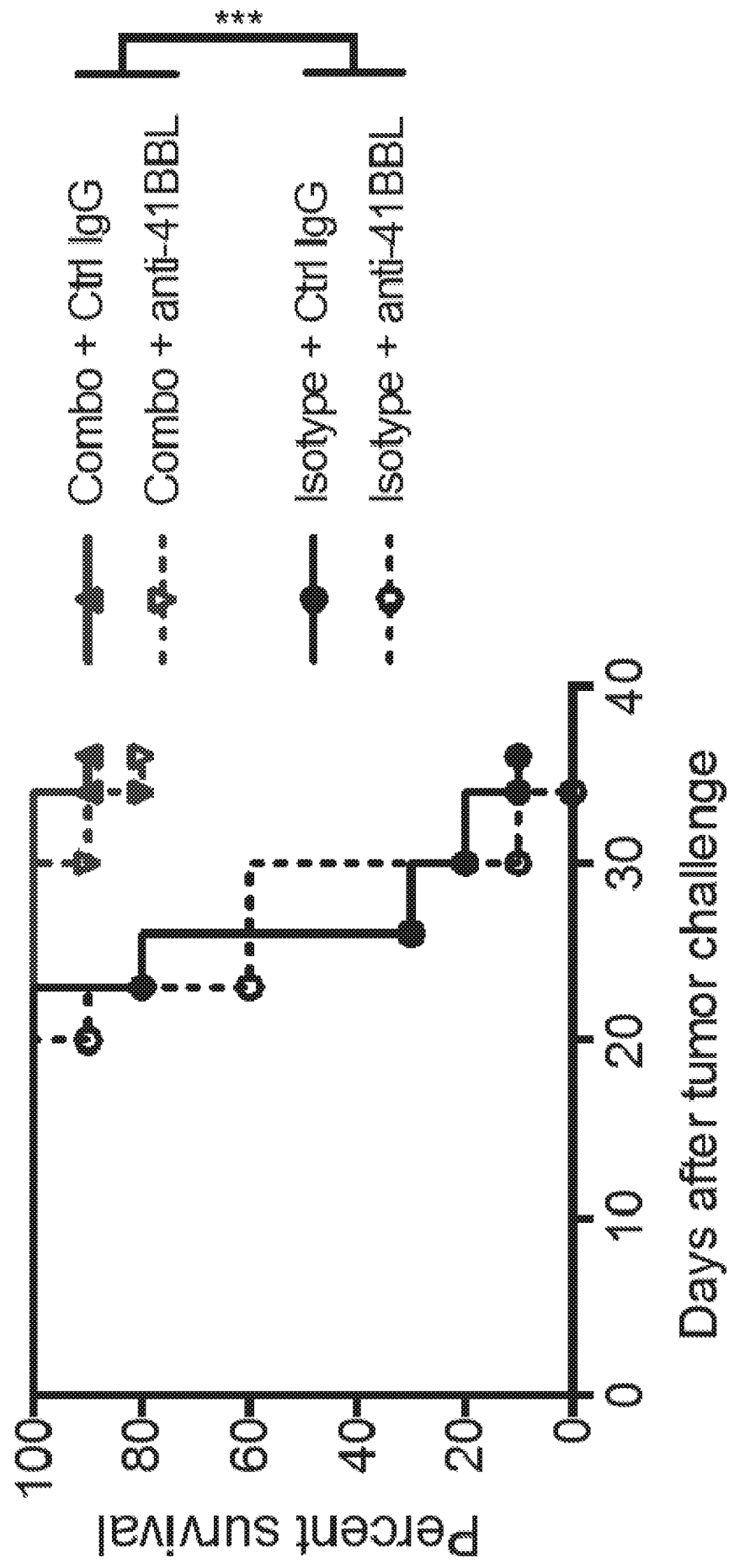


FIG. 12F

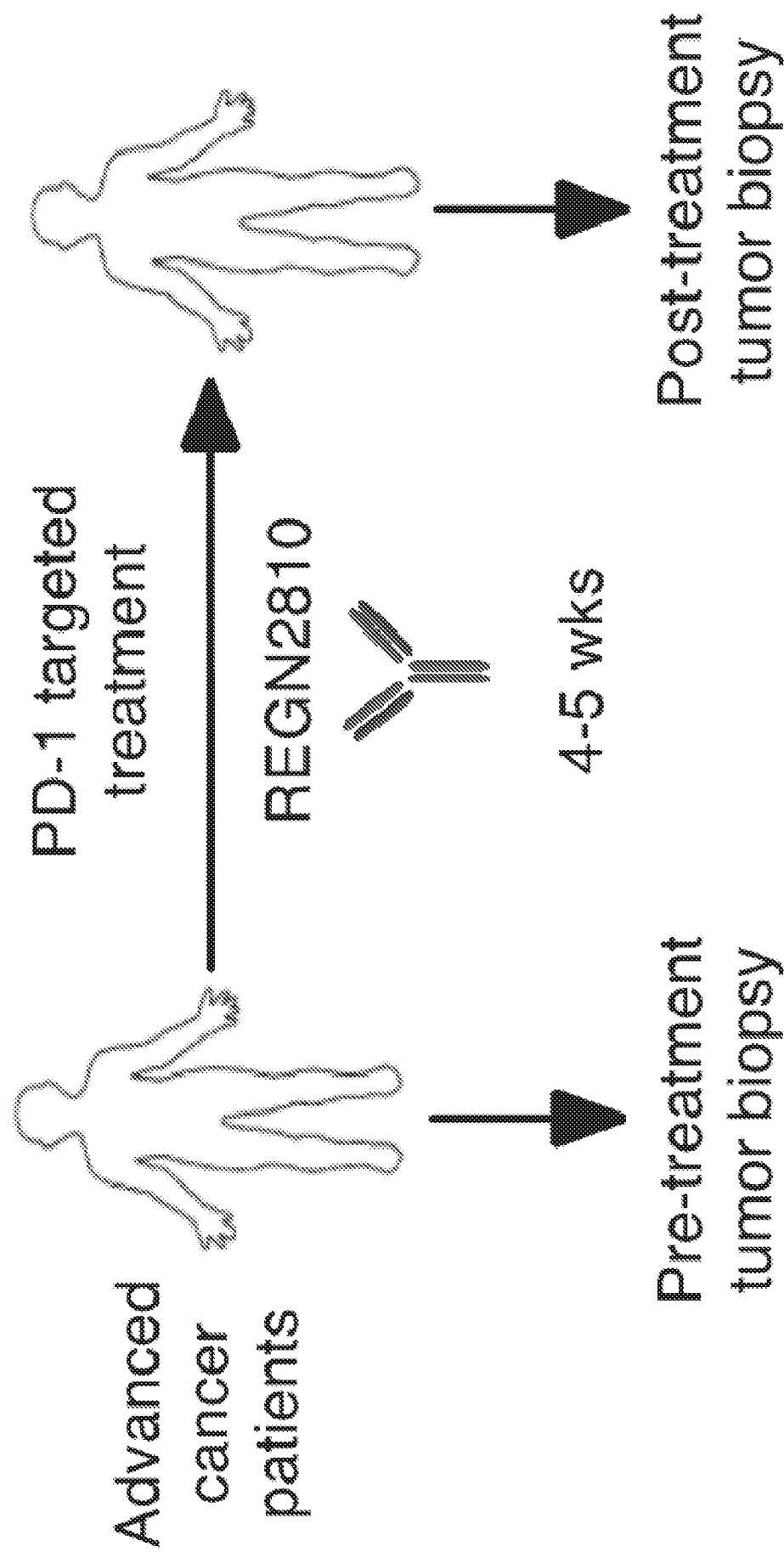


FIG. 12G

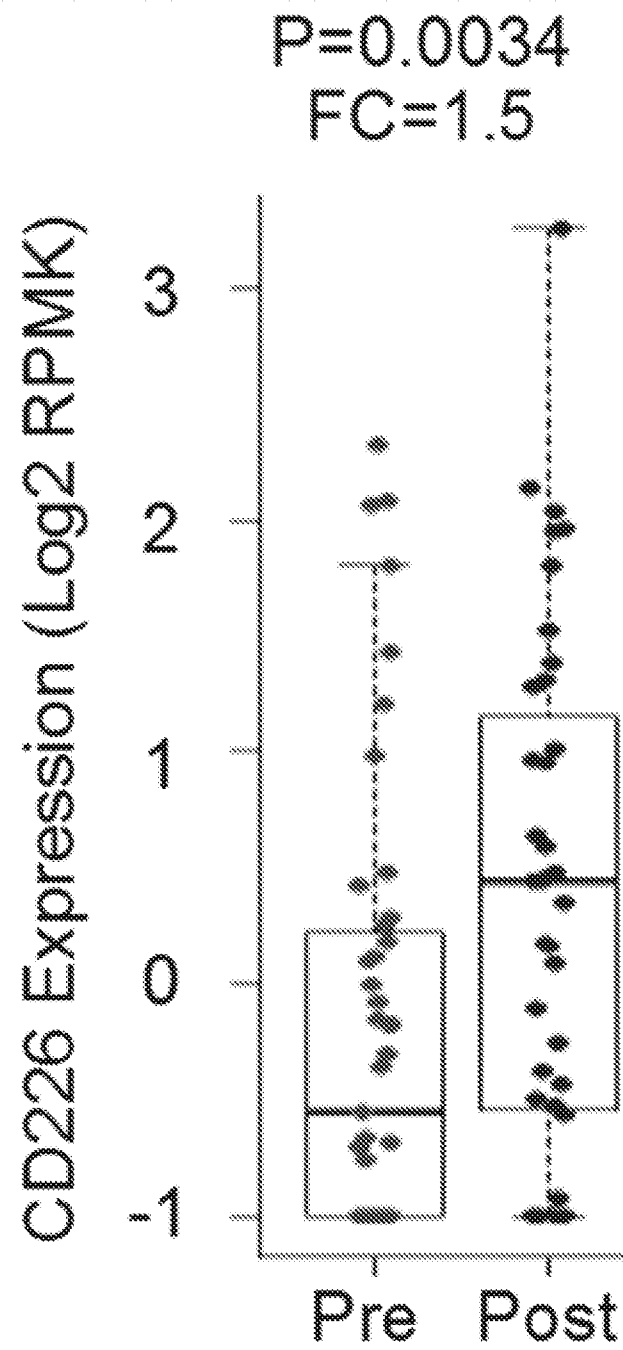


FIG. 12H

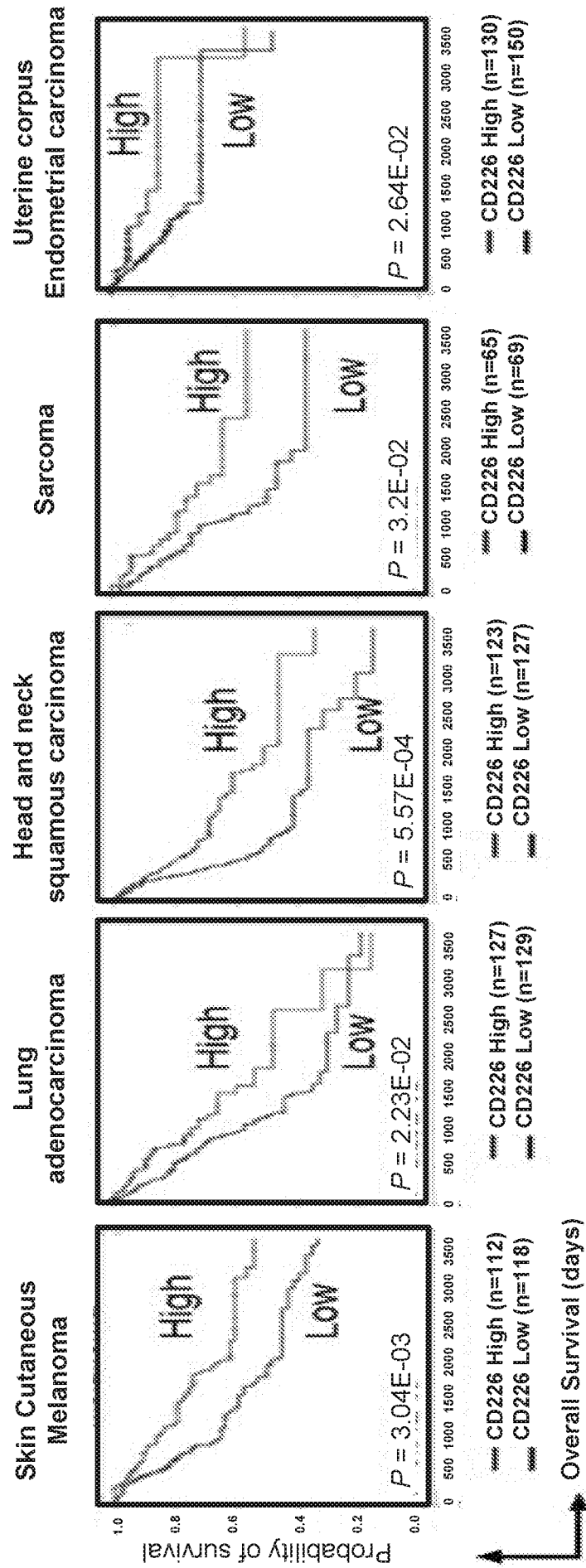


FIG. 13

| Sample ID   | Description                 | Species | Sample type      | MiTCR | TCRklass | rpsTCR | Input reads<br>(passed QC>=25) |
|-------------|-----------------------------|---------|------------------|-------|----------|--------|--------------------------------|
| Renca       | kidney tumor cell line      | mouse   | negative control | 23    | 0        | 0      | 44,906,248                     |
| B16F1       | melanoma tumor cell line    | mouse   | negative control | 76    | 0        | 0      | 39,305,839                     |
| Colon26     | Colon tumor cell line       | mouse   | negative control | 22    | 1        | 0      | 39,233,756                     |
| MC38        | colon tumor cell line       | mouse   | negative control | 99    | 1        | 0      | 48,661,267                     |
| T-ALL_neg1  | Spleen from Rag1/2 KO mouse | mouse   | negative control | 17    | 1        | 0      | 39,068,155                     |
| T-ALL_neg2  | Spleen from Rag1/2 KO mouse | mouse   | negative control | 51    | 0        | 0      | 39,469,692                     |
| NeuProgCell | Neural progenitor cell line | human   | negative control | 123   | 0        | 0      | 37,684,399                     |
| LHCN-M2     | Skeletal myoblast cell line | human   | negative control | 77    | 0        | 0      | 36,639,557                     |

FIG. 14

| TCR type   | Total | CDR3 detected<br>by our pipeline | Detection rate of<br>our pipeline | Detection rate reported<br>by Han A. et al. |
|------------|-------|----------------------------------|-----------------------------------|---------------------------------------------|
| TRB-CDR3   | 1,379 | 1,186                            | 86.0%                             | 92%                                         |
| TRA-CDR3   | 1,379 | 1,078                            | 78.2%                             | 87%                                         |
| TRA&B-CDR3 | 1,379 | 1,009                            | 73.1%                             | 82%                                         |

FIG. 15

| Treatment            | Pathway                                                  | p Value  |
|----------------------|----------------------------------------------------------|----------|
| Anti-PD1 + Anti-GITR | Adaptive immune response                                 | 1.50E-08 |
|                      | Cell cycle                                               | 5.80E-07 |
|                      | Metabolism of lipids and lipoproteins                    | 3.00E-04 |
| Anti-PD1             | Lymphocyte activation                                    | 2.30E-05 |
|                      | Gene targets for miR-124u (T cell activation)            | 1.80E-05 |
|                      | Jak-STAT signaling pathway                               | 3.00E-04 |
| Anti-GITR            | Glucose metabolism                                       | 8.20E-10 |
|                      | Protein metabolism                                       | 7.50E-08 |
|                      | The citric acid cycle and respiratory electron transport | 3.90E-06 |

FIG. 16A

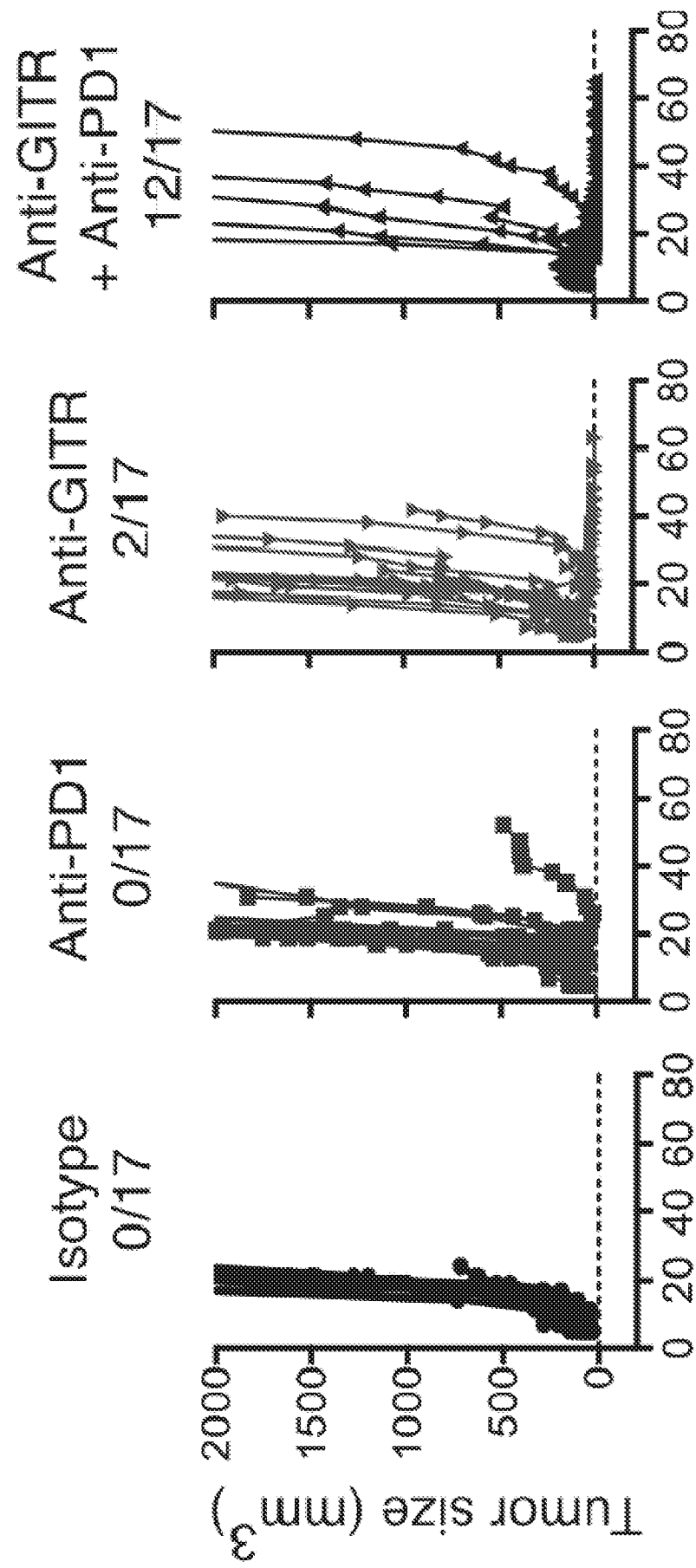
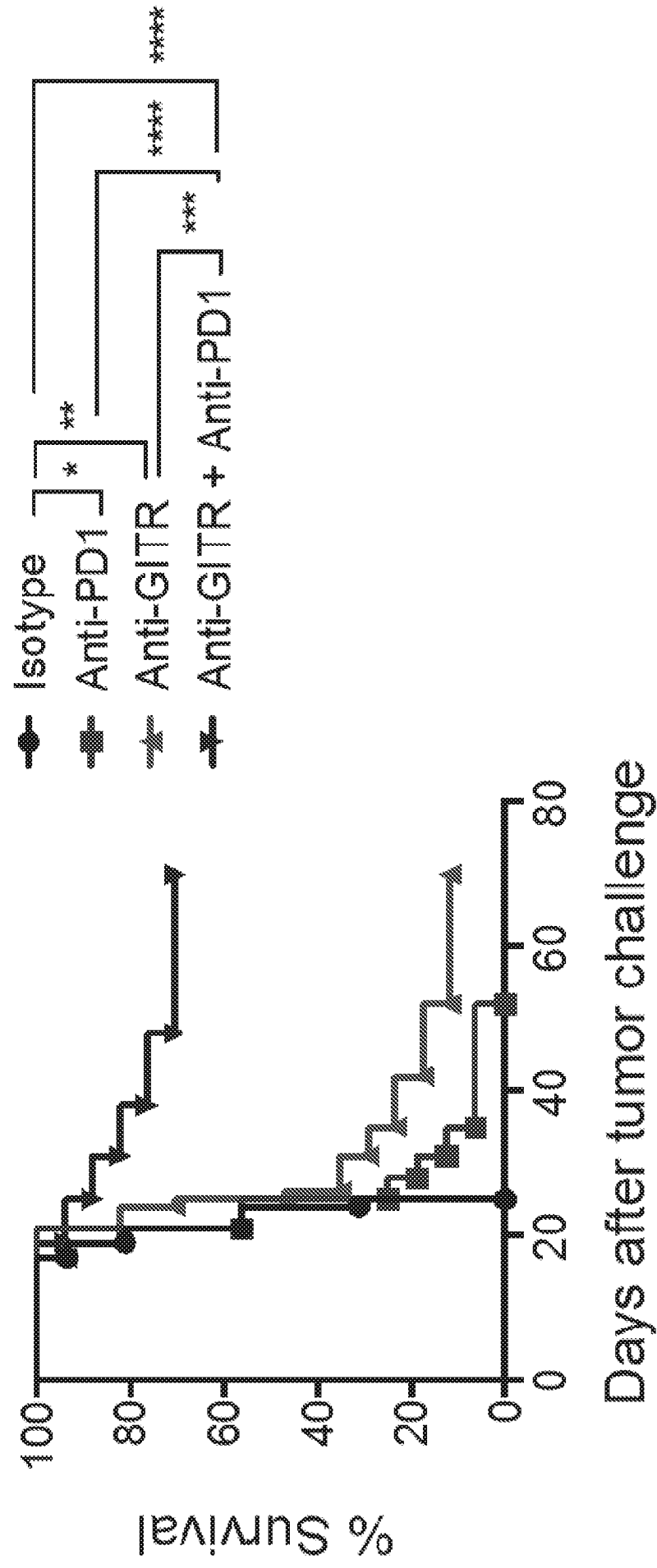


