

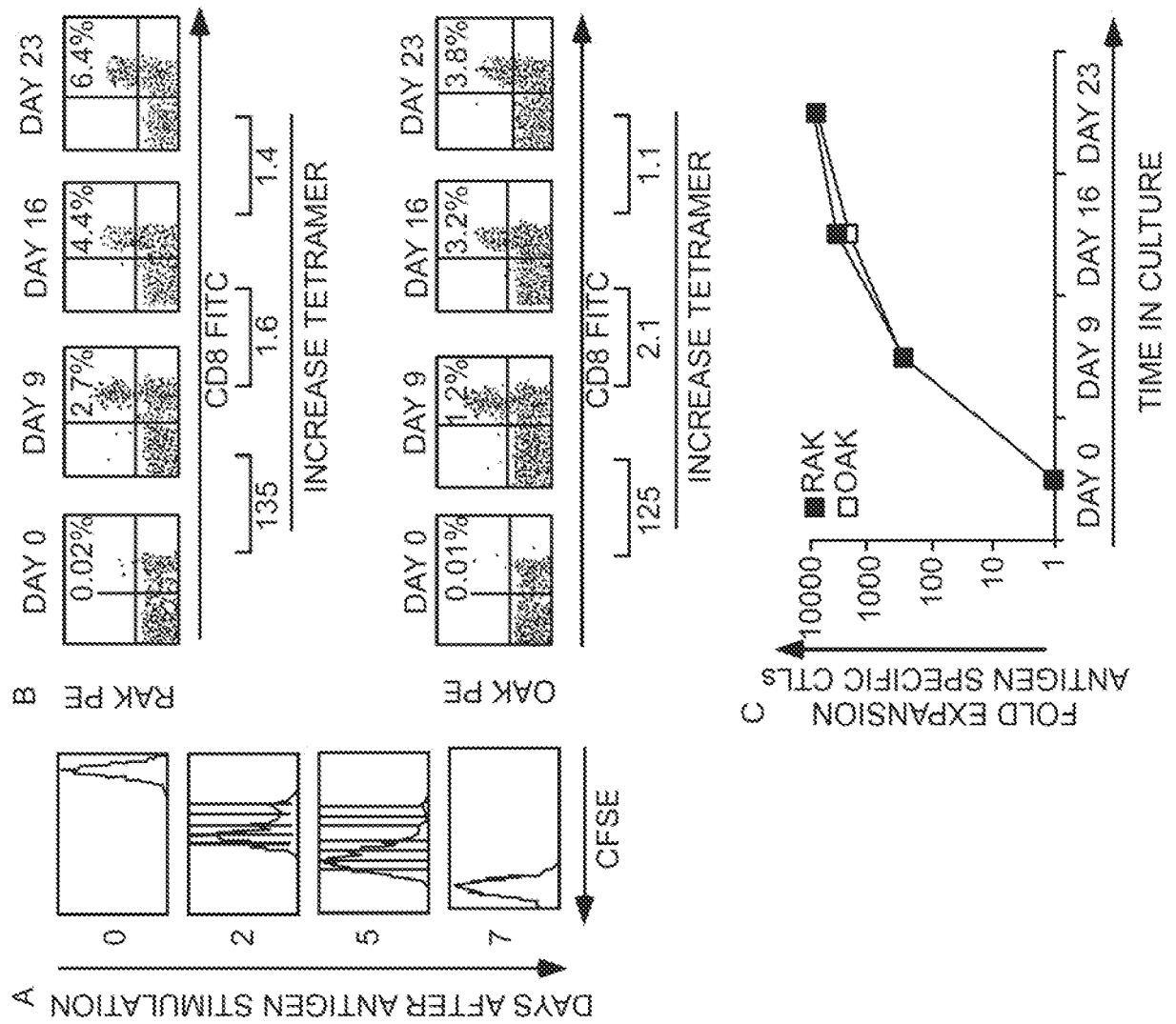


Fig. 1

Fig. 2

EXPECTED AND OBSERVED CTL EXPANSION							
CELL DOUBLING	1	2	3	4	5	6	7
EXPECTED FOLD EXPANSION	2	4	8	16	32	64	128
OBSERVED FOLD EXPANSION (DAY 0 TO 9)							258 RANGE (48 TO 409)
OBSERVED FOLD EXPANSION (DAY 9 TO 16)							5.7 RANGE (2.2 TO 10.6)
OBSERVED FOLD EXPANSION (DAY 16 TO 23)							4.3 RANGE (4.1 TO 14.9)

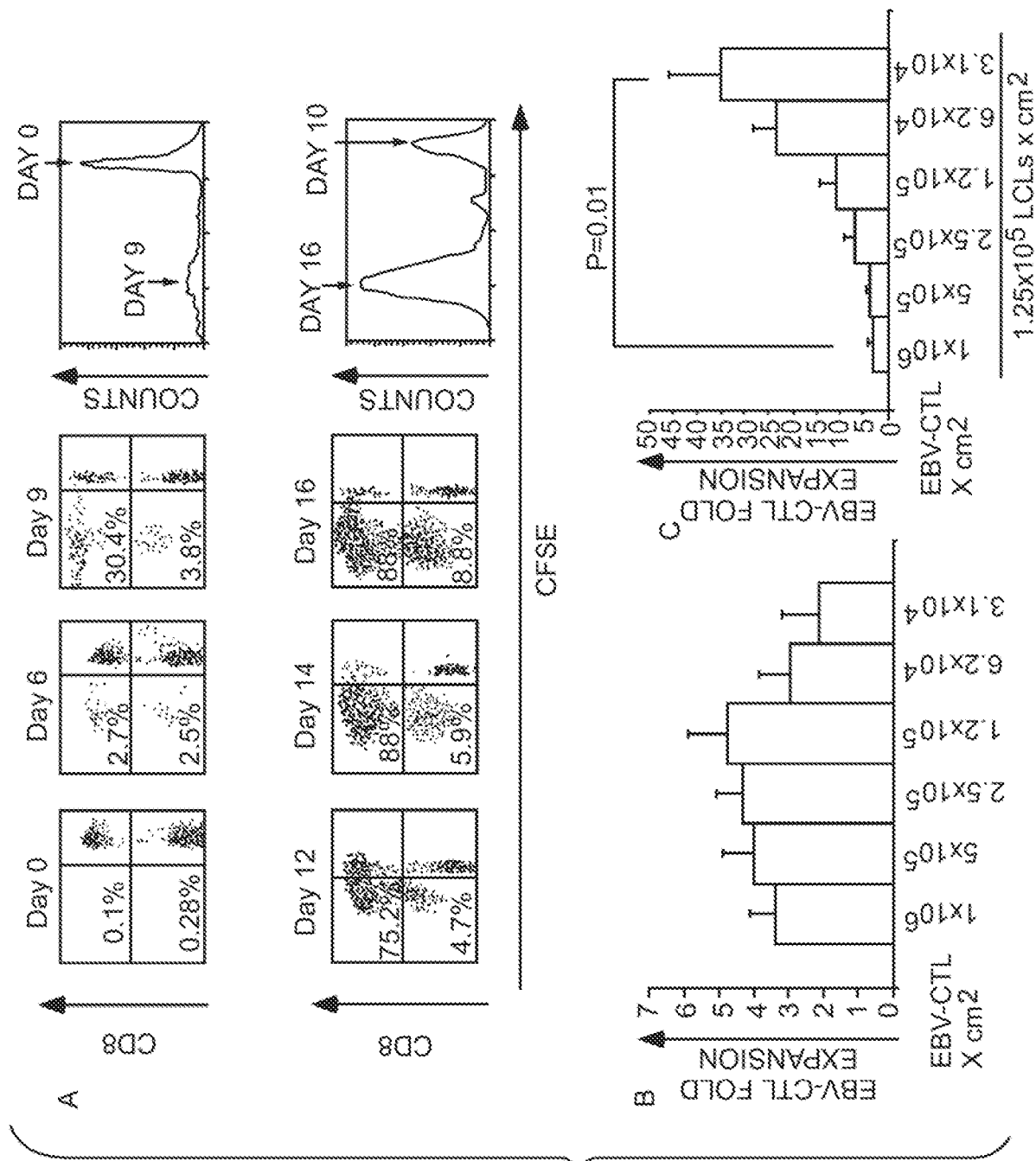
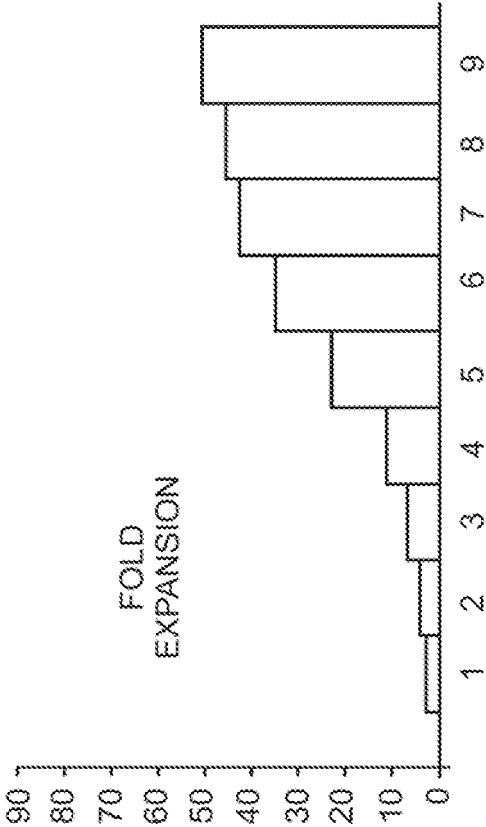