FIG. 16B



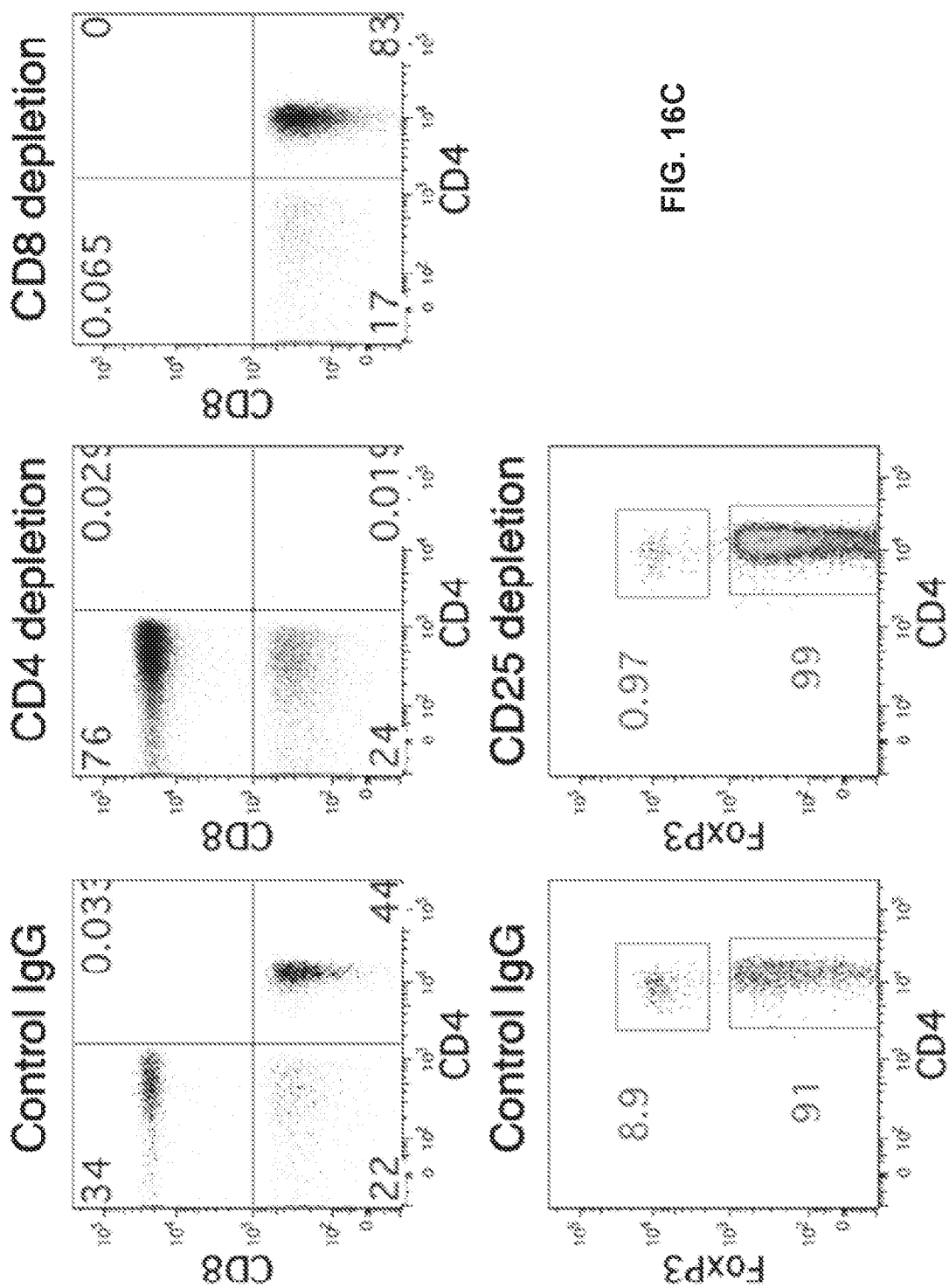


FIG. 16C

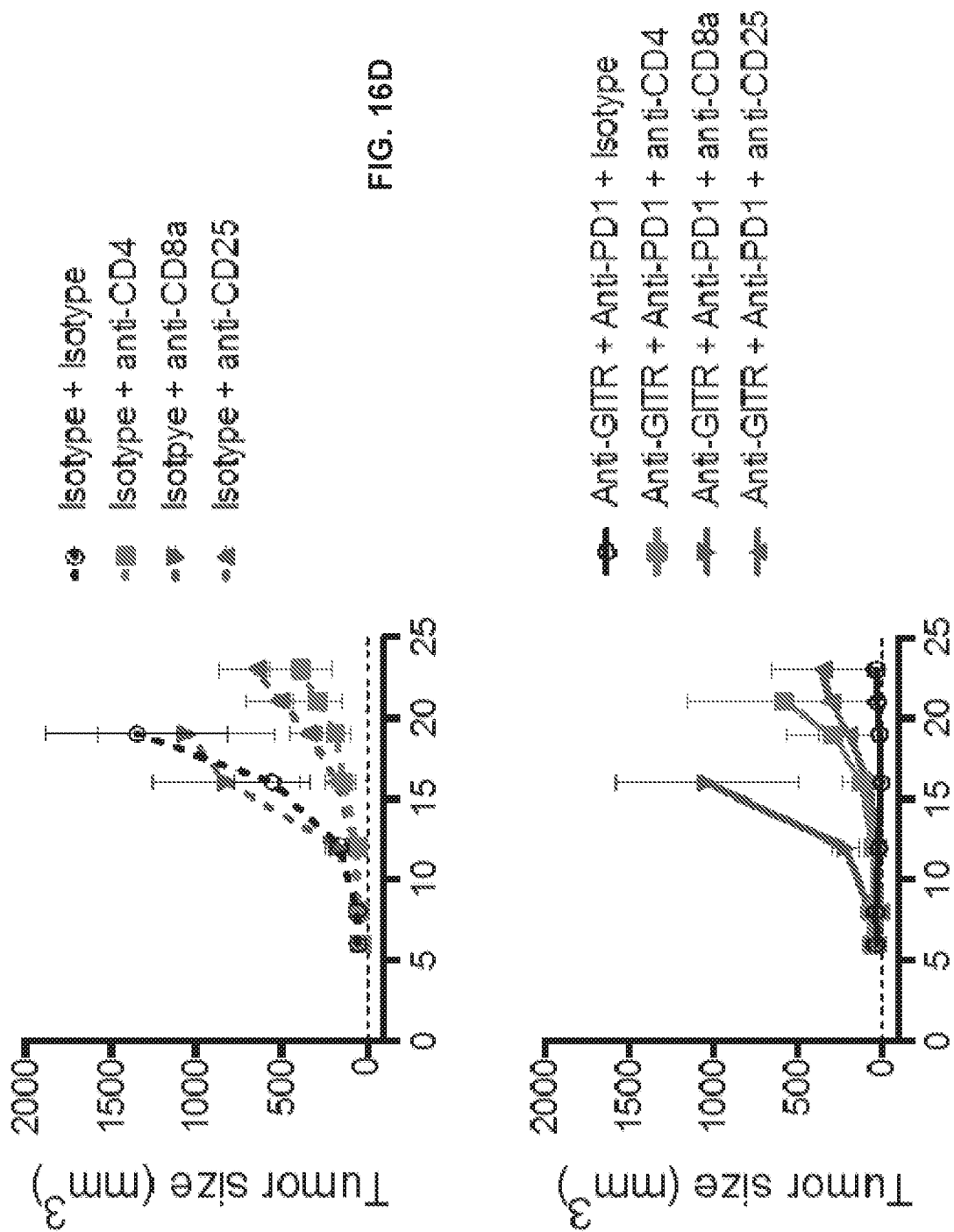


FIG. 16E

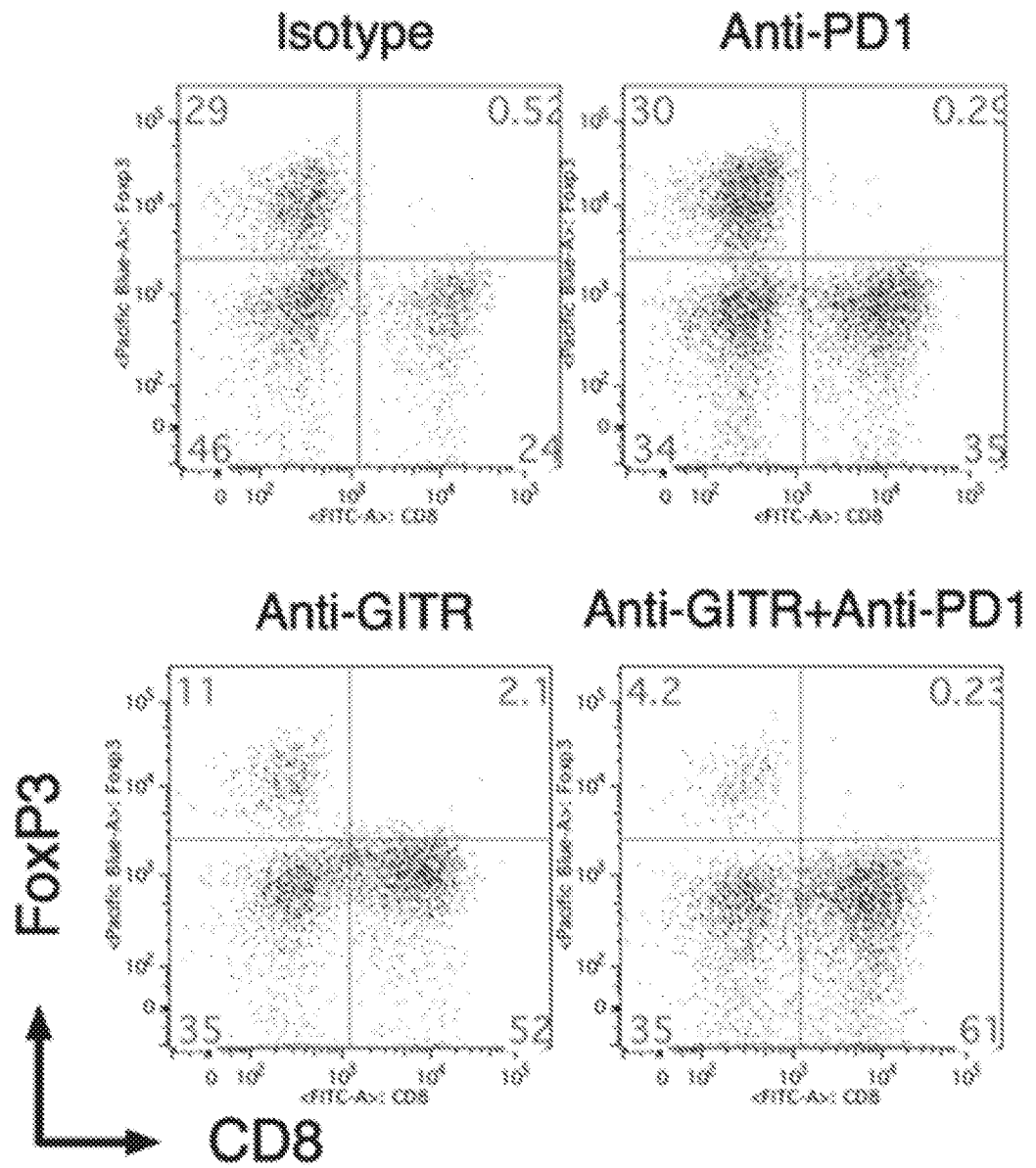


FIG. 16F

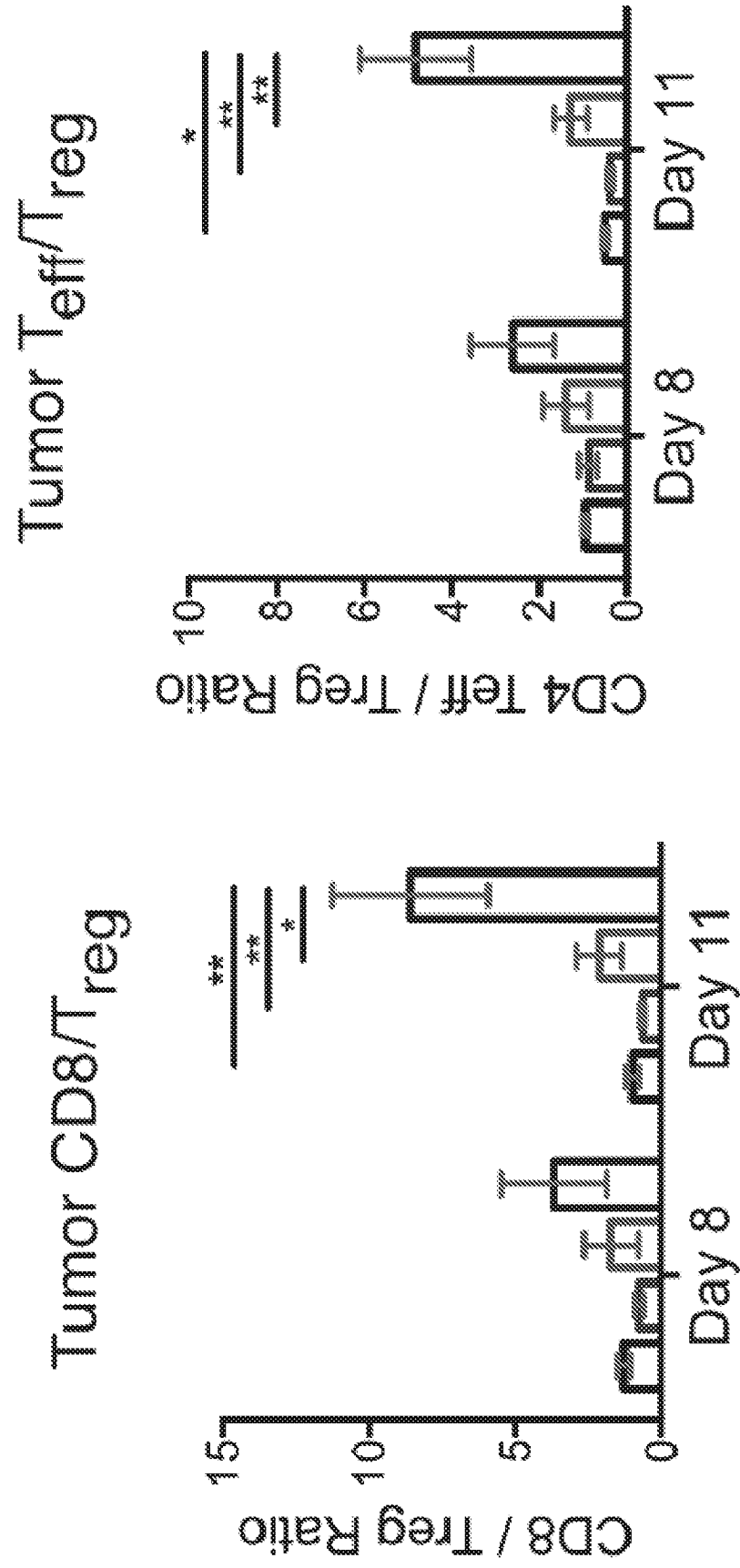


FIG. 16G

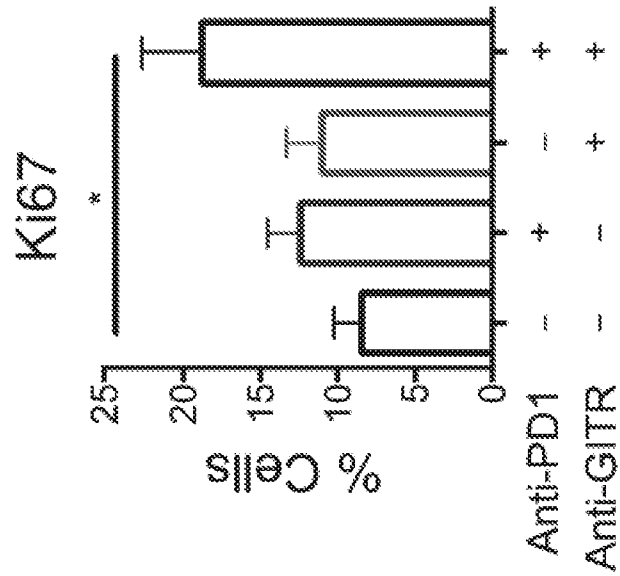


FIG. 16H

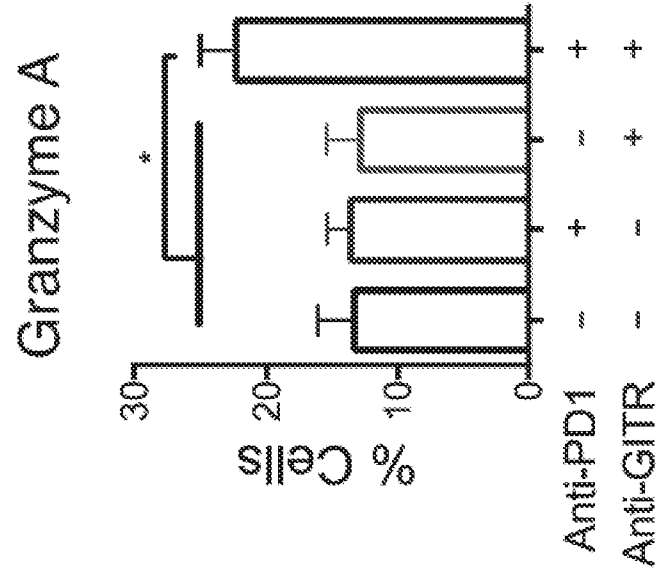


FIG. 16I

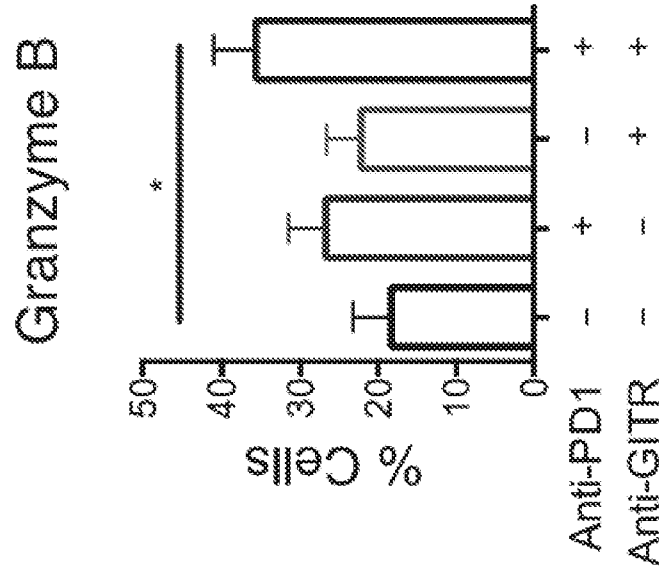


FIG. 16J

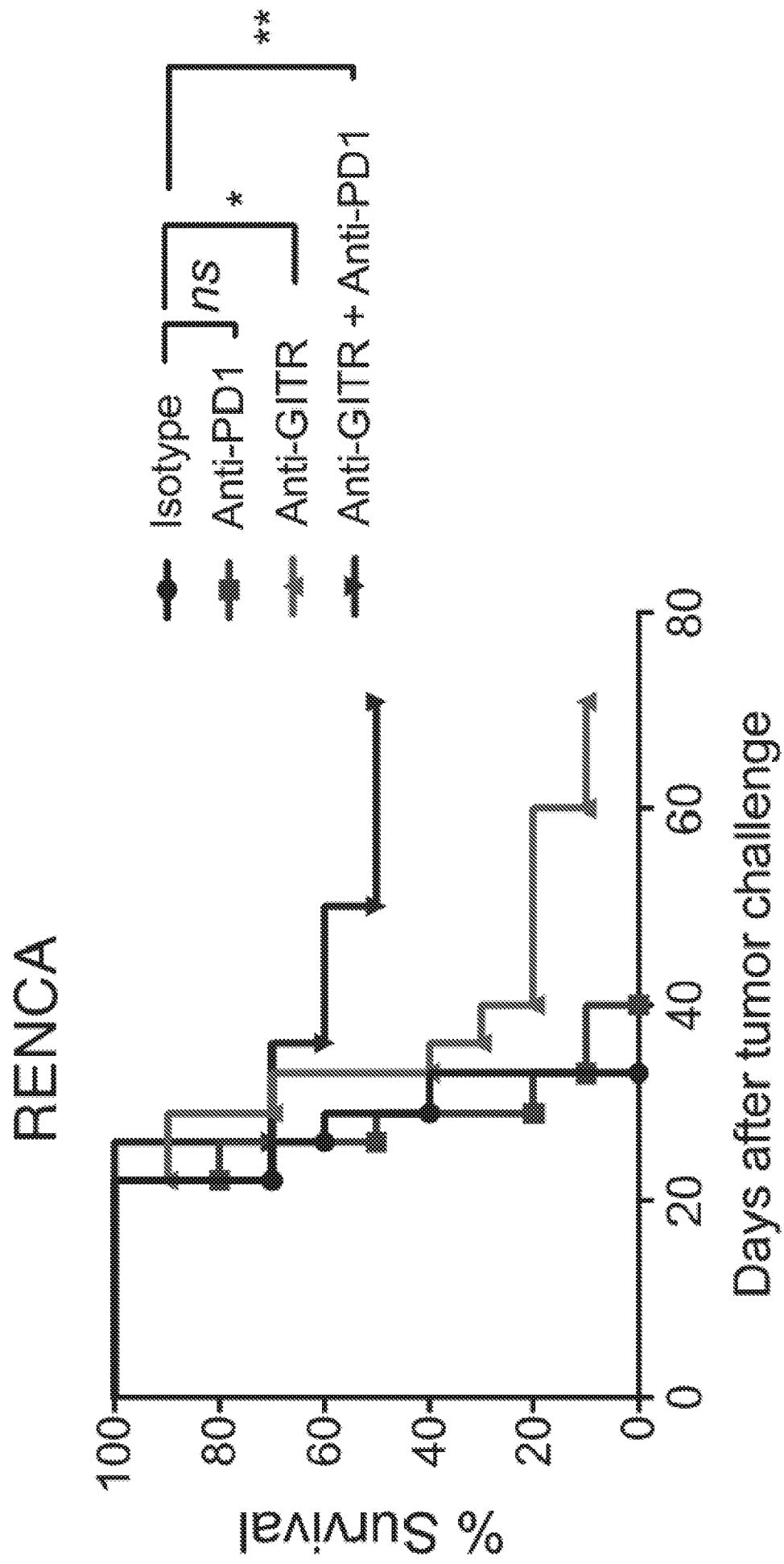
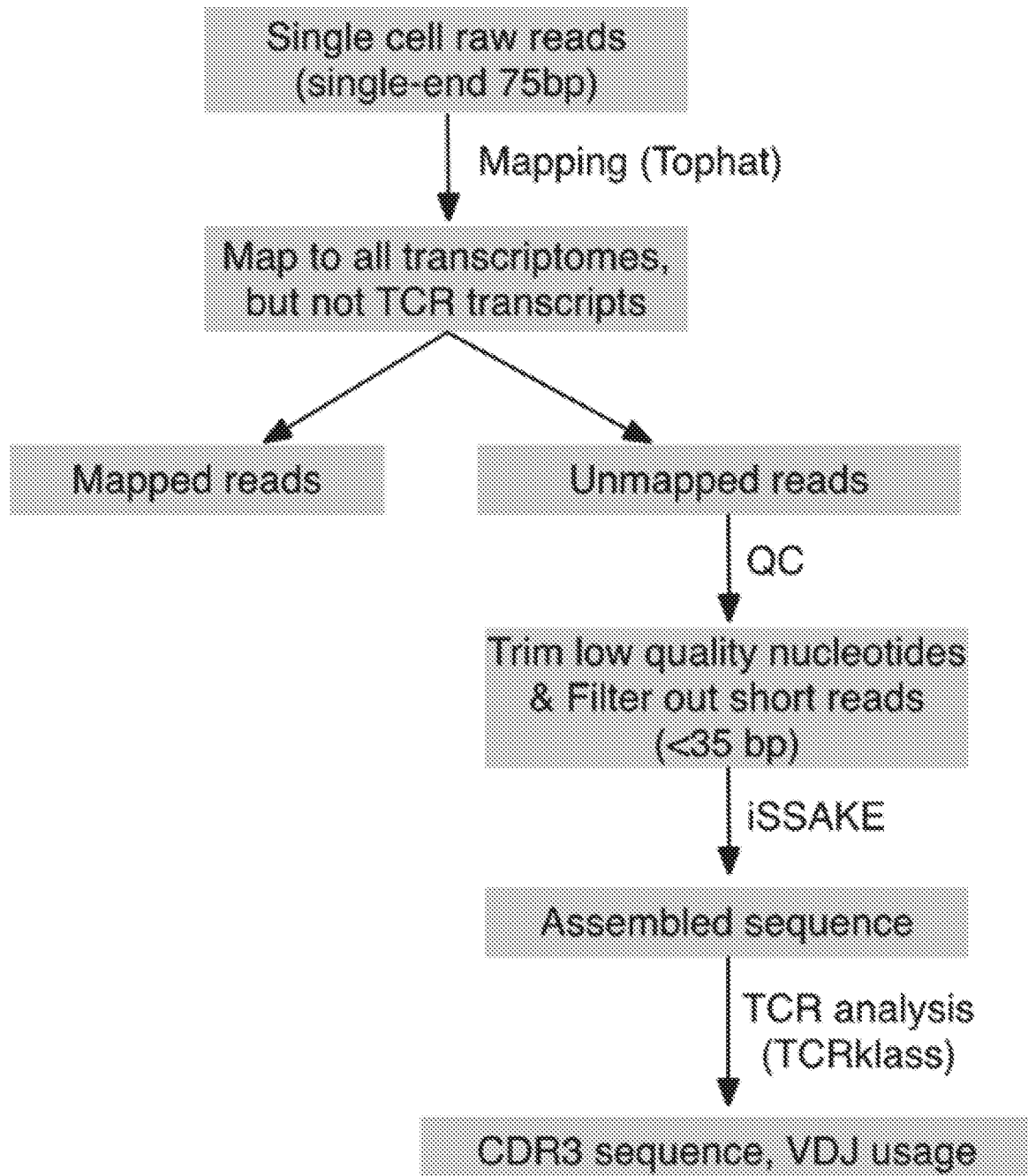


FIG. 17



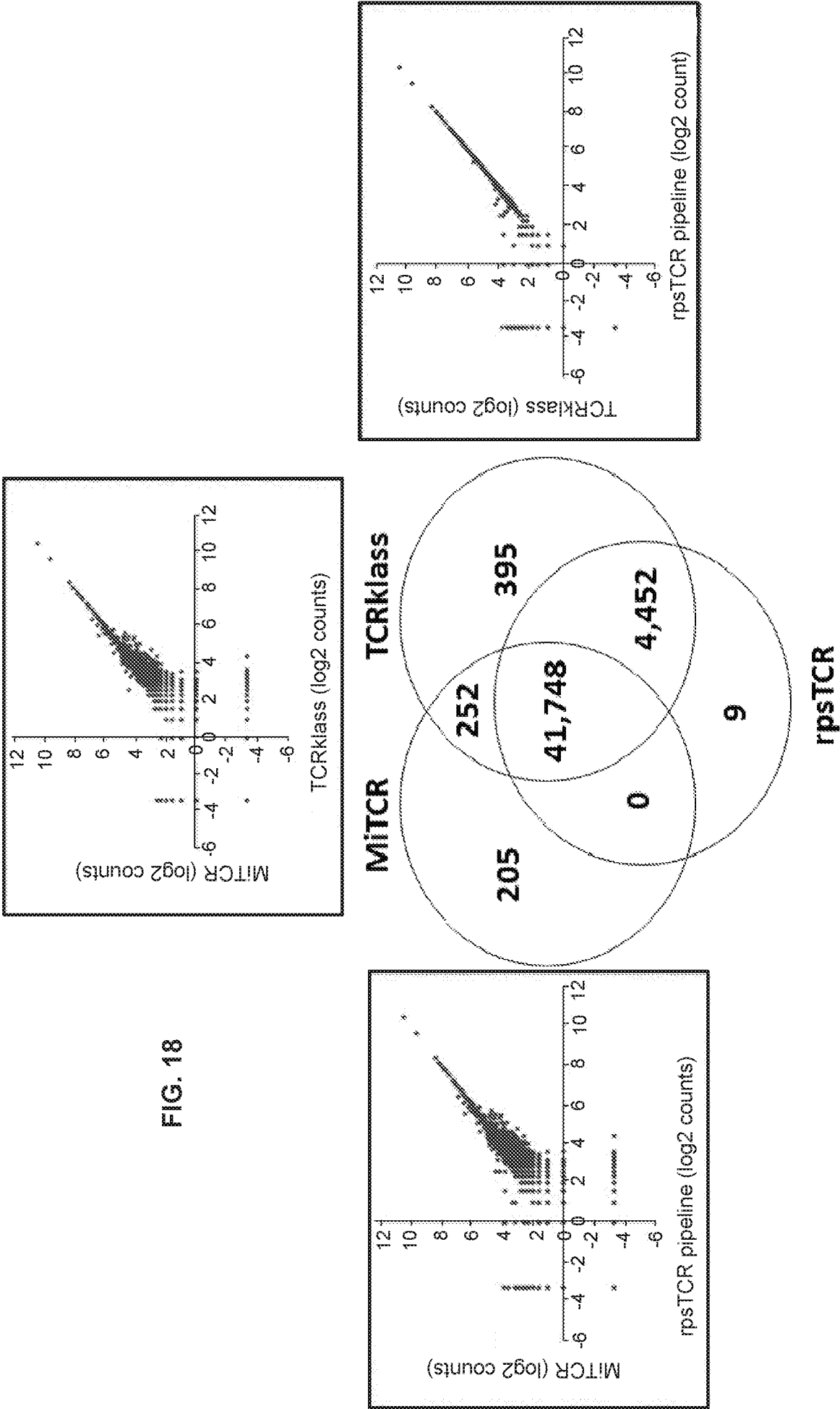
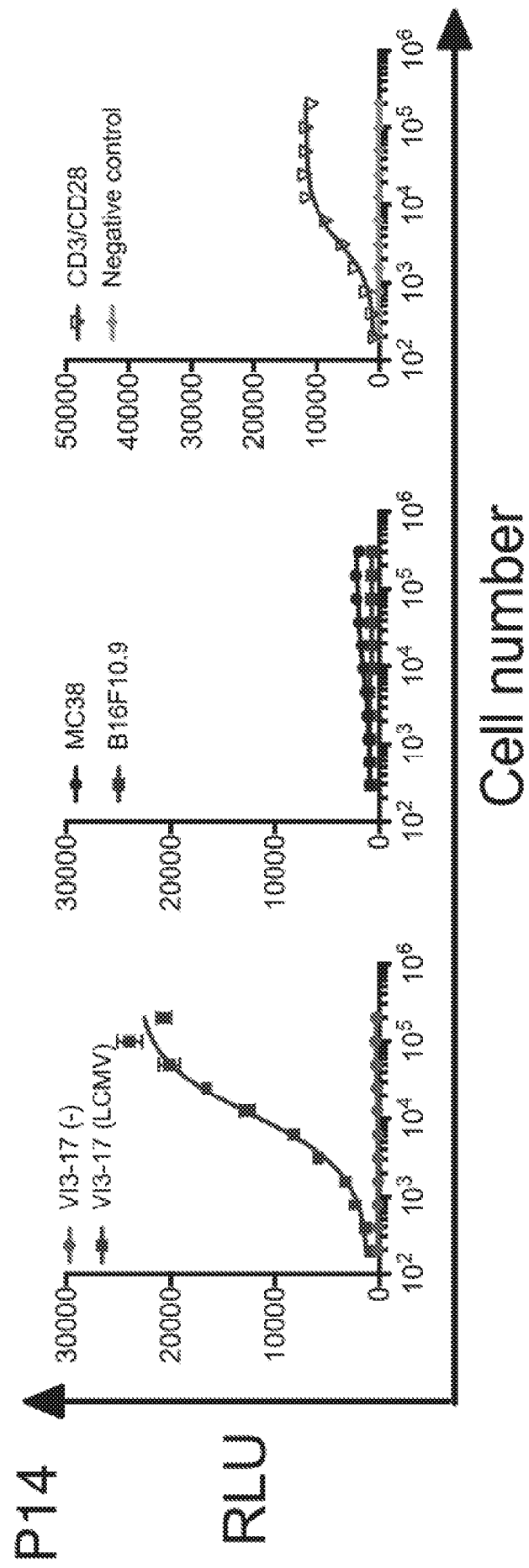