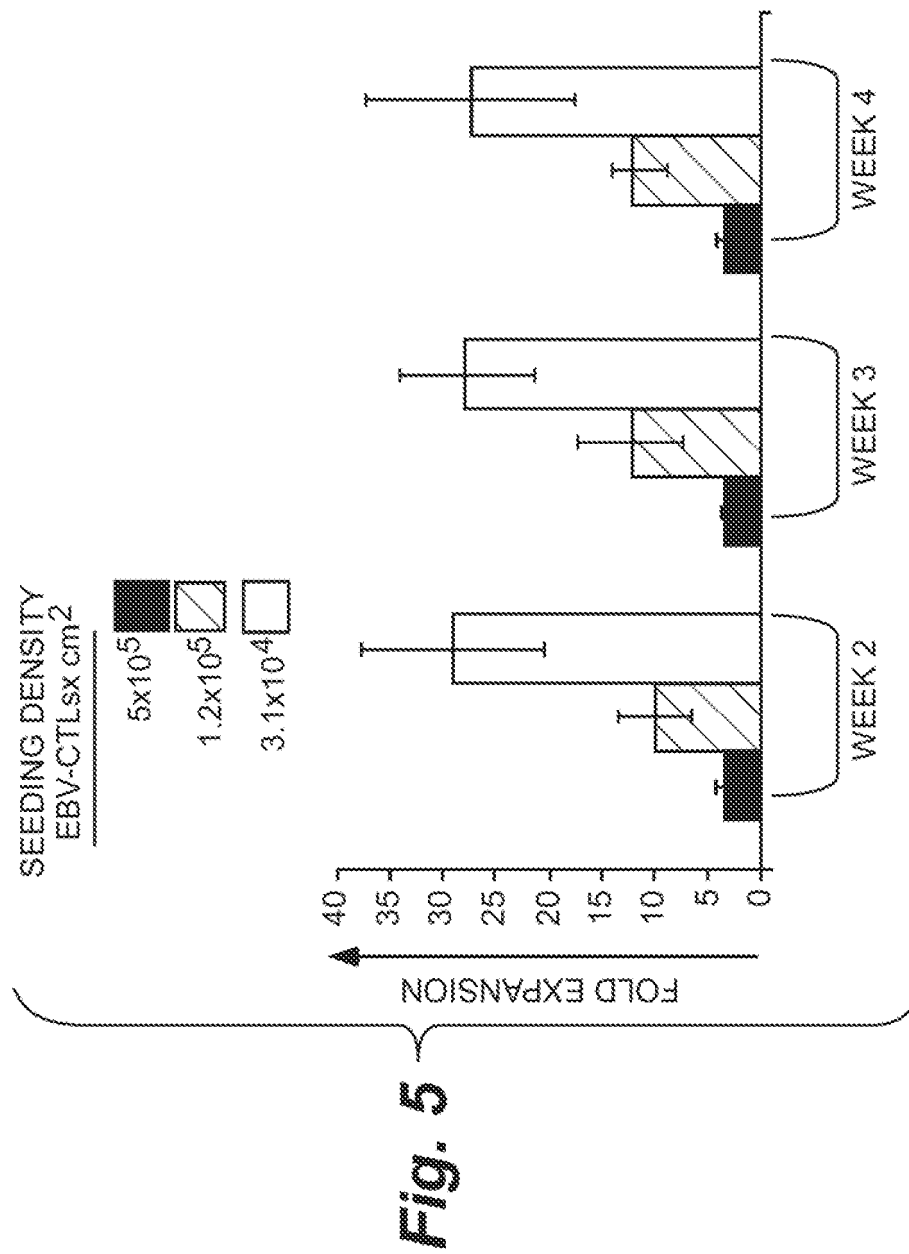
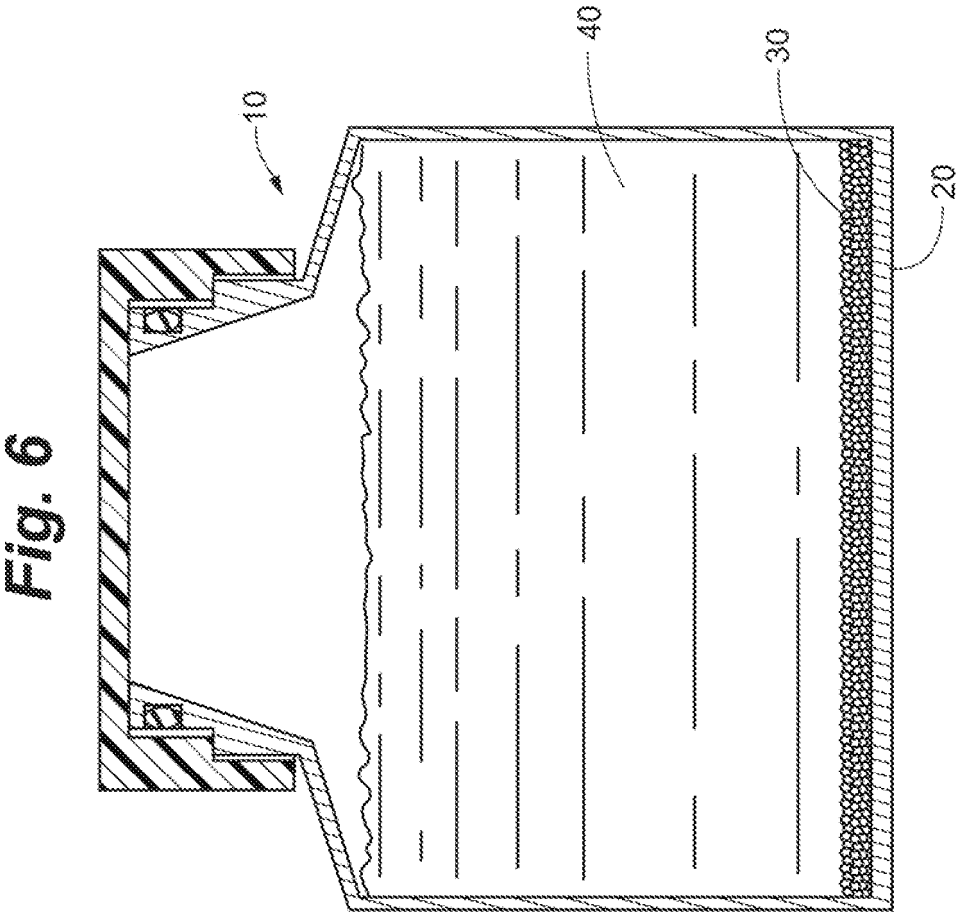