FIG. 19



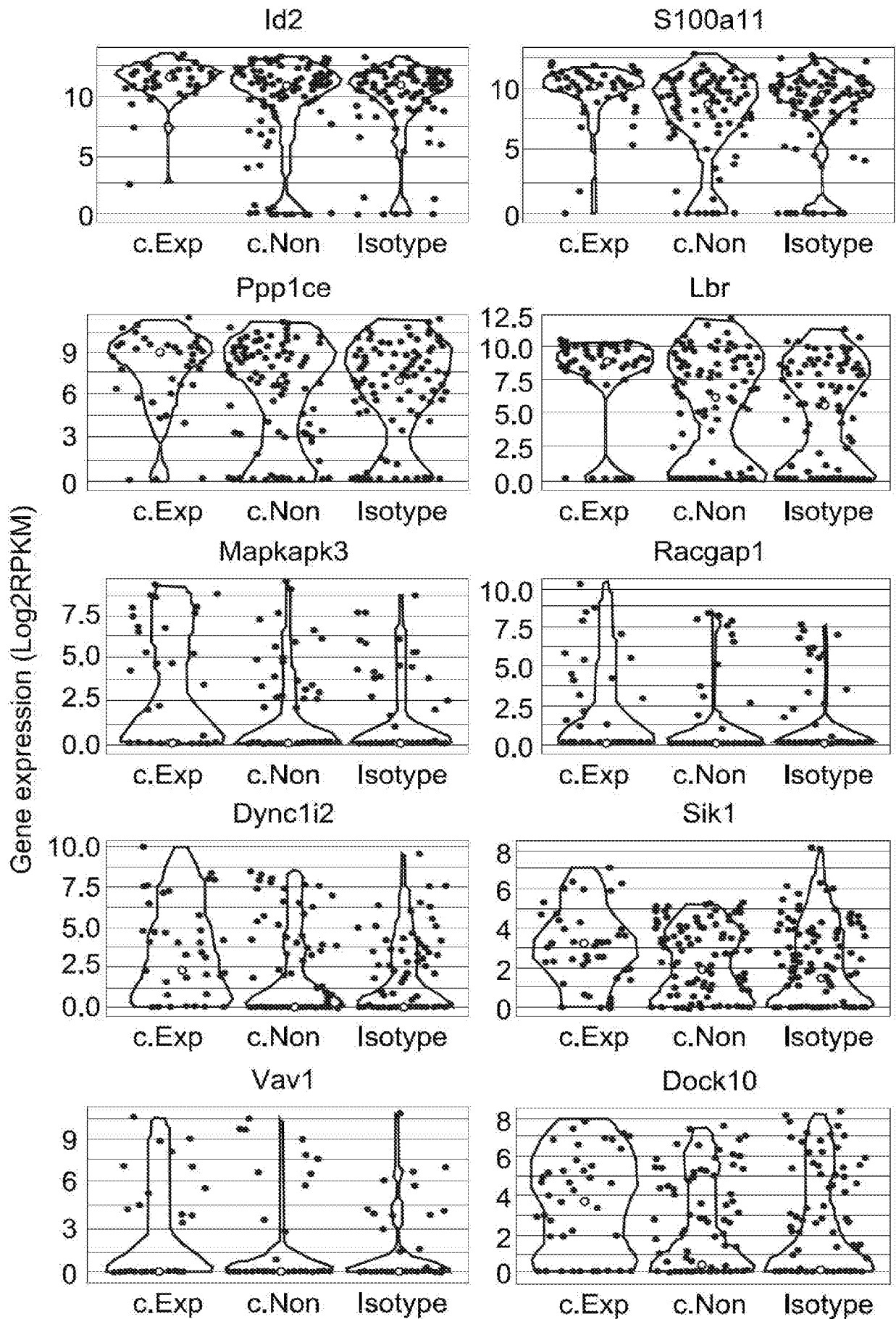


FIG. 20

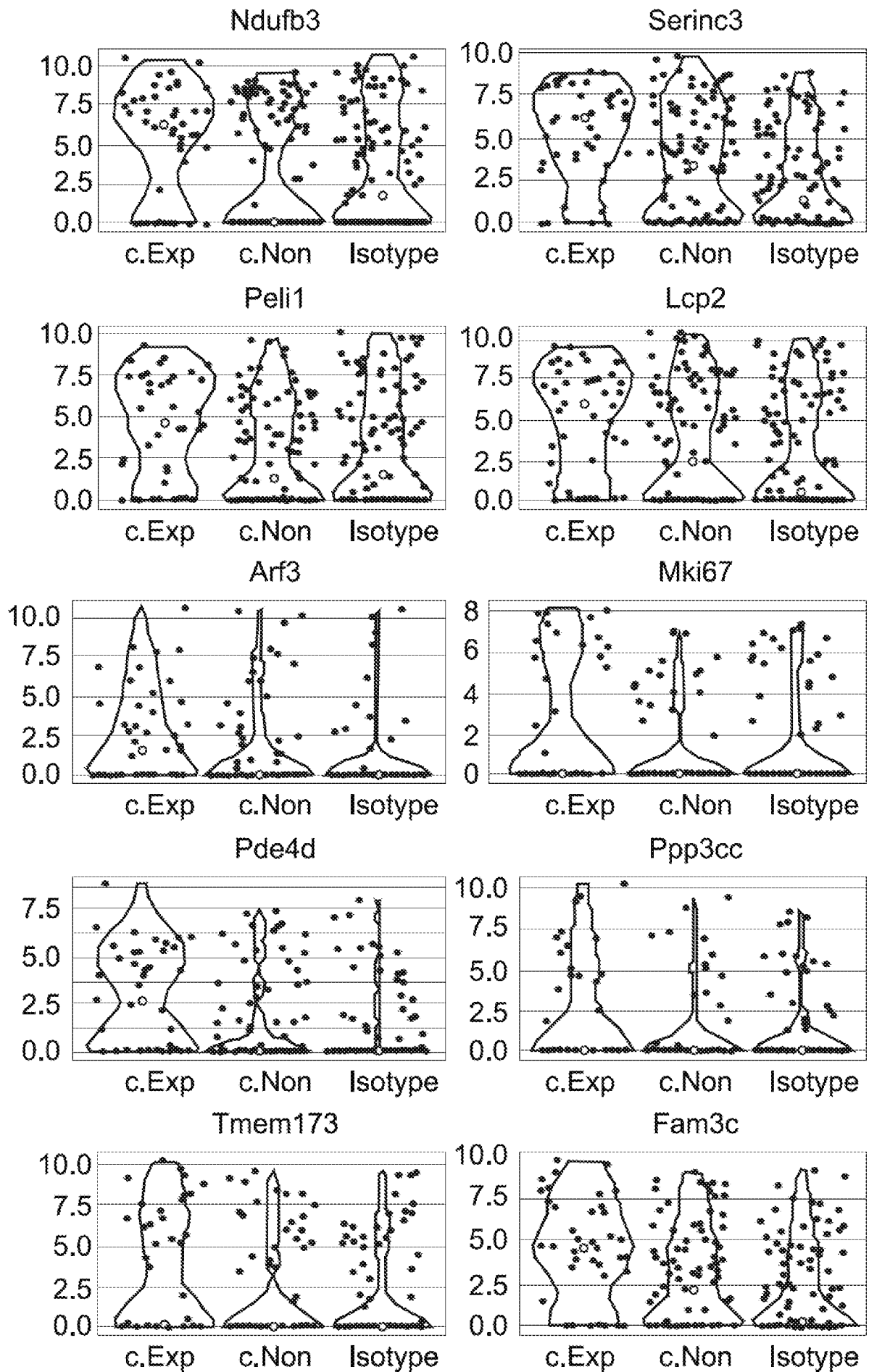


FIG. 20 Cont'd

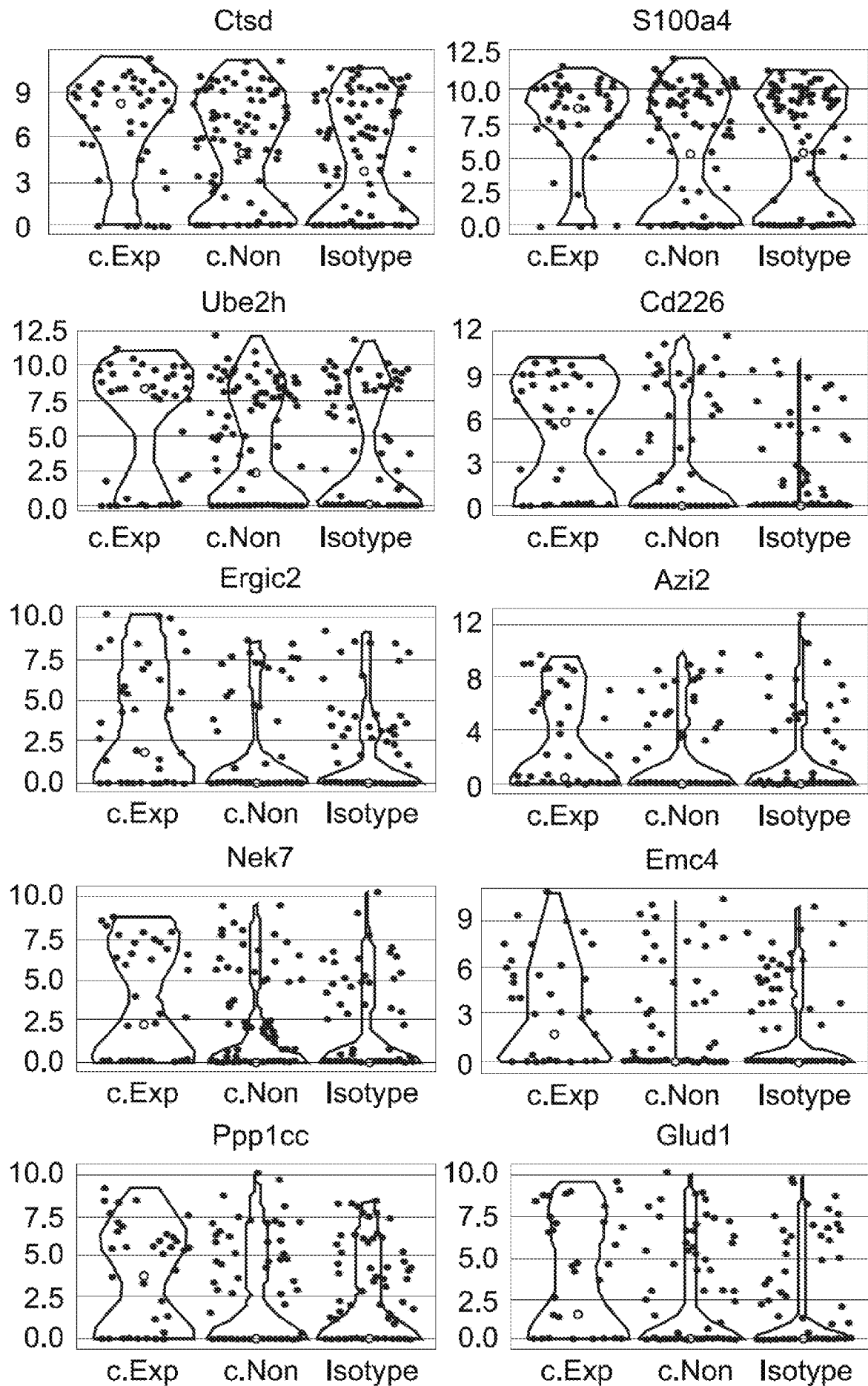
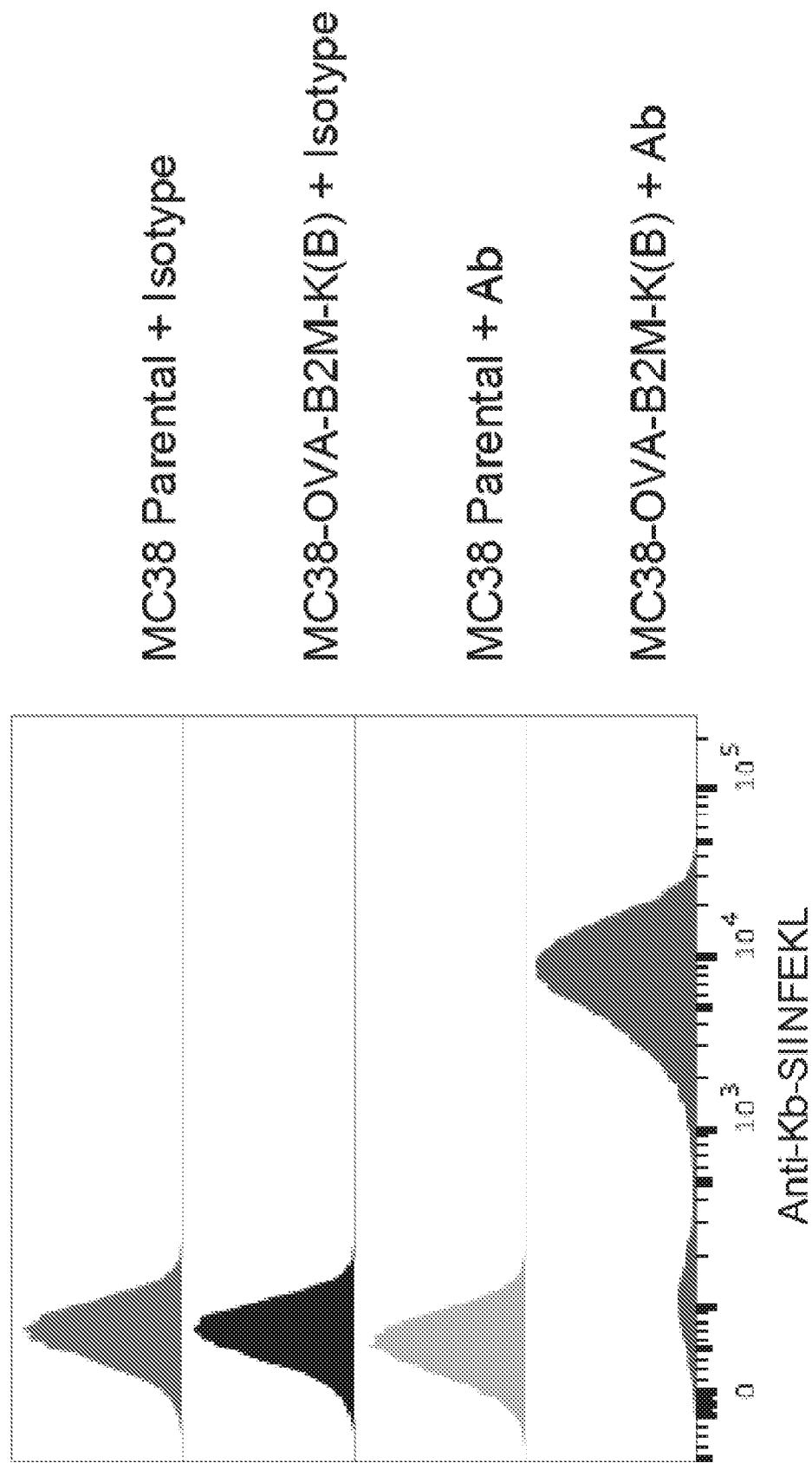


FIG. 20 Cont'd

FIG. 21A



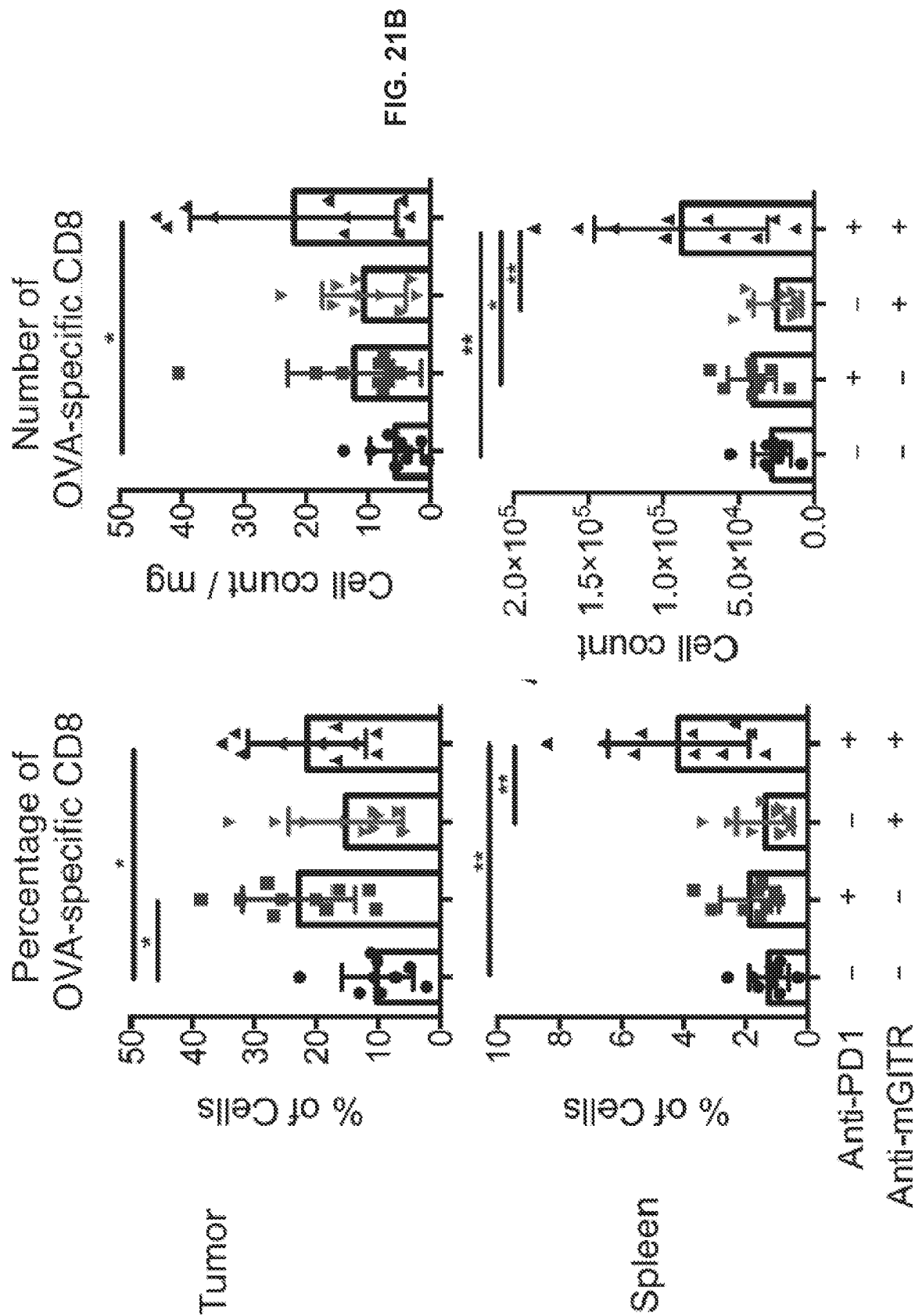


FIG. 21C

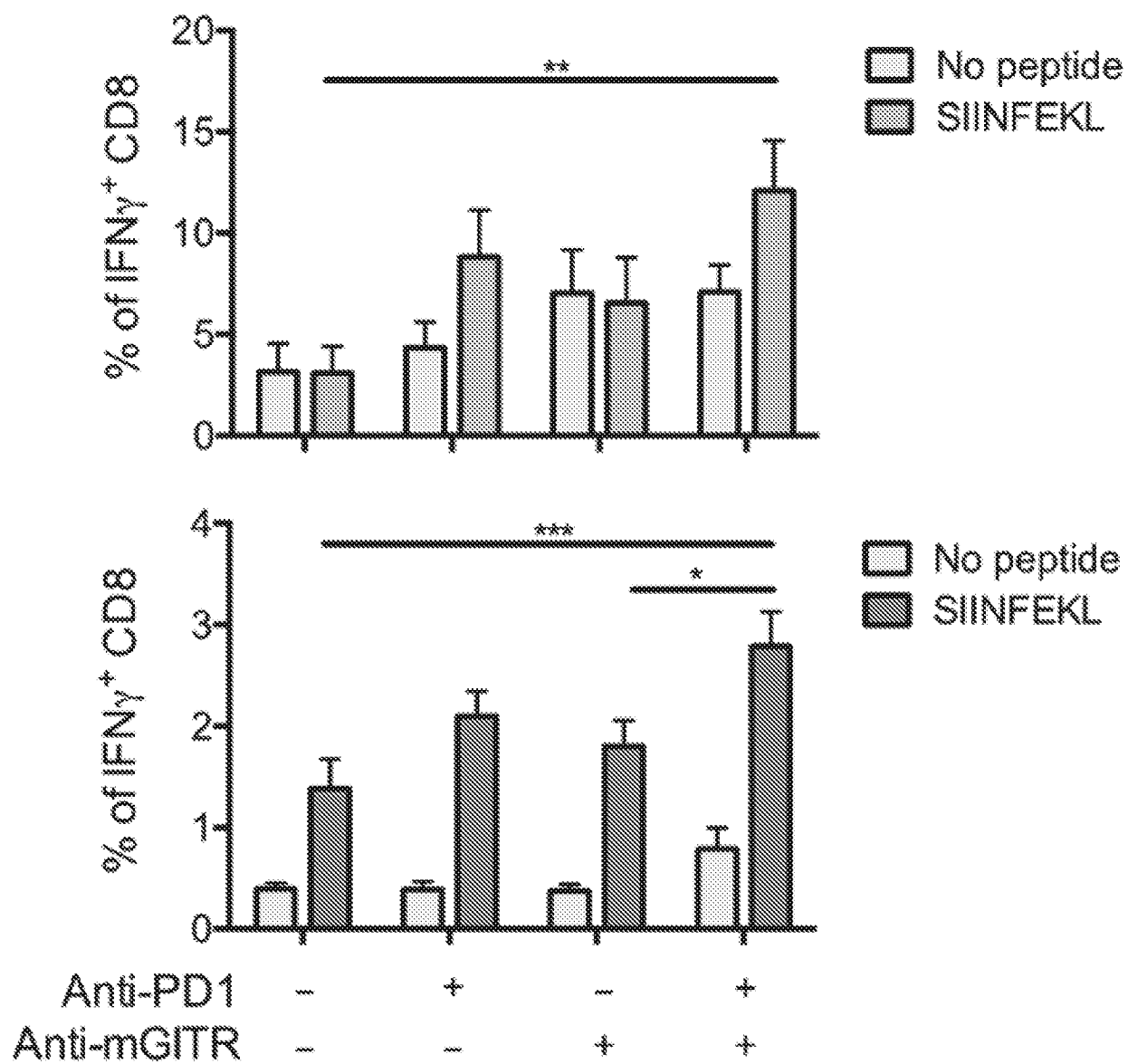


FIG. 22A

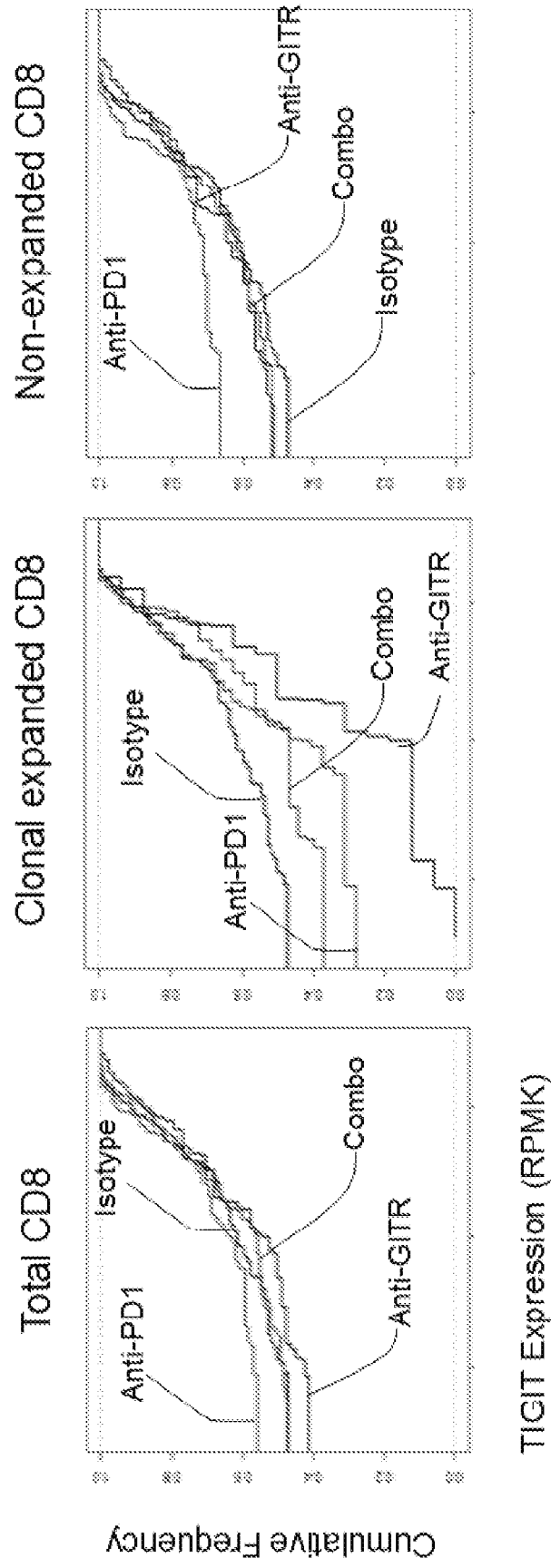


FIG. 22B

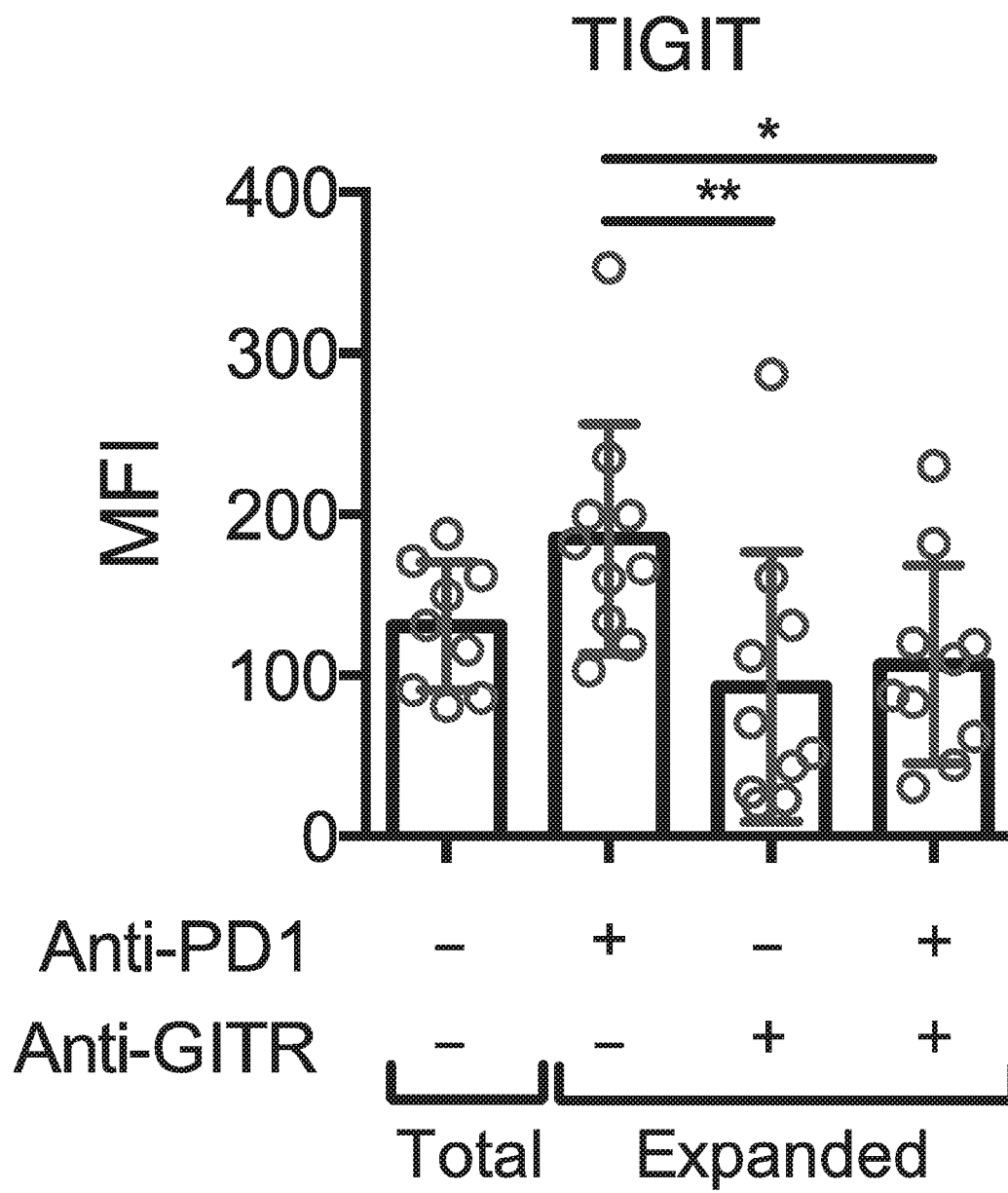


FIG. 22C

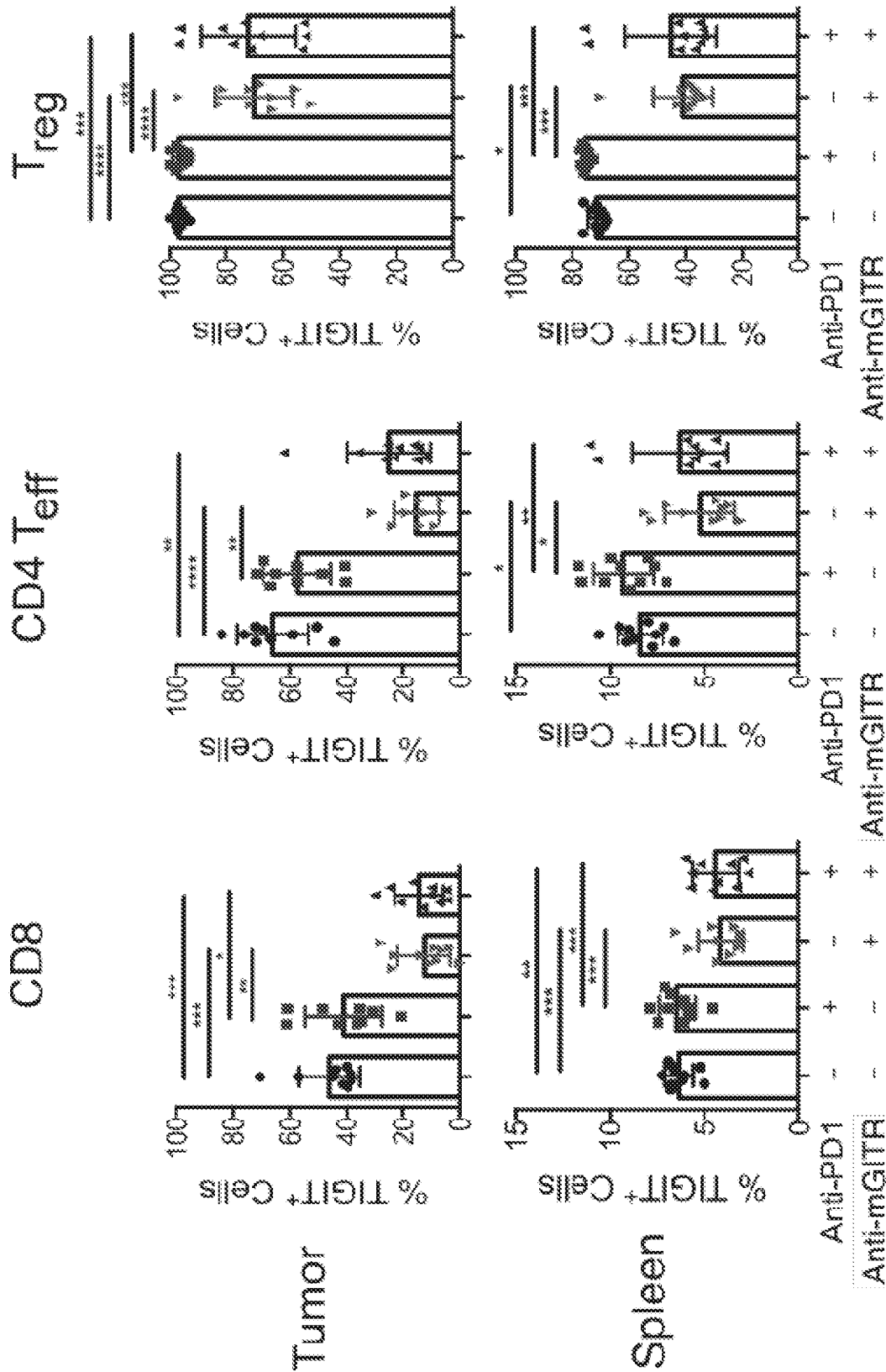


FIG. 22D

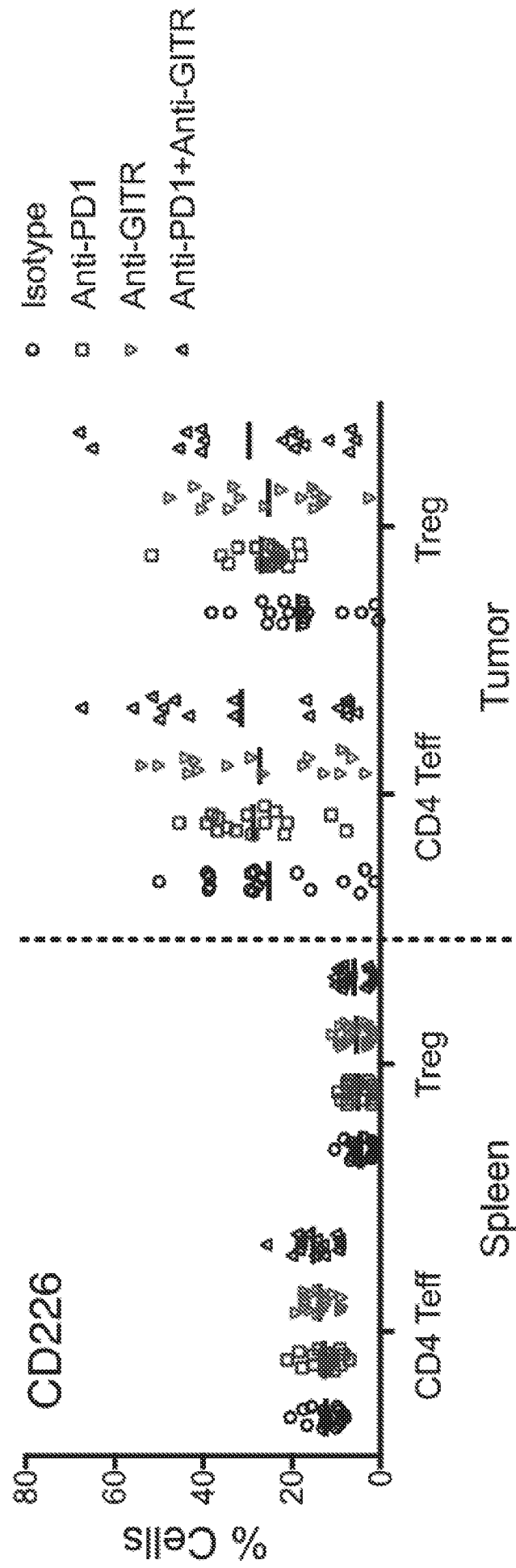


FIG. 23A

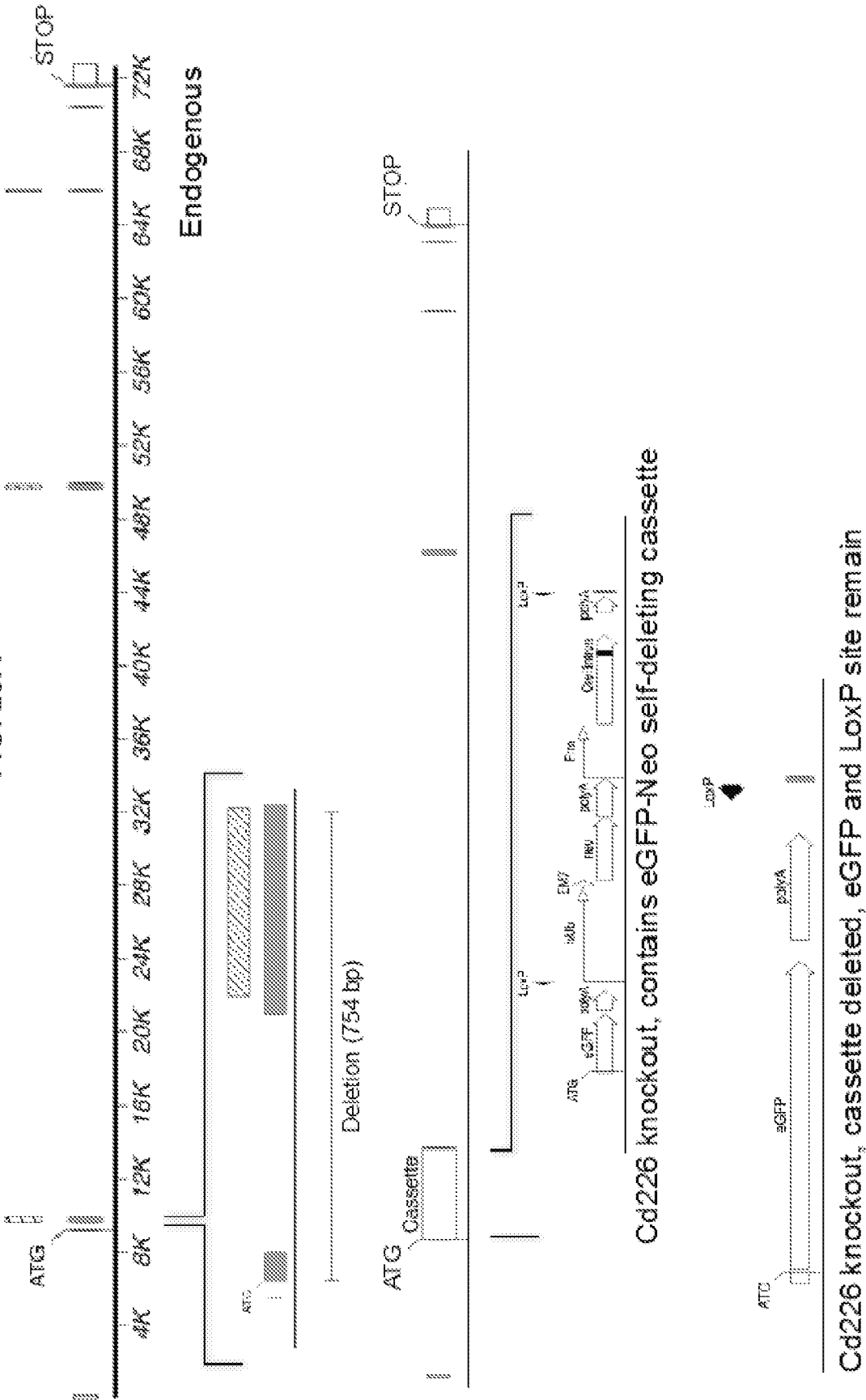


FIG. 23B

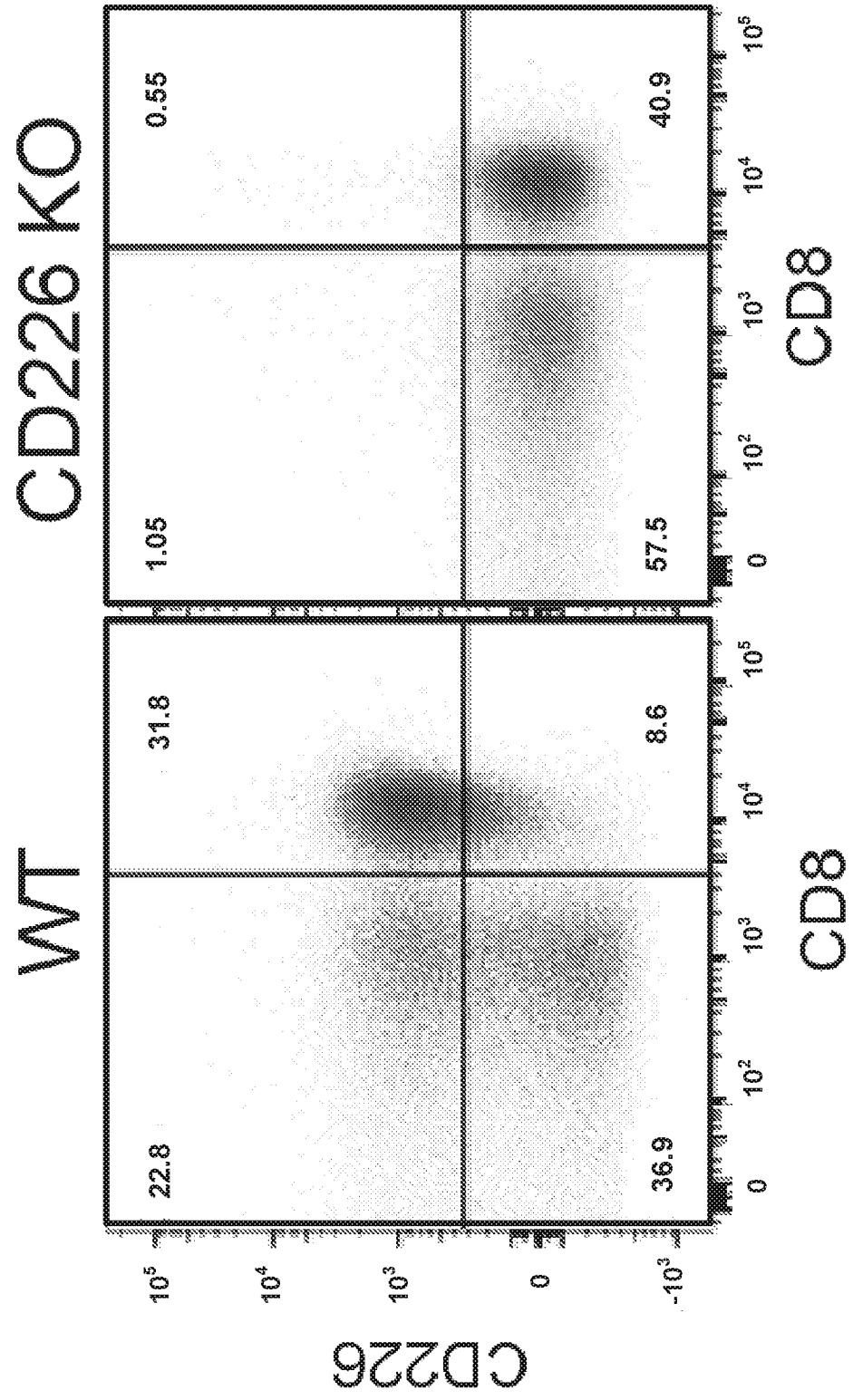


FIG. 23C

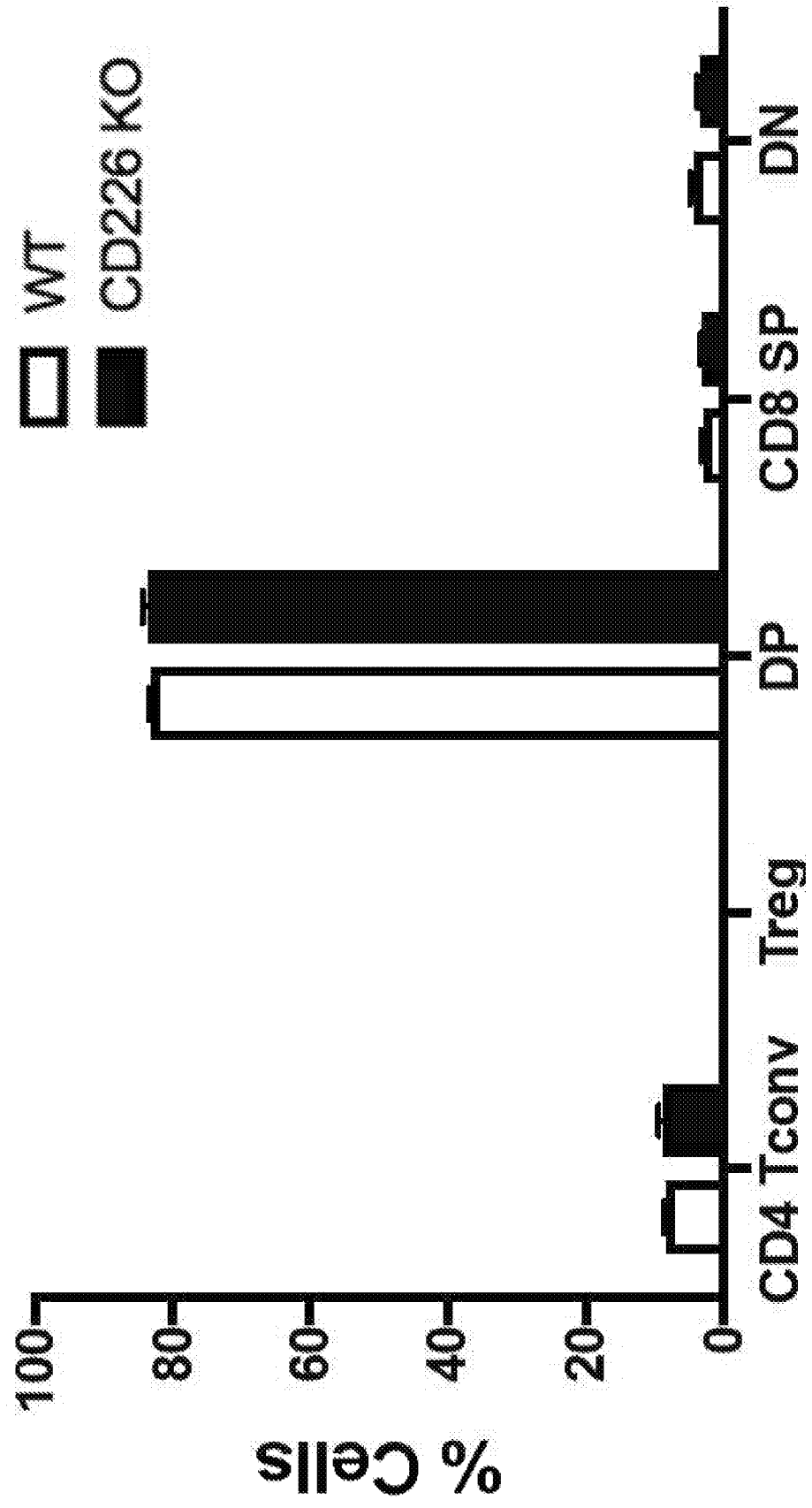


FIG. 23D

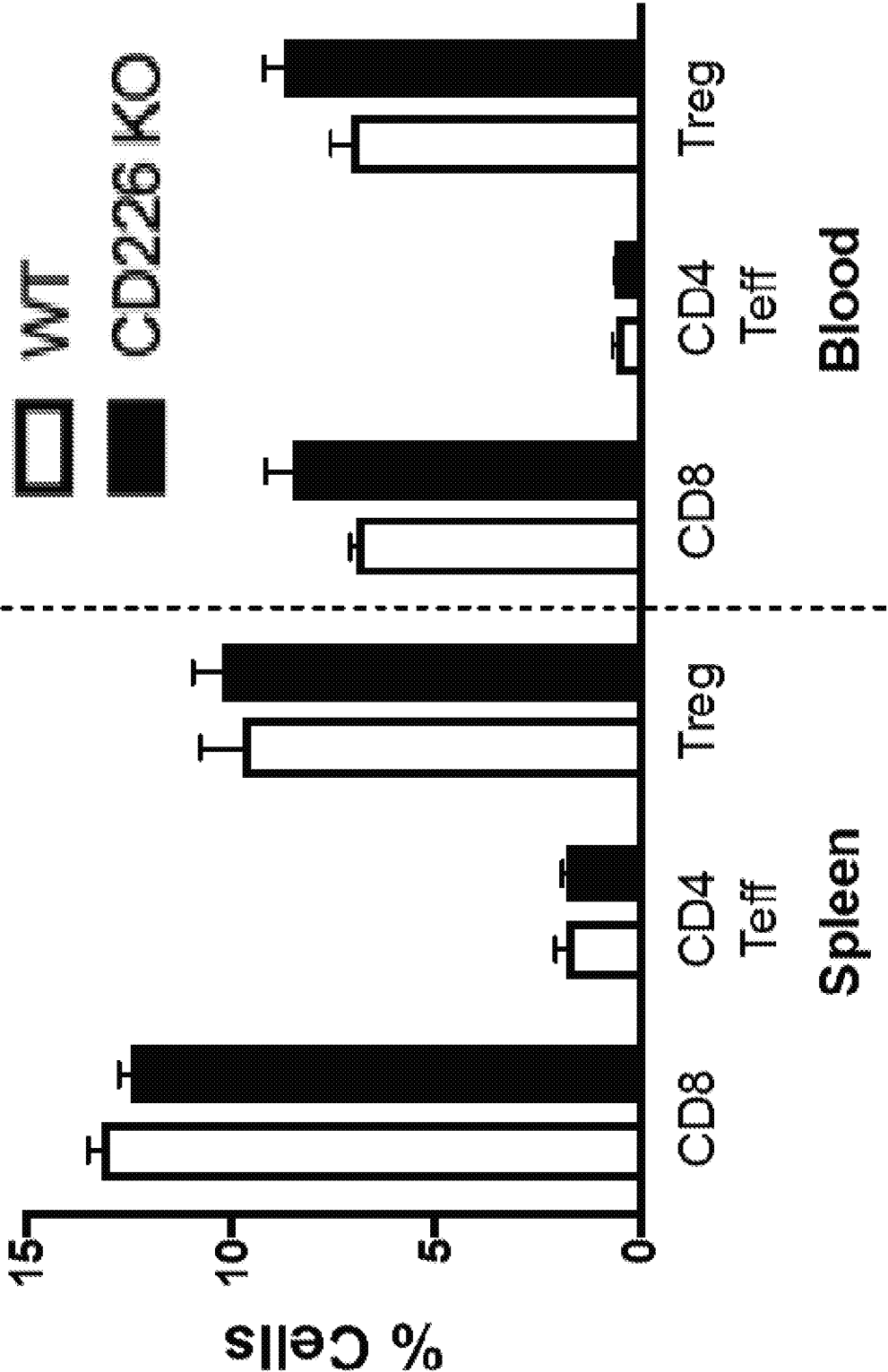


FIG. 23E

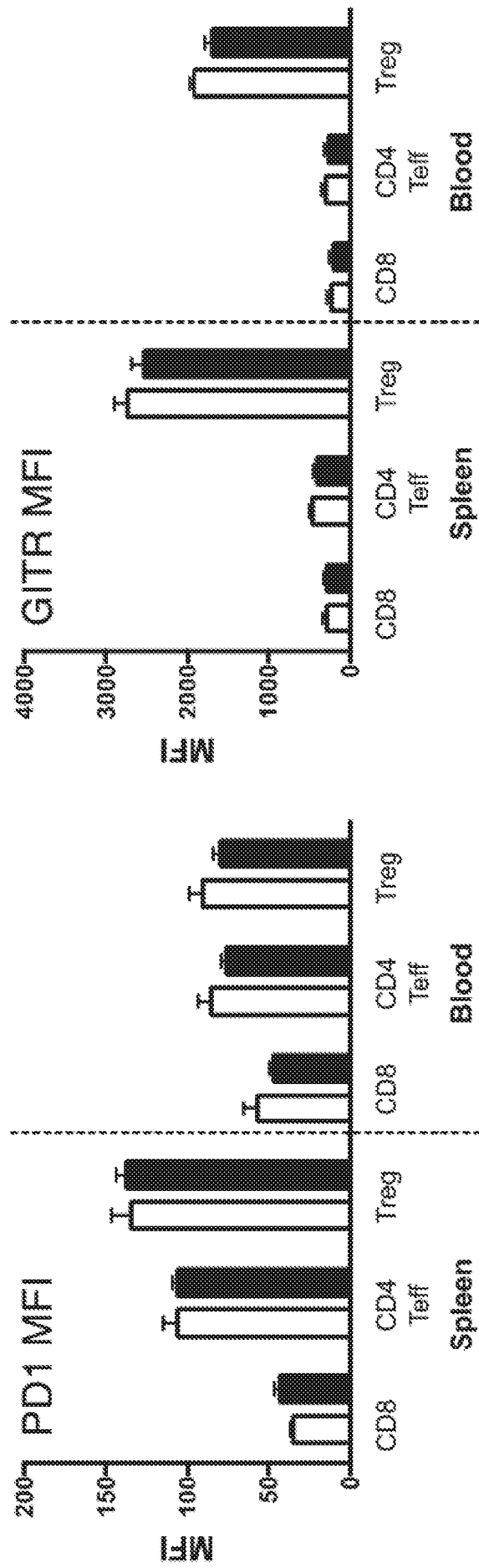


FIG. 23F

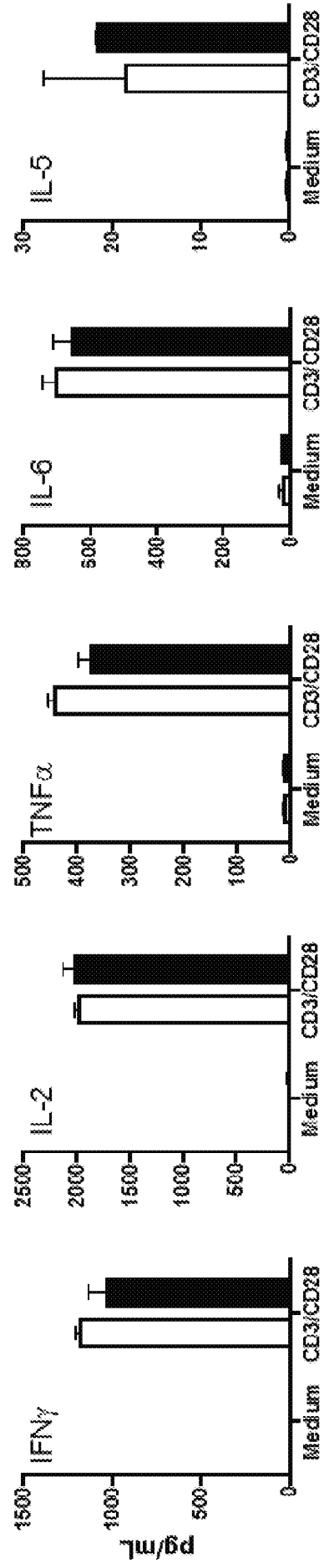


FIG. 24A