Fig. 4

	CTL/cm ²	LCL/cm ²	TOTAL CTL + LCL	R:S RATIO
1	1,000,000	125,000	1,125,000	8:1
2	500,000	125,000	625,000	4:1
3	250,000	125,000	375,000	2:1
4	125,000	125,000	250,000	1:1
5	62,500	125,000	187,500	1:2
6	31,250	125,000	156,250	1:4
7	15,625	125,000	140,625	1:8
8	7,812	125,000	132,812	1:16
9	3,906	125,000	128,906	1:32







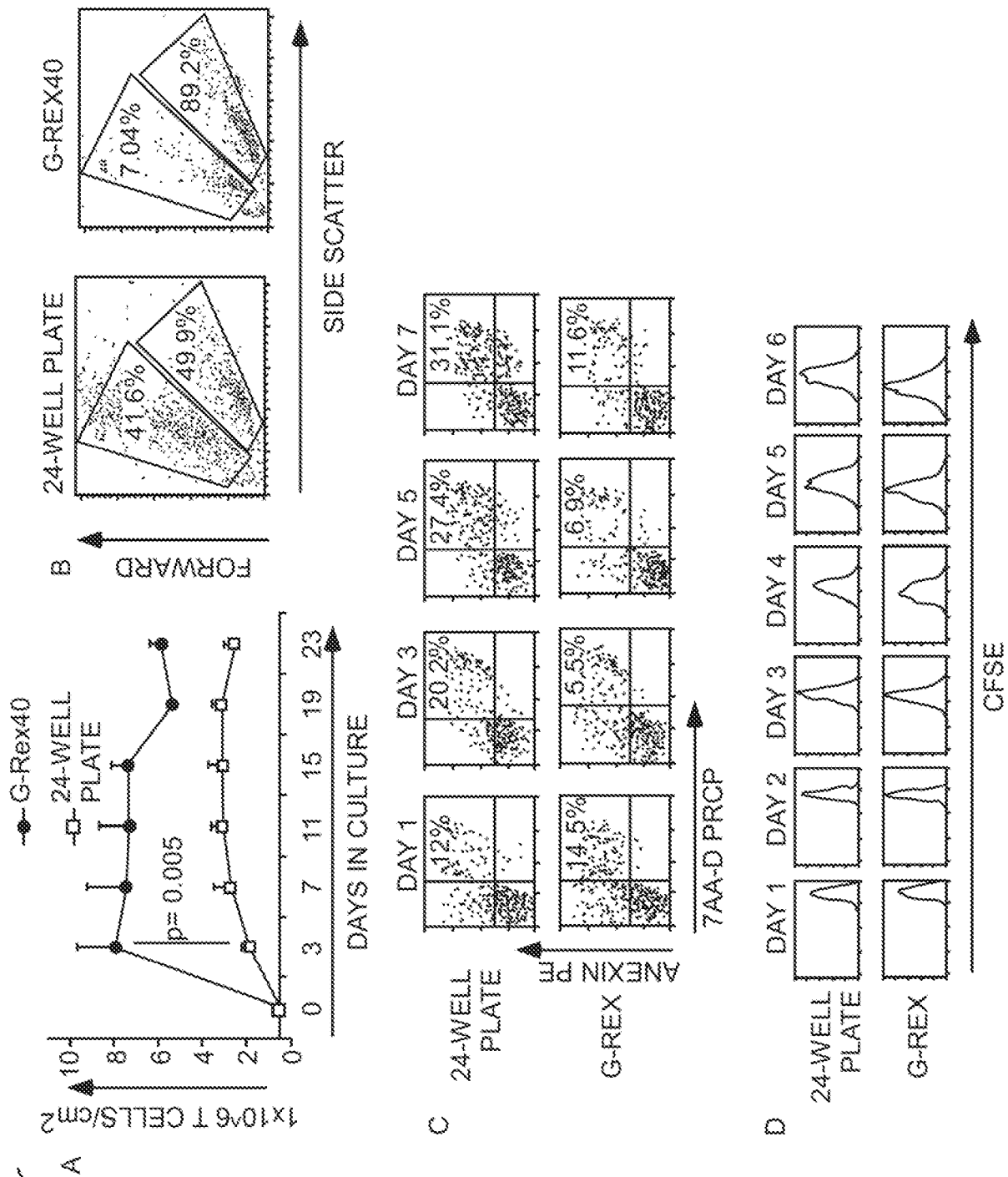


Fig. 7

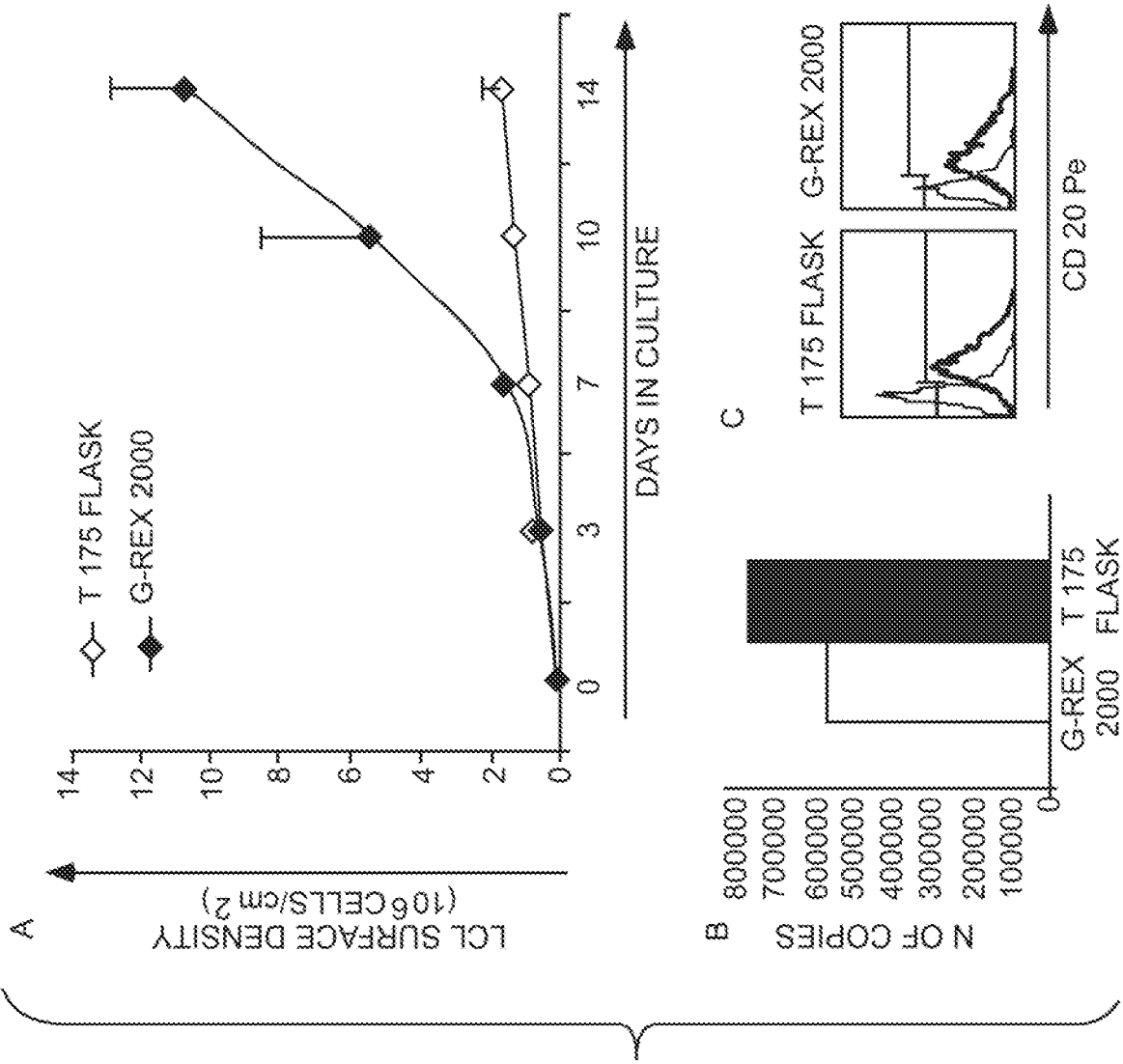


Fig. 8

Fig. 9

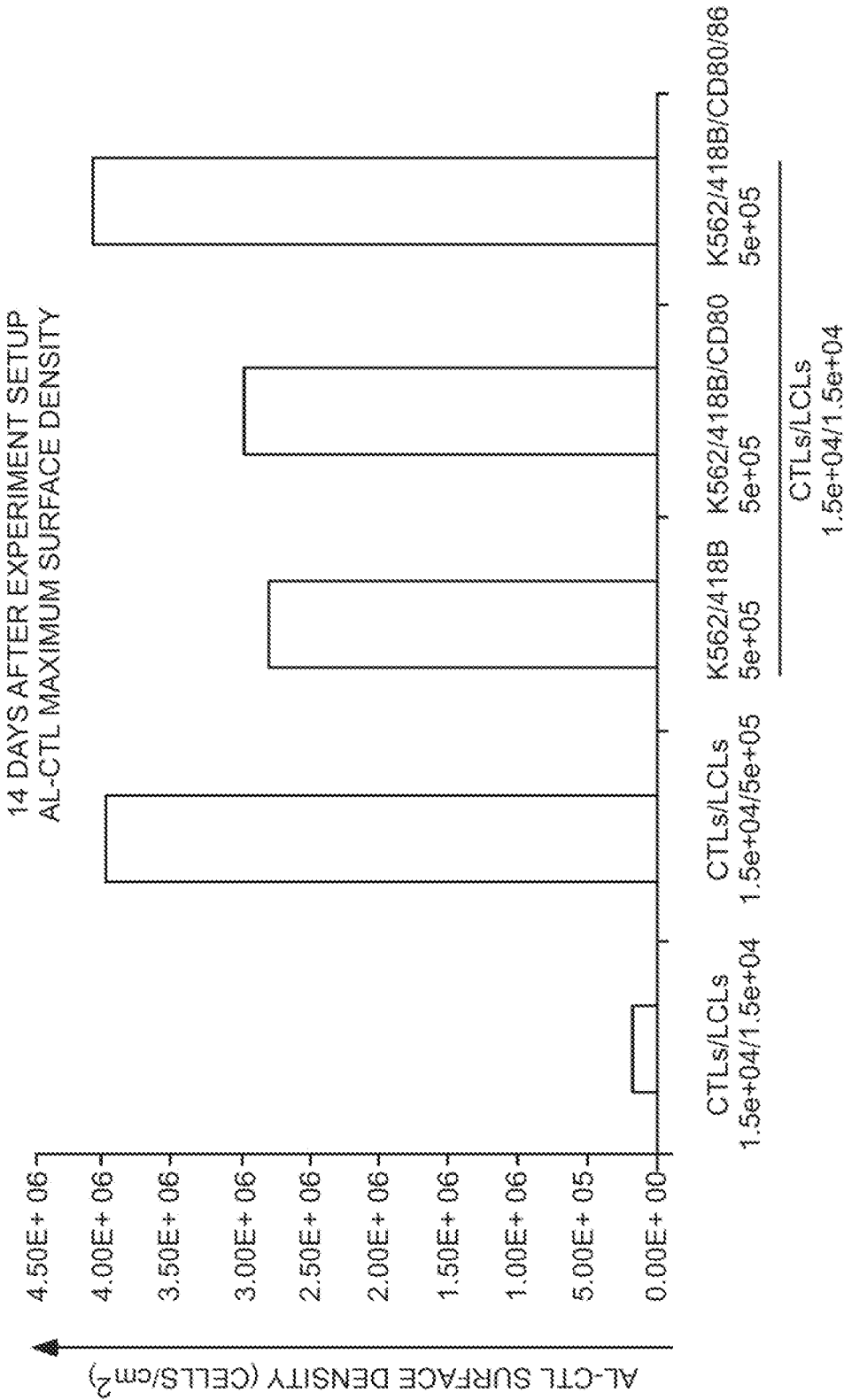


Fig. 10

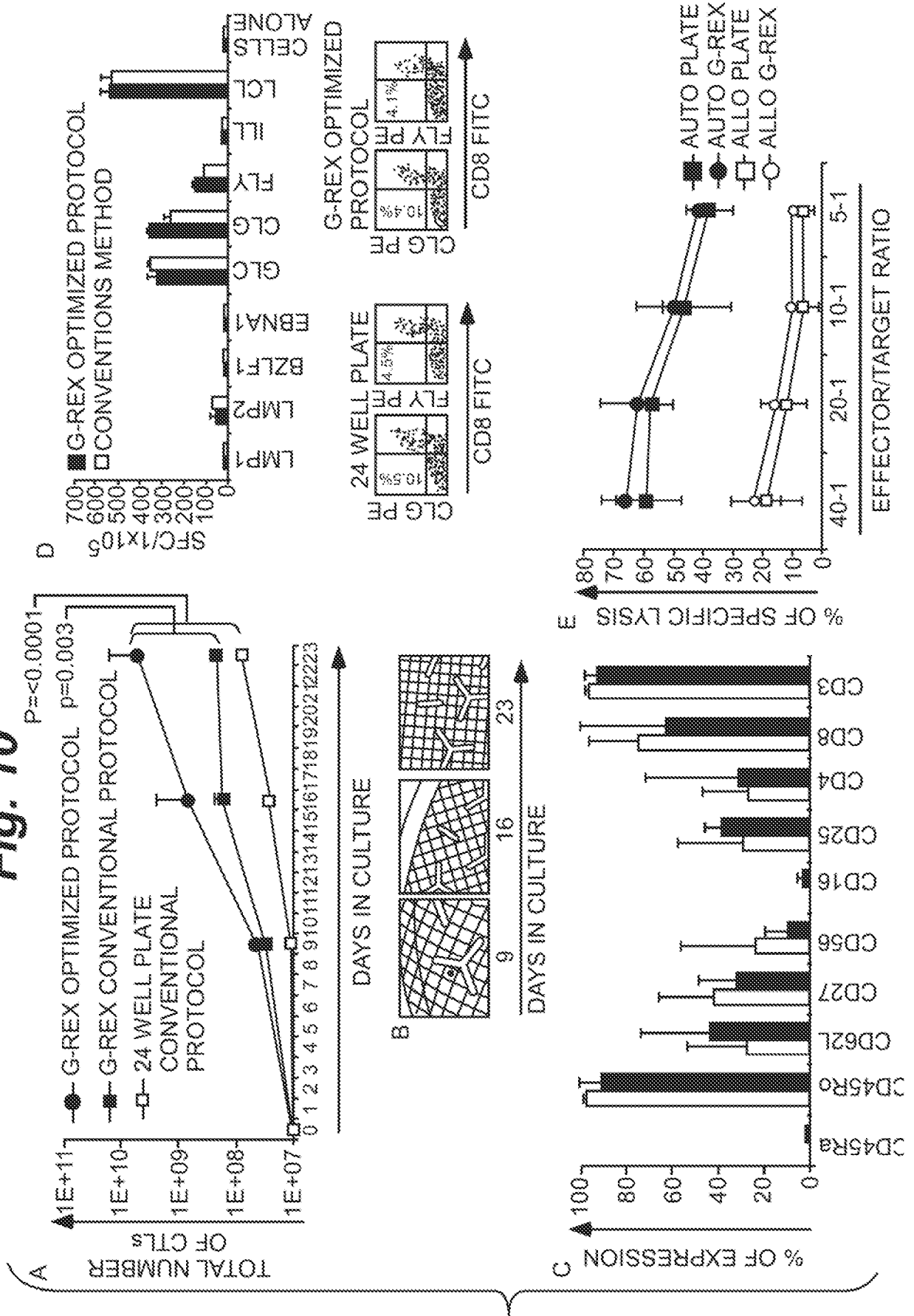


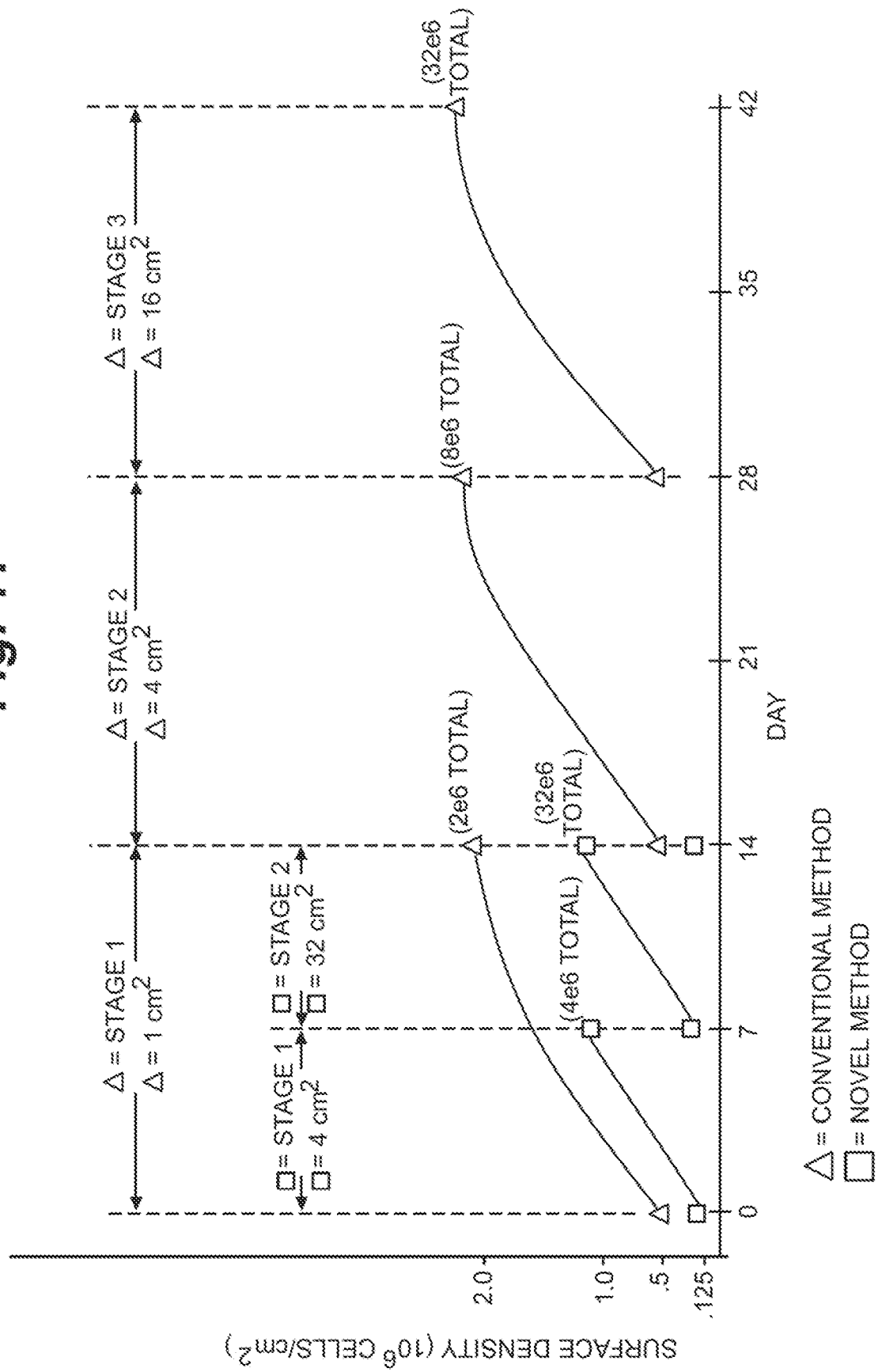
Fig. 11

Fig. 12

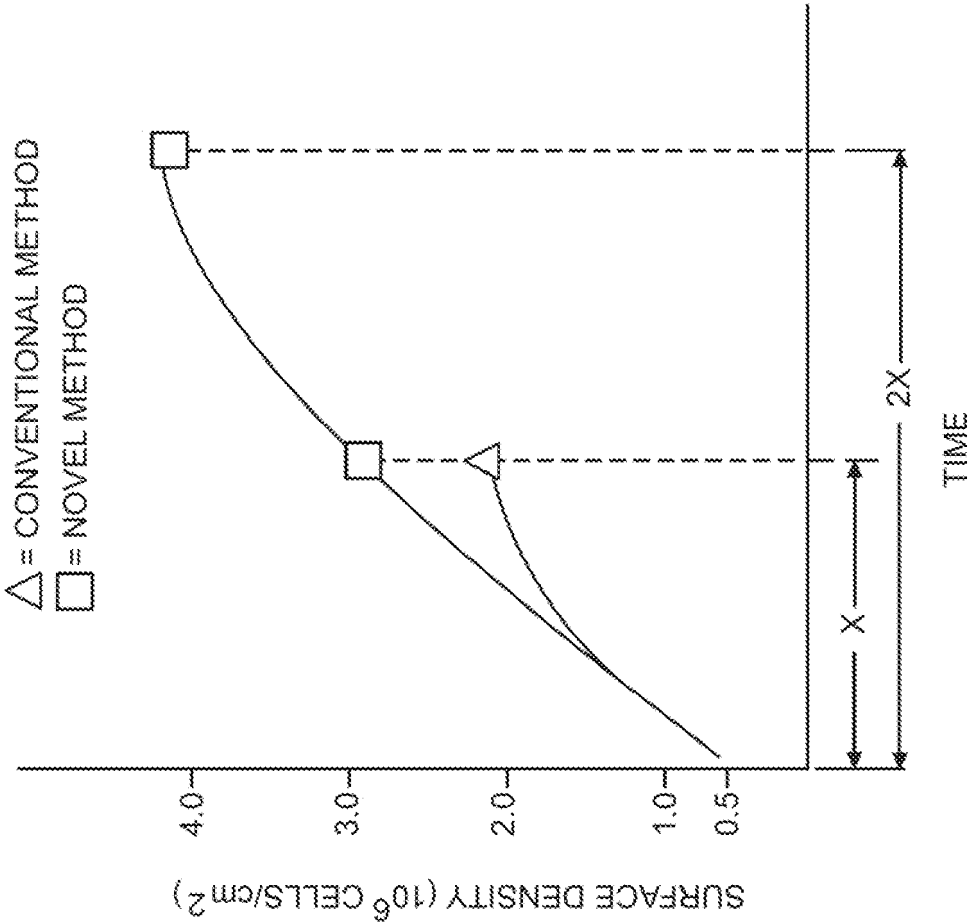


Fig. 13

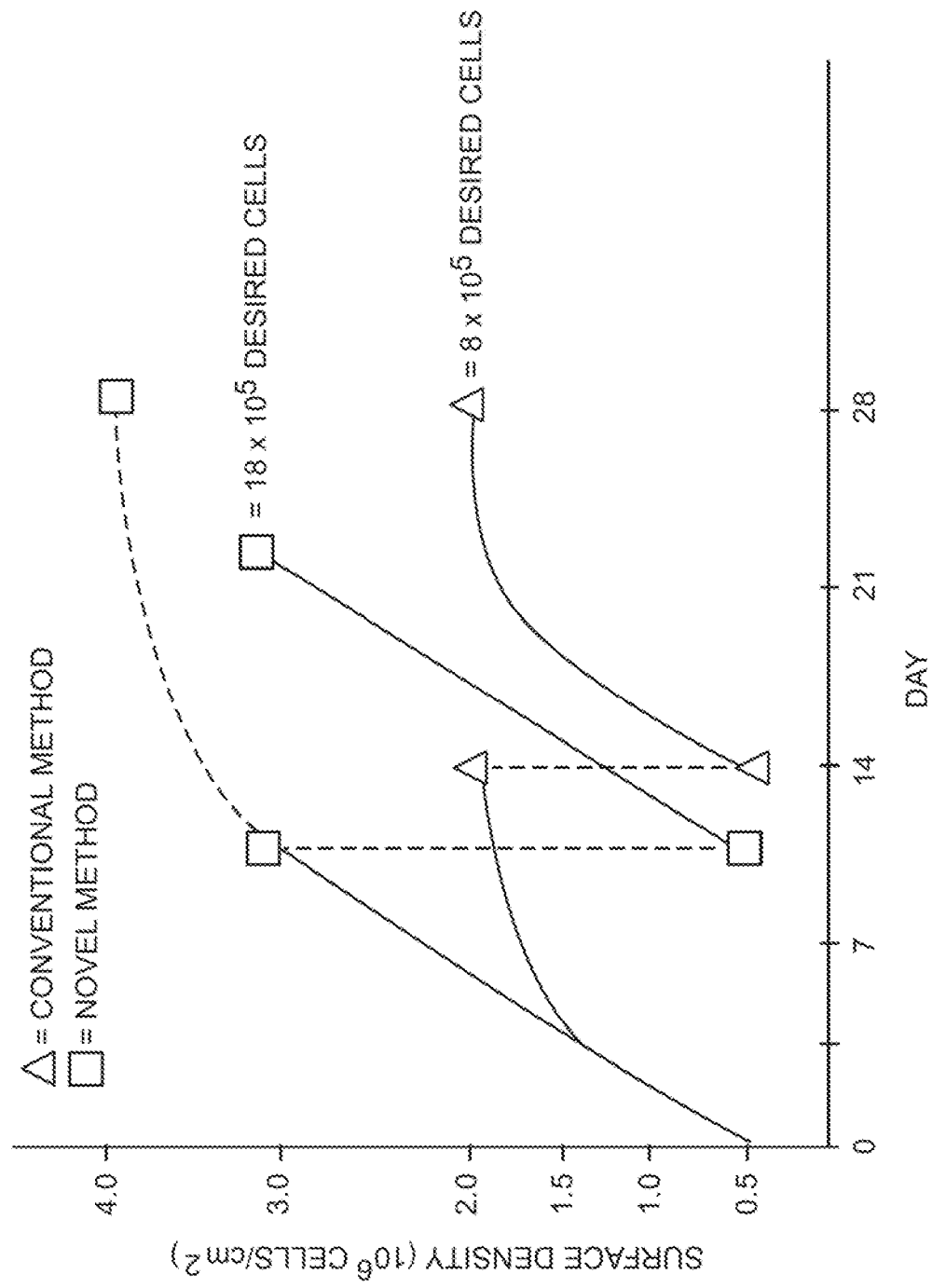


Fig. 14

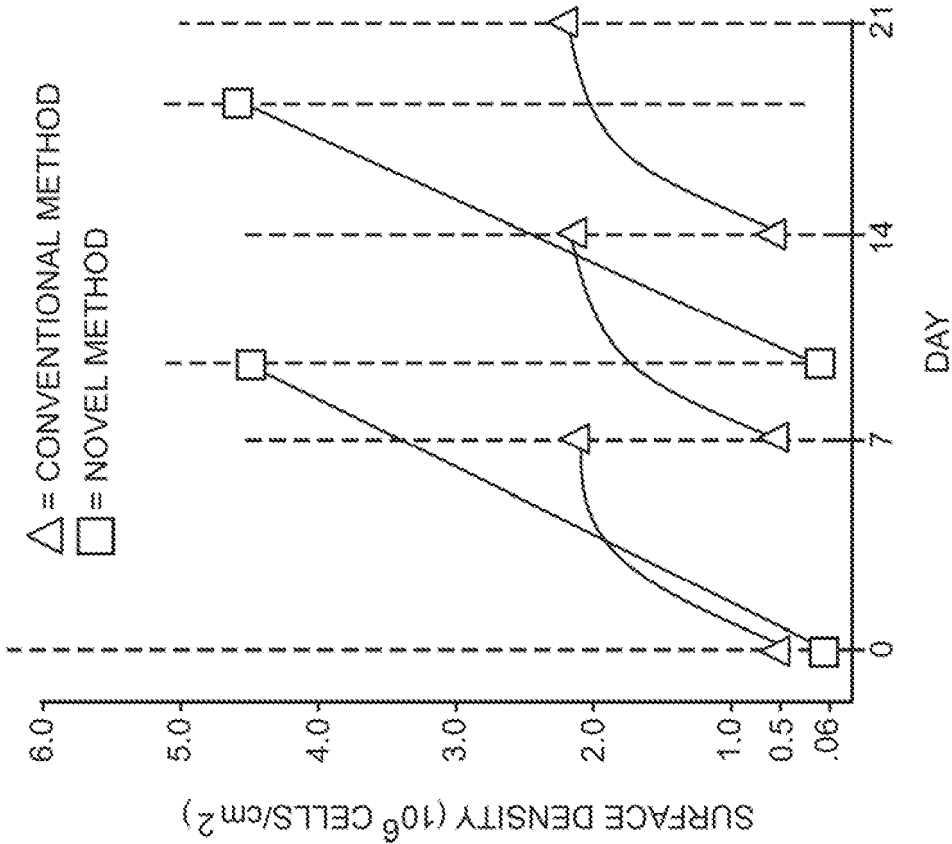


Fig. 15

	CONVENTIONAL				
CYCLE	1	2	3	4	5
DAYS PER CYCLE	7	7	7	7	7
CUMULATIVE DAYS	7	14	21	28	35
SURFACE AREA (CM ²)	4	16	64	256	1024