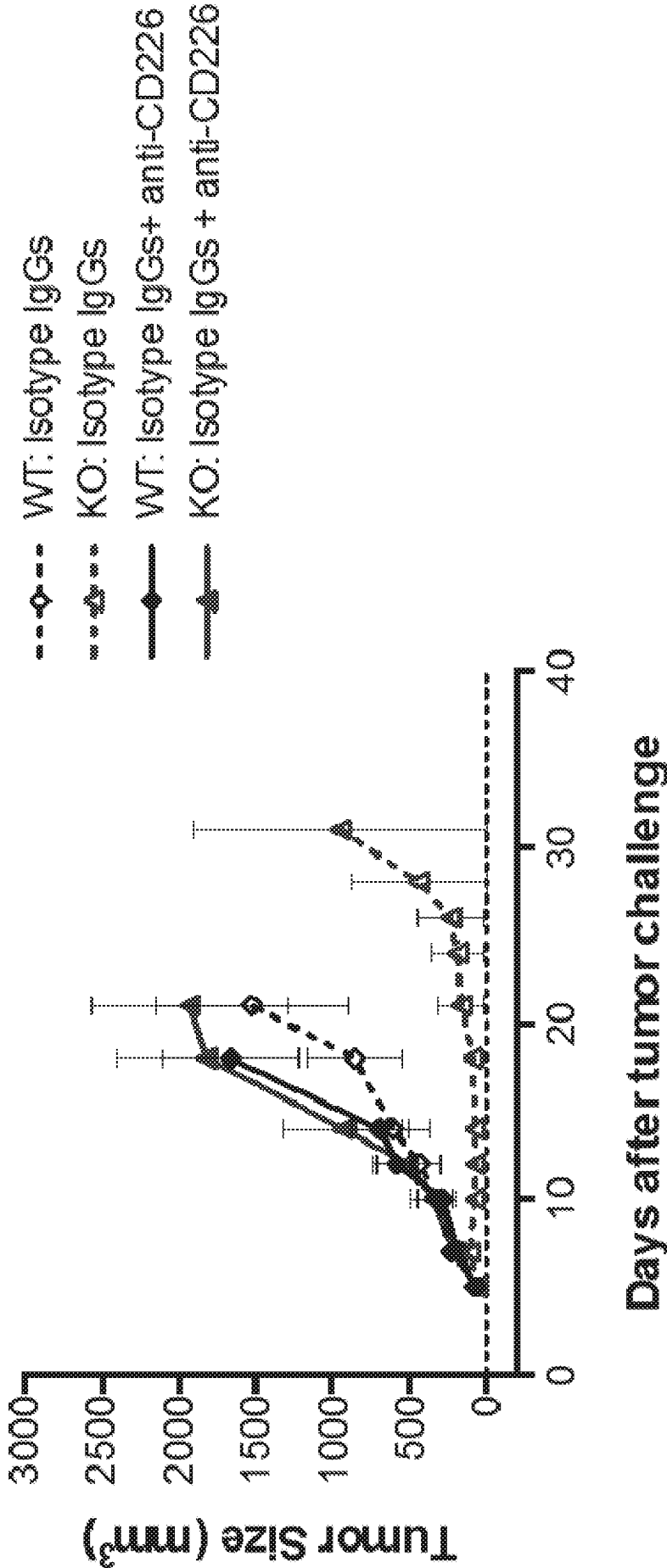


FIG. 24B

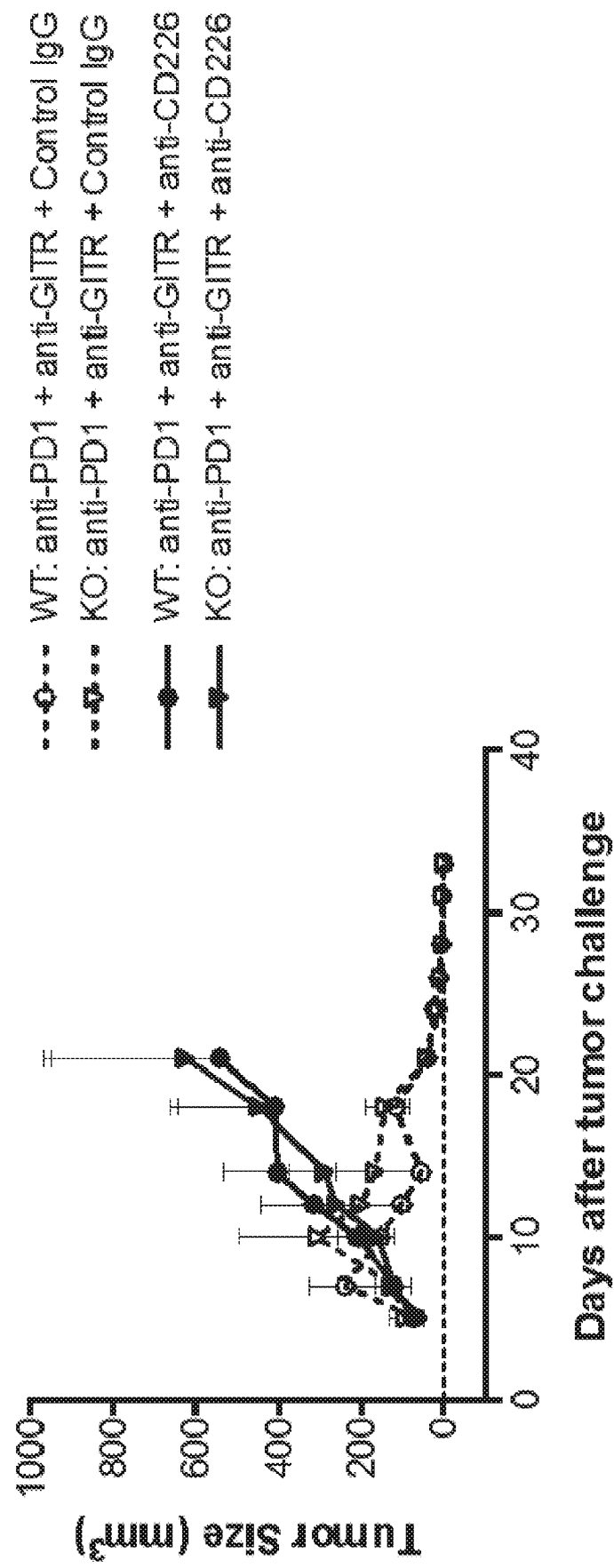


FIG. 24C

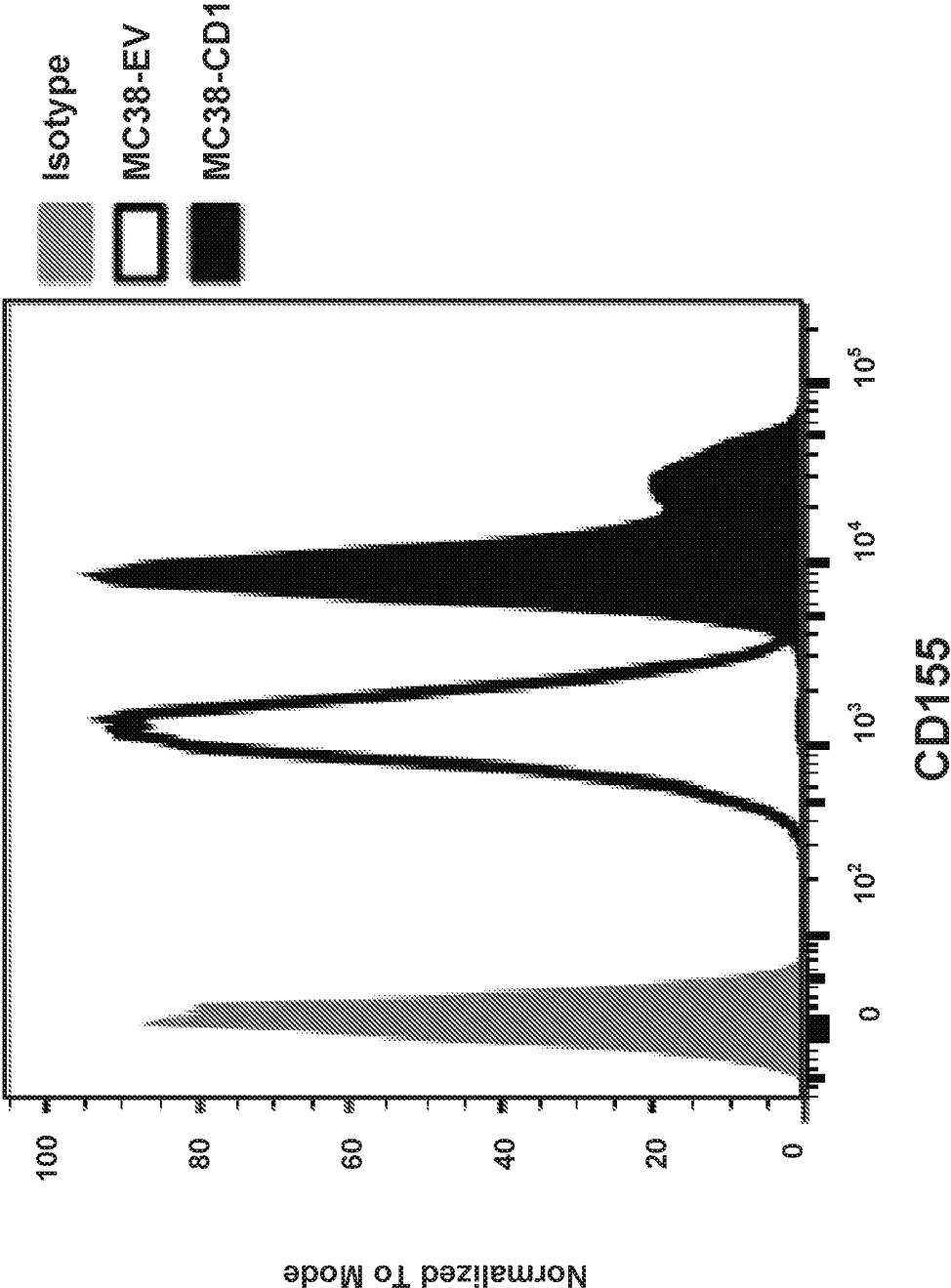


FIG. 24D

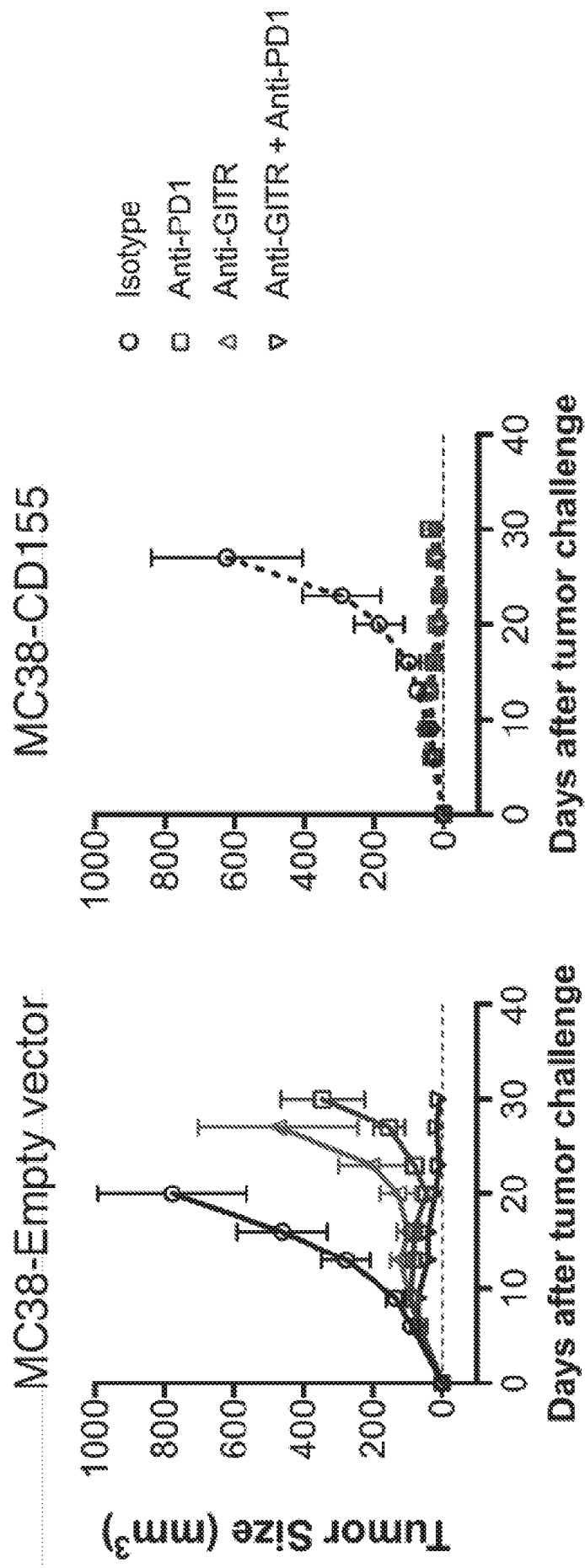


FIG. 24E

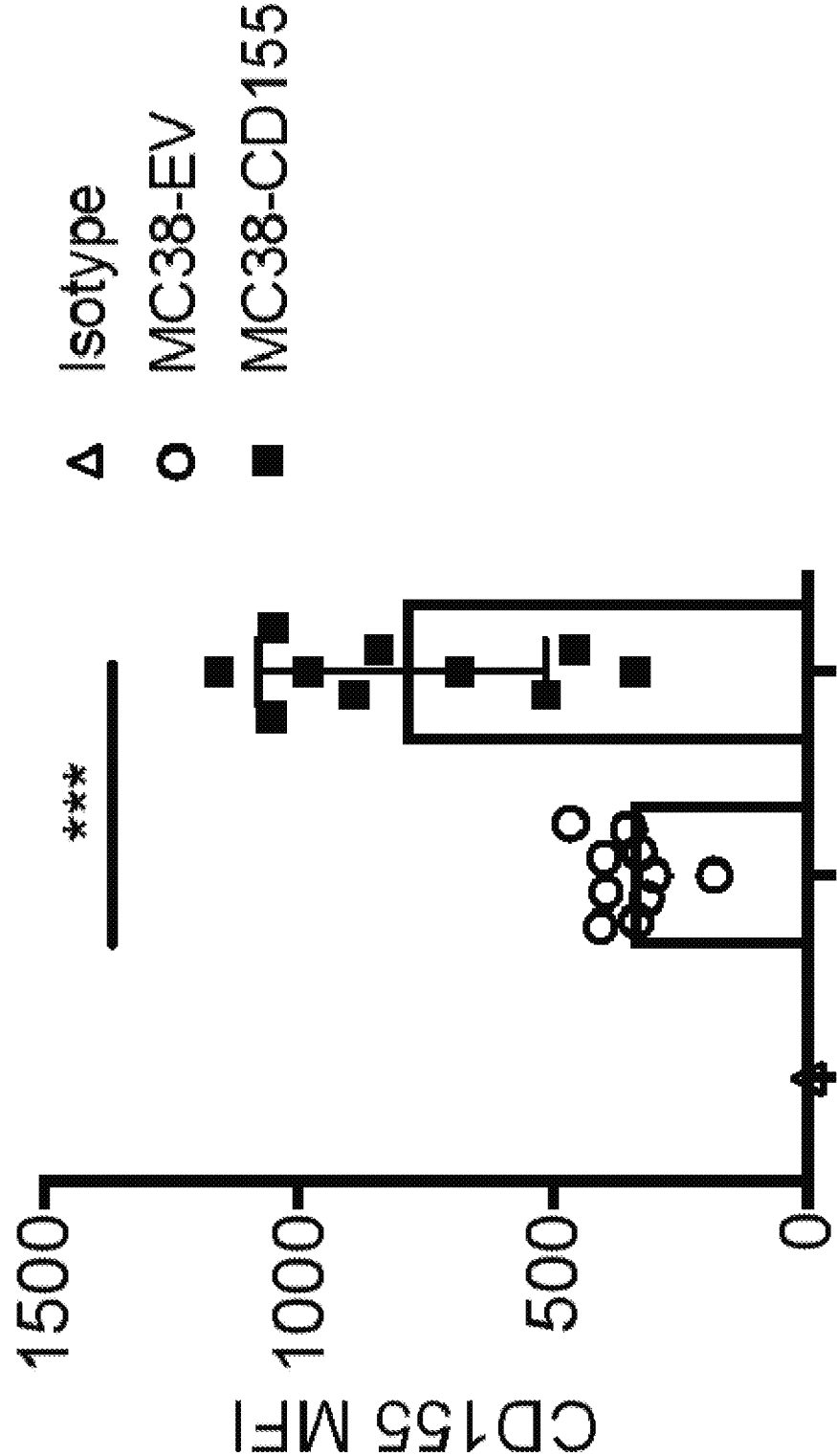


FIG. 24F

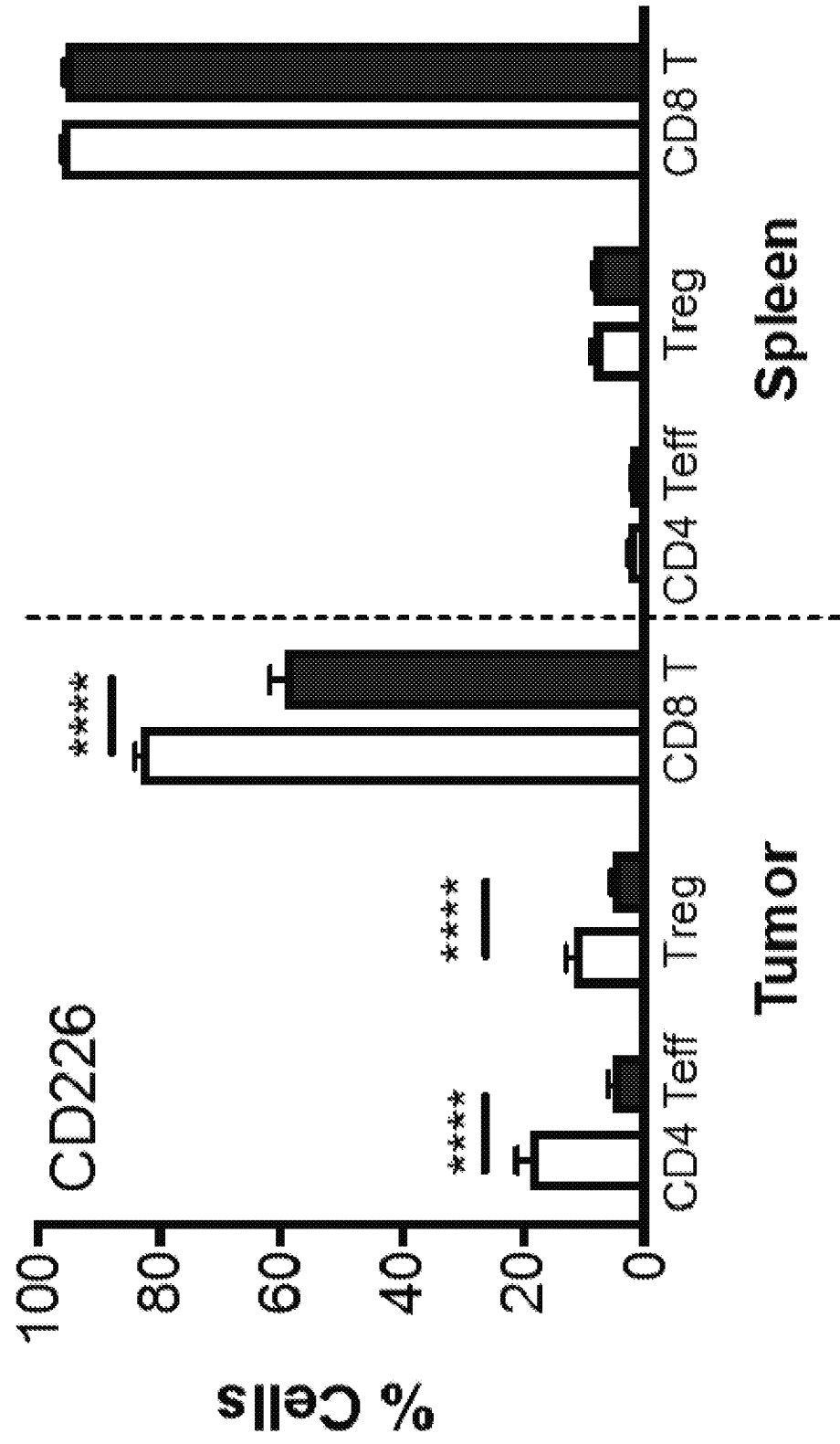
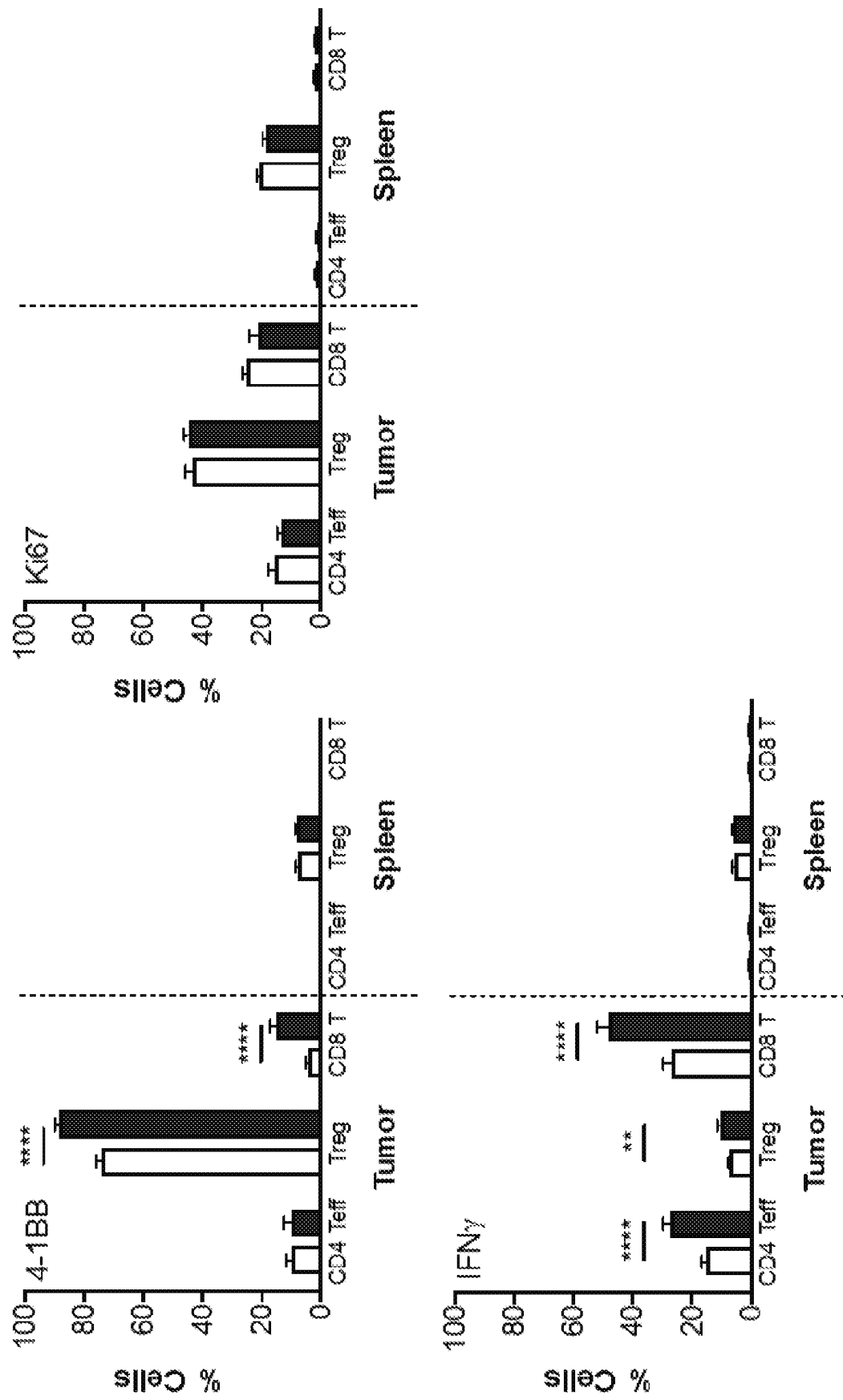


FIG. 24G



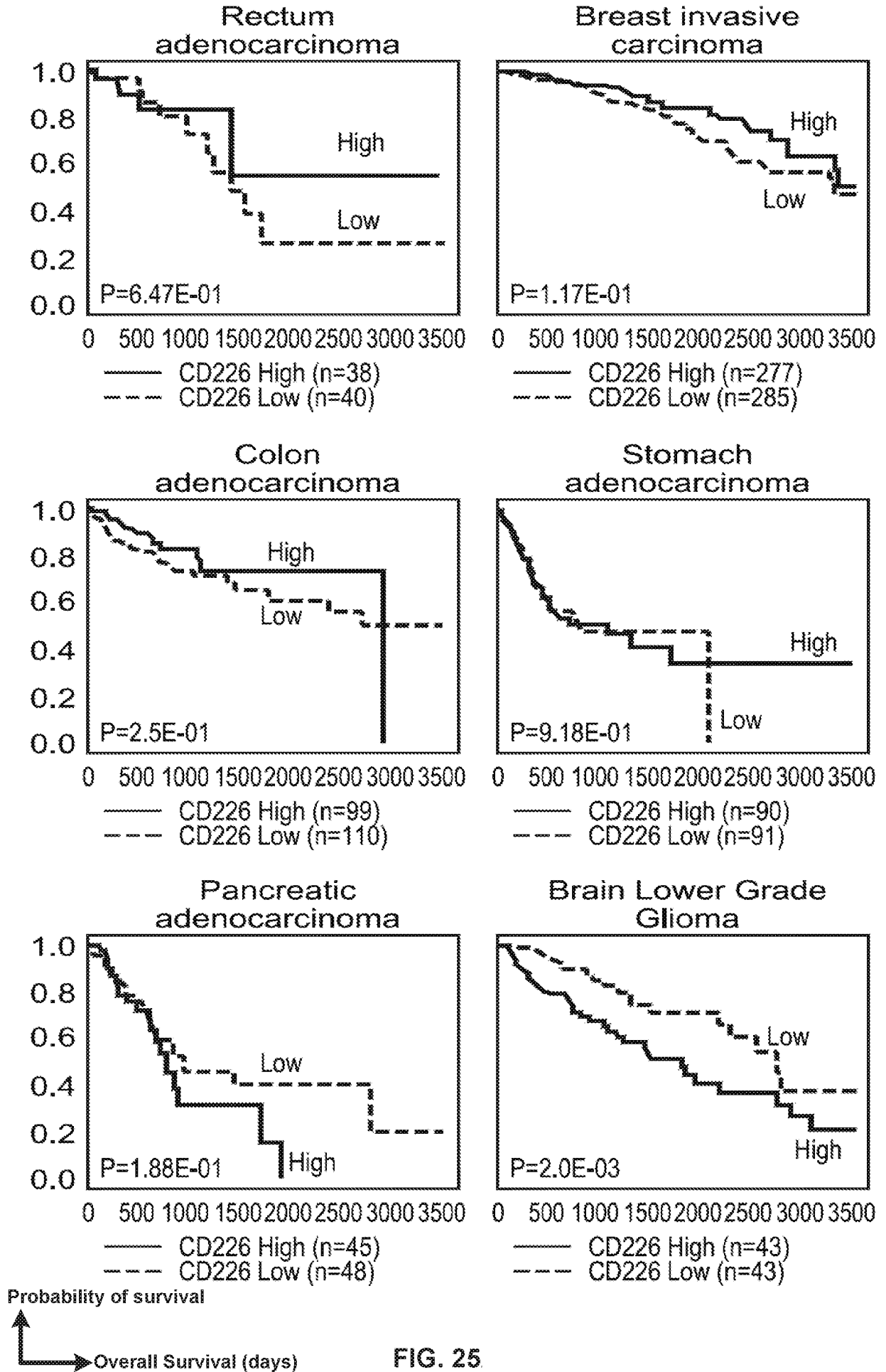


FIG. 25

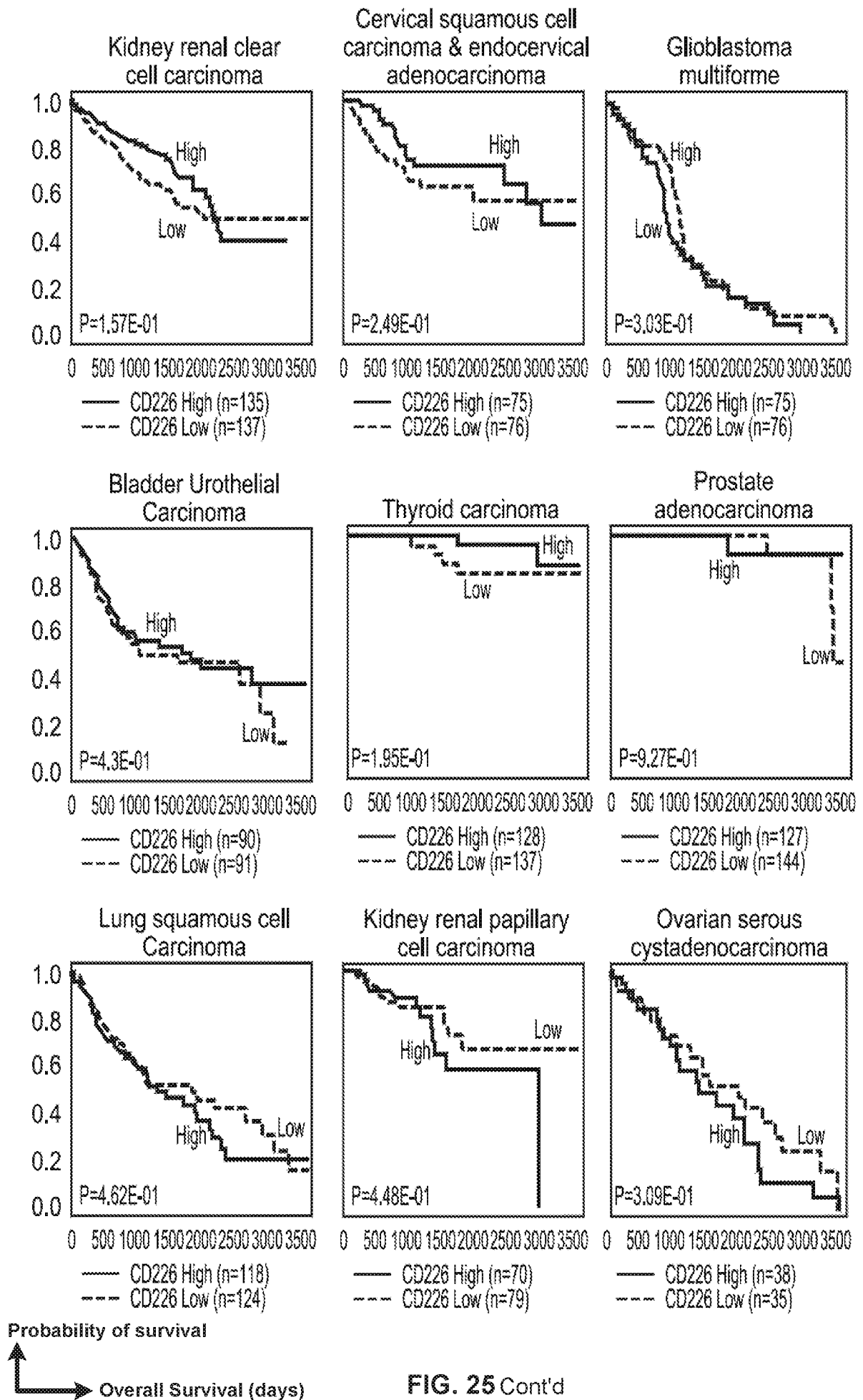


FIG. 25 Cont'd

|                                         |                               |                                                                                                      |
|-----------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------|
| <b>RT primers</b>                       | <b>TCR<math>\alpha</math></b> | 5' - GCAGGTGAAGCTTGTCTGGTTGCT - 3'<br>(SEQ ID NO:25)                                                 |
|                                         | <b>TCR<math>\beta</math></b>  | 5' - CGAGGGTAGCCCTTTTGTGTTTGC - 3'<br>(SEQ ID NO:26)                                                 |
| <b>1<sup>st</sup> round PCR primers</b> | <b>TCR<math>\alpha</math></b> | 5' - ACACTCTTTCCCTACACGACGCTCTTCCGATCT<br>TCAAAGTCGGTGAACAGGCAGAG - 3'<br>(SEQ ID NO:27)             |
|                                         | <b>TCR<math>\beta</math></b>  | 5' - ACACTCTTTCCCTACACGACGCTCTTCCGATCT<br>GACCTGGGTGGAGTCACATTTC - 3'<br>(SEQ ID NO:28)              |
|                                         | <b>PE2-PIIA</b>               | 5' - GTGACTGGAGTTCAGACGTGTGCTCTTCCGATCT<br>AAGCAGTGGTATCAACGCAGAGT - 3'<br>(SEQ ID NO:29)            |
| <b>2<sup>nd</sup> round PCR primers</b> | <b>Forward</b>                | 5' - AATGATACGGCGACCAACCGAGATCTACACXXXXX<br>ACACTCTTTCCCTACACGACGCTCTTCCGATCT - 3'<br>(SEQ ID NO:30) |
|                                         | <b>Reverse</b>                | 5' - CAAGCAGAAGACGGCATACGAGATXXXXXX<br>GTGACTGGAGTTCAGACGTGTGCTCTTCCGATCT - 3'<br>(SEQ ID NO:31)     |