STARTING SURFACE DENSITY (CELLS/CM ²)	1	1	1	1	1
FINAL SURFACE DENSITY (CELLS/CM ²)	2	2	2	2	2
CELLS PRODUCED (x10 ⁶)	8	32	128	512	2048
		NOVEL			
CYCLE	1	2	3		
DAYS PER CYCLE (APPROX.)	9.5	9.5	15.0		
CUMULATIVE DAYS	9.5	19.0	34.0		
SURFACE AREA (CM ²)	8	625	46875		
STARTING SURFACE DENSITY (CELLS/CM ²)	0.06	0.06	0.06		
FINAL SURFACE DENSITY (CELLS/CM ²)	4.50	4.50	4.50		
CELLS PRODUCED (x10 ⁶)	38	2813	210938		

Fig. 16

	CONVENTIONAL				
CYCLE	1	2	3	4	5
DAYS PER CYCLE	7	7	7	7	7
CUMULATIVE DAYS	7	14	21	28	35
SURFACE AREA (CM ²)	4	16	64	256	1024
STARTING SURFACE DENSITY (CELLS/CM ²)	1	1	1	1	1
FINAL SURFACE DENSITY (CELLS/CM ²)	2	2	2	2	2
CELLS PRODUCED (x10 ⁶)	8	32	128	512	2048
		NOVEL			
CYCLE	1	2	3		
DAYS PER CYCLE (APPROX.)	9.5	9.5	15.0		
CUMULATIVE DAYS	9.5	19.0	34.0		
SURFACE AREA (CM ²)	8	625	4018		
STARTING SURFACE DENSITY (CELLS/CM ²)	0.06	0.06	0.70		
FINAL SURFACE DENSITY (CELLS/CM ²)	4.50	4.50	7.50		