FIG. 26

FIG. 27

| Sample ID            | Species | Sample type      | MiTCR   | TCRklass | rpsTCR pipeline | Input reads (passed QC>=25) |
|----------------------|---------|------------------|---------|----------|-----------------|-----------------------------|
| M620343              | mouse   | negative control | 23      | 0        | 0               | 44,906,248                  |
| M620295              | mouse   | negative control | 76      | 0        | 0               | 39,305,839                  |
| M620279              | mouse   | negative control | 22      | 1        | 0               | 39,233,756                  |
| M620274              | mouse   | negative control | 99      | 1        | 0               | 48,661,267                  |
| M620272              | mouse   | negative control | 5       | 0        | 0               | 32,426,335                  |
| M620270              | mouse   | negative control | 22      | 0        | 0               | 46,609,234                  |
| T-ALL_neg1-40M       | mouse   | negative control | 17      | 1        | 0               | 39,068,155                  |
| T-ALL_neg2-40M       | mouse   | negative control | 51      | 0        | 0               | 39,469,692                  |
| NeuProgCell-40M      | human   | negative control | 123     | 0        | 0               | 37,684,399                  |
| LHCN-M2-40M          | human   | negative control | 77      | 0        | 0               | 36,639,557                  |
| VI-next-mouse-T cell | mouse   | positive control | 128,956 | 137,156  | 135,980         | 169,009                     |

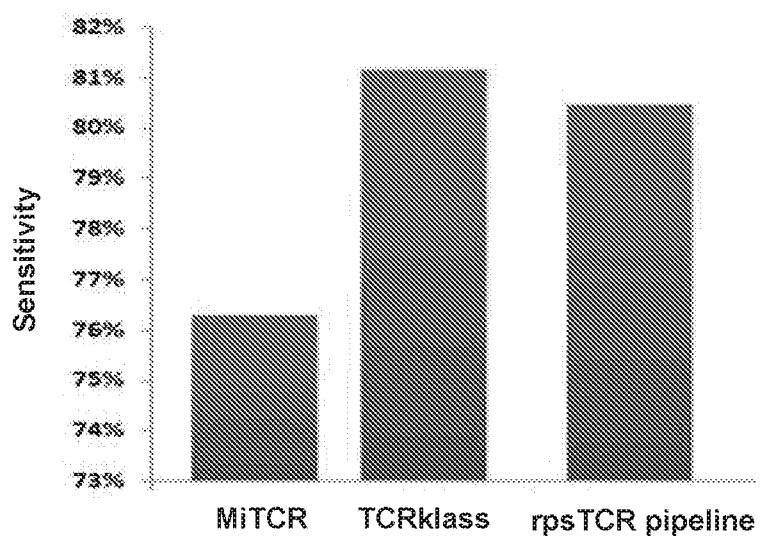


FIG. 28

Top CDR3s found by MiTCR

| CDR3       | VI-next |          |        | MP-50bp-500M |          |        |
|------------|---------|----------|--------|--------------|----------|--------|
|            | MITCR   | TCRklass | rpsTCR | MITCR        | TCRklass | rpsTCR |
| CATSNYLGYF | 0       | 0        | 0      | 63           | 0        | 0      |
| CARHYF     | 0       | 0        | 0      | 63           | 0        | 0      |
| CAFFYWLF   | 0       | 0        | 0      | 62           | 0        | 0      |
| CGAGSFQHF  | 0       | 0        | 0      | 39           | 0        | 0      |
| CARDSIF    | 0       | 0        | 0      | 21           | 0        | 0      |
| CARGRRITIF | 0       | 0        | 0      | 15           | 0        | 0      |
| CARHDLYF   | 0       | 0        | 0      | 15           | 0        | 0      |
| CARHGIF    | 0       | 0        | 0      | 15           | 0        | 0      |
| CAKDRGTIF  | 0       | 0        | 0      | 14           | 0        | 0      |
| CARGPRGIF  | 0       | 0        | 0      | 13           | 0        | 0      |

Top CDR3s found by TCRklass

| CDR3            | VI-next |          |        | MP-50bp-500M |          |        |
|-----------------|---------|----------|--------|--------------|----------|--------|
|                 | MITCR   | TCRklass | rpsTCR | MITCR        | TCRklass | rpsTCR |
| CASSPDADTQYF    | 0       | 0        | 0      | 3            | 3        | 0      |
| CGAGTTETLYF     | 27      | 27       | 27     | 3            | 2        | 2      |
| CASSDVRDTEVFF   | 178     | 174      | 174    | 2            | 2        | 0      |
| CASSDLGEDTQYF   | 39      | 44       | 44     | 2            | 2        | 1      |
| CTCSASAETLYF    | 35      | 30       | 29     | 2            | 2        | 1      |
| CASSQEARNYAEQFF | 21      | 21       | 21     | 2            | 2        | 0      |
| CASSLGNYAEQFF   | 8       | 8        | 8      | 2            | 2        | 1      |
| CASGDRYAEQFF    | 7       | 7        | 7      | 2            | 2        | 0      |
| CASGDGGGNTLYF   | 5       | 5        | 5      | 2            | 2        | 2      |
| CASSVGGQDTQYF   | 2       | 0        | 2      | 2            | 2        | 0      |

Top CDR3s found by rps TCR pipeline

| CDR3             | VI-next |          |        | MP-50bp-500M |          |        |
|------------------|---------|----------|--------|--------------|----------|--------|
|                  | MITCR   | TCRklass | rpsTCR | MITCR        | TCRklass | rpsTCR |
| CASSSPGQGAREQYF  | 1423    | 1383     | 1374   | 3            | 0        | 21     |
| CTCSAGQKAETLYF   | 805     | 788      | 773    | 1            | 1        | 9      |
| CASSQDWGGDEQYF   | 287     | 277      | 274    | 1            | 1        | 7      |
| CASSPGQISNERLFF  | 0       | 0        | 0      | 0            | 0        | 5      |
| CTCSADWGAETLYF   | 266     | 265      | 260    | 2            | 1        | 4      |
| CASSPGQLQNTLYF   | 103     | 102      | 102    | 0            | 0        | 4      |
| CASSGRDRGLGNTLYF | 77      | 76       | 75     | 0            | 0        | 4      |
| CAKTENSDYTF      | 18      | 18       | 18     | 4            | 1        | 4      |
| CASSVTGEGNTLYF   | 18      | 18       | 18     | 0            | 0        | 4      |
| CASRRHLSYEQYF    | 8       | 8        | 8      | 3            | 0        | 4      |

FIG. 29

| VI-Next data (301bp) |      |       |          |                  |  |
|----------------------|------|-------|----------|------------------|--|
| CDR3                 | Rank | MITCR | TCRklass | rps TCR pipeline |  |
| CASSSPGQGAREQYF      | 1    | 1423  | 1383     | 1374             |  |
| CTCSAGQKAETLYF       | 2    | 805   | 788      | 773              |  |
| CTCSAERASAETLYF      | 3    | 337   | 330      | 326              |  |
| CASSRDWGASAETLYF     | 4    | 329   | 323      | 323              |  |
| CASSQDWGGDEQYF       | 5    | 287   | 277      | 274              |  |
| CTCSADWGAETLYF       | 6    | 266   | 265      | 260              |  |
| CASGDAPGTNSDYFT      | 7    | 237   | 231      | 231              |  |
| CASSDGTGDYAEQFF      | 8    | 224   | 217      | 217              |  |
| CASSDGGKANERLFF      | 9    | 215   | 211      | 211              |  |
| CTCSADGRGNYAEQFF     | 10   | 190   | 189      | 188              |  |

| MP-50BP-MITCR    |     |     |      |      |            |
|------------------|-----|-----|------|------|------------|
| CDR3             | 10M | 50m | 100m | 200m | 500m       |
| CASSSPGQGAREQYF  | 0   | 0   | 0    | 1    | 3(rank 15) |
| CTCSAGQKAETLYF   | 0   | 0   | 0    | 0    | 1          |
| CTCSAERASAETLYF  | 0   | 0   | 0    | 0    | 1          |
| CASSRDWGASAETLYF | 0   | 0   | 0    | 0    | 0          |
| CASSQDWGGDEQYF   | 0   | 0   | 0    | 1    | 1          |
| CTCSADWGAETLYF   | 0   | 0   | 0    | 0    | 2          |
| CASGDAPGTNSDYFT  | 0   | 0   | 0    | 0    | 0          |
| CASSDGTGDYAEQFF  | 0   | 0   | 0    | 1    | 1          |
| CASSDGGKANERLFF  | 0   | 0   | 0    | 0    | 0          |
| CTCSADGRGNYAEQFF | 0   | 0   | 0    | 0    | 0          |

| MP-50bp-TCRklass |     |     |      |      |      |
|------------------|-----|-----|------|------|------|
| CDR3             | 10M | 50m | 100m | 200m | 500m |
| CASSSPGQGAREQYF  | 0   | 0   | 0    | 0    | 0    |
| CTCSAGQKAETLYF   | 0   | 0   | 0    | 0    | 1    |
| CTCSAERASAETLYF  | 0   | 0   | 0    | 0    | 0    |
| CASSRDWGASAETLYF | 0   | 0   | 0    | 0    | 0    |
| CASSQDWGGDEQYF   | 0   | 0   | 0    | 1    | 1    |
| CTCSADWGAETLYF   | 0   | 0   | 0    | 0    | 1    |
| CASGDAPGTNSDYFT  | 0   | 0   | 0    | 0    | 0    |
| CASSDGTGDYAEQFF  | 0   | 0   | 0    | 1    | 1    |
| CASSDGGKANERLFF  | 0   | 0   | 0    | 0    | 0    |
| CTCSADGRGNYAEQFF | 0   | 0   | 0    | 0    | 0    |

| MP-50bp-rpsTCR pipeline |     |     |           |           |            |
|-------------------------|-----|-----|-----------|-----------|------------|
| CDR3                    | 10M | 50m | 100m      | 200m      | 500m       |
| CASSSPGQGAREQYF         | 1   | 2   | 5(rank 1) | 9(rank 1) | 21(rank 1) |
| CTCSAGQKAETLYF          | 0   | 0   | 3(rank 2) | 4(rank 2) | 9(rank 2)  |
| CTCSAERASAETLYF         | 0   | 0   | 0         | 1         | 1          |
| CASSRDWGASAETLYF        | 0   | 0   | 0         | 0         | 1          |
| CASSQDWGGDEQYF          | 0   | 0   | 0         | 2         | 7(rank 3)  |
| CTCSADWGAETLYF          | 0   | 0   | 1         | 1         | 4(rank 5)  |
| CASGDAPGTNSDYFT         | 0   | 0   | 0         | 2         | 2          |
| CASSDGTGDYAEQFF         | 0   | 0   | 0         | 0         | 2          |
| CASSDGGKANERLFF         | 0   | 0   | 0         | 0         | 0          |
| CTCSADGRGNYAEQFF        | 0   | 0   | 0         | 0         | 0          |

FIG. 30

Top CDR3s found by MiTCR

| CDR3            | VI-next |          |        | MP-100bp-200M |          |        |
|-----------------|---------|----------|--------|---------------|----------|--------|
|                 | MITCR   | TCRklass | rpsTCR | MITCR         | TCRklass | rpsTCR |
| CATSNYLGYP      | 0       | 0        | 0      | 106           | 0        | 0      |
| CARHYF          | 0       | 0        | 0      | 85            | 0        | 0      |
| CAFFYWLF        | 0       | 0        | 0      | 83            | 0        | 0      |
| CGAGSFQHF       | 0       | 0        | 0      | 60            | 0        | 0      |
| CARGRRITIF      | 0       | 0        | 0      | 49            | 0        | 0      |
| CAKDGGVTIF      | 0       | 0        | 0      | 33            | 0        | 0      |
| CARDRSIF        | 0       | 0        | 0      | 31            | 0        | 0      |
| CARGPRGIF       | 0       | 0        | 0      | 31            | 0        | 0      |
| CARHDLYYF       | 0       | 0        | 0      | 25            | 0        | 0      |
| CASSFKDKRMQDVNF | 0       | 0        | 0      | 24            | 0        | 0      |

Top CDR3s found by TCRklass

| CDR3             | VI-next |          |        | MP-100bp-200M |          |        |
|------------------|---------|----------|--------|---------------|----------|--------|
|                  | MITCR   | TCRklass | rpsTCR | MITCR         | TCRklass | rpsTCR |
| CASLQYF          | 0       | 0        | 0      | 0             | 99       | 0      |
| CASGGKKTSTAFF    | 0       | 0        | 0      | 0             | 97       | 0      |
| CASSSPGQGAREQYF  | 1423    | 1383     | 1374   | 23            | 18       | 13     |
| CASRRGIGNTLF     | 87      | 86       | 86     | 9             | 8        | 8      |
| CTCSAGQKAETLYF   | 805     | 788      | 773    | 8             | 5        | 7      |
| CASRRHLSYEYF     | 8       | 8        | 8      | 6             | 5        | 6      |
| CASGDAPGTNSDYTF  | 237     | 231      | 231    | 6             | 4        | 4      |
| CASSQDWGGDEYF    | 287     | 277      | 274    | 4             | 4        | 4      |
| CASSGRDRGLGNTLYF | 77      | 76       | 75     | 4             | 4        | 4      |
| CGARDRGSNTLYF    | 1       | 1        | 1      | 4             | 4        | 7      |

Top CDR3s found by rps TCR pipeline

| CDR3             | VI-next |          |        | MP-100bp-200M |          |        |
|------------------|---------|----------|--------|---------------|----------|--------|
|                  | MITCR   | TCRklass | rpsTCR | MITCR         | TCRklass | rpsTCR |
| CASSSPGQGAREQYF  | 1423    | 1383     | 1374   | 23            | 18       | 13     |
| CASRRGIGNTLF     | 87      | 86       | 86     | 9             | 8        | 8      |
| CTCSAGQKAETLYF   | 805     | 788      | 773    | 8             | 5        | 7      |
| CGARDRGSNTLYF    | 1       | 1        | 1      | 4             | 4        | 7      |
| CASRRHLSYEYF     | 8       | 8        | 8      | 6             | 5        | 6      |
| CASSQDPWGVVEYF   | 2       | 2        | 2      | 3             | 3        | 5      |
| CASGDAPGTNSDYTF  | 237     | 231      | 231    | 6             | 4        | 4      |
| CASSQDWGGDEYF    | 287     | 277      | 274    | 4             | 4        | 4      |
| CASSGRDRGLGNTLYF | 77      | 76       | 75     | 4             | 4        | 4      |
| CASSDHSSAETLYF   | 78      | 77       | 77     | 3             | 3        | 4      |



FIG. 32

| CDR3              | # of cells | Single cell sequencing (75bp) |          |        | Bulk RNA sequencing (80bp) |          |        |
|-------------------|------------|-------------------------------|----------|--------|----------------------------|----------|--------|
|                   |            | MITCR                         | TCRklass | rpsTCR | MITCR                      | TCRklass | rpsTCR |
| CASSPTGYNSPLYF    | 4          | 495                           | 463      | 982    | 242                        | 302      | 512    |
| CASSQVQGS AETLYF  | 9          | 142                           | 138      | 646    | 200                        | 183      | 394    |
| CASSGTGGNQDTQYF   | 1          | 495                           | 408      | 595    | 0                          | 0        | 0      |
| CASGDAGTGN YAEQFF | 1          | 282                           | 247      | 399    | 32                         | 26       | 29     |
| CASSLRTGYNSPLYF   | 3          | 206                           | 202      | 294    | 123                        | 141      | 114    |
| CASRLGGDQNTLYF    | 3          | 292                           | 151      | 291    | 82                         | 93       | 131    |
| CASKTGGYEQYF      | 1          | 297                           | 140      | 285    | 154                        | 93       | 75     |
| CASSEGDTLYF       | 1          | 370                           | 307      | 229    | 46                         | 38       | 18     |
| CASSPGTFNQDTQYF   | 3          | 113                           | 78       | 195    | 45                         | 23       | 36     |
| CASASWTGDEQYF     | 1          | 110                           | 49       | 144    | 0                          | 0        | 0      |
| CASSLPQSQNTLYF    | 1          | 98                            | 61       | 140    | 0                          | 0        | 0      |
| CASSRDWAQDTQYF    | 2          | 127                           | 81       | 128    | 141                        | 125      | 169    |
| CASSDNWGAGEQYF    | 1          | 161                           | 107      | 99     | 5                          | 5        | 2      |
| CASSSGTASDTQYF    | 1          | 41                            | 30       | 86     | 0                          | 0        | 0      |
| CASSQTRDWGYEQYF   | 1          | 33                            | 17       | 75     | 28                         | 18       | 70     |
| CTCSGGLGLEQYF     | 1          | 66                            | 34       | 74     | 10                         | 6        | 9      |
| CASSLGTGGIEQYF    | 1          | 56                            | 32       | 54     | 4                          | 4        | 5      |
| CASSLSDSNQDTQYF   | 1          | 52                            | 47       | 50     | 0                          | 0        | 0      |
| CASSERGG RDTQYF   | 1          | 49                            | 34       | 46     | 0                          | 0        | 0      |
| CTCSAVREGNSPLYF   | 1          | 41                            | 34       | 46     | 6                          | 5        | 4      |
| CASSLTGVSNERLFF   | 1          | 74                            | 63       | 42     | 0                          | 0        | 0      |
| CASSRQLNSDYTF     | 2          | 50                            | 46       | 35     | 129                        | 114      | 96     |
| CASSLRQGSNTEVFF   | 1          | 34                            | 32       | 34     | 40                         | 28       | 20     |
| CASSQNRDISAETLYF  | 1          | 22                            | 23       | 34     | 77                         | 76       | 117    |
| CASSWTANTEVFF     | 1          | 72                            | 42       | 30     | 0                          | 0        | 0      |
| CASSLRDWGQDTQYF   | 1          | 26                            | 19       | 28     | 39                         | 27       | 39     |
| CASSHWGGTTGQLYF   | 1          | 28                            | 27       | 21     | 0                          | 0        | 0      |
| CASSYSKGS AETLYF  | 1          | 17                            | 17       | 17     | 0                          | 0        | 0      |
| CAVSMINYNVLYF     | 1          | 0                             | 1        | 17     | 0                          | 6        | 13     |
| CASSDGQYEQYF      | 1          | 10                            | 7        | 14     | 0                          | 0        | 0      |
| CASSQRTGQNTLYF    | 1          | 12                            | 9        | 6      | 0                          | 0        | 0      |
| CASSQEGPGQLYF     | 1          | 8                             | 7        | 5      | 39                         | 35       | 27     |
| CASTGQGYNSPLYF    | 1          | 0                             | 1        | 1      | 0                          | 0        | 0      |
| CGANSQIQLAVFF     | 1          | 5                             | 0        | 0      | 0                          | 0        | 0      |
| CSFIYF            | 1          | 4                             | 0        | 0      | 5                          | 0        | 0      |
| CAARGYNQGLIF      | 1          | 3                             | 0        | 0      | 0                          | 0        | 0      |