CELLS PRODUCED (x10 ⁶)	38	2813	30134		

Fig. 17A

ROW			DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	1.00E + 06				
2	SURFACE AREA OF GROWTH SURFACE (cm ²)		100	100	100	100
3	MEDIUM VOLUME (ml)		1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)		10	10	10	10
5	MEDIA HEIGHT (cm)		10	10	10	10
6	SURFACE DENSITY (cells/cm ²)		1.00E + 06	4.71E + 06	9.79E + 06	9.73E + 06
7	CELL DENSITY (cells/ml)		1.00E + 05	4.71E + 05	9.79E + 05	9.73E + 05
8	GLUCOSE CONCENTRATION (mg/dl)	240	240	112	56	0
9	GLUCOSE CONSUMPTION IN (mg/ml)		0	128	184	240
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE		0.00E + 00	6.40E + 08	9.20E + 08	1.20E + 09
11	VIABILITY		100%	100%	99%	90%
12	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT		1.00E + 08	4.71E + 08	9.79E + 08	9.73E + 08

Fig. 17B

ROW		DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	5.00E + 05			
2	SURFACE AREA OF GROWTH SURFACE (cm ²)	100	100	100	100
3	MEDIUM VOLUME (ml)	1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)	10	10	10	10
5	MEDIA HEIGHT (cm)	10	10	10	10
6	SURFACE DENSITY (cells/cm ²)	5.00E + 05	3.23E + 06	8.60E + 06	9.53E + 06
7	CELL DENSITY (cells/ml)	5.00E + 04	3.23E + 05	8.60E + 05	9.53E + 05
8	GLUCOSE CONCENTRATION (mg/dl)	240	132	76	0
9	GLUCOSE CONSUMPTION IN (mg/ml)	0	108	164	240
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE	0.00E + 00	5.40E + 08	8.20E + 08	1.20E + 09
11	VIABILITY	100%	100%	100%	91%
12	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT	5.00E + 07	3.23E + 08	8.60E + 08	9.53E + 08

Fig. 17C

ROW			DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	2.50E + 05				
2	SURFACE AREA OF GROWTH SURFACE (cm ²)		100	100	100	100
3	MEDIUM VOLUME (ml)		1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)		10	10	10	10
5	MEDIA HEIGHT (cm)		10	10	10	10
6	SURFACE DENSITY (cells/cm ²)		2.50E + 05	3.02E + 06	7.53E + 06	1.02E + 07
7	CELL DENSITY (cells/ml)		2.50E + 04	3.02E + 05	7.53E + 05	1.02E + 06
8	GLUCOSE CONCENTRATION (mg/dl)	240	240	134	98	0
9	GLUCOSE CONSUMPTION IN (mg/ml)		0	106	142	240
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE		0.00E + 00	5.30E + 08	7.10E + 08	1.20E + 09
11	VIABILITY		100%	100%	100%	94%
12	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT		2.50E + 07	3.02E + 08	7.53E + 08	1.02E + 09

Fig. 17D

ROW			DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	1.25E + 05				
2	SURFACE AREA OF GROWTH SURFACE (cm ²)		100	100	100	100
3	MEDIUM VOLUME (ml)		1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)		10	10	10	10
5	MEDIA HEIGHT (cm)		10	10	10	10
6	SURFACE DENSITY (cells/cm ²)		1.25E + 05	2.65E + 06	6.55E + 06	9.88E + 06
7	CELL DENSITY (cells/ml)		1.25E + 04	2.65E + 05	6.55E + 05	9.88E + 05
8	GLUCOSE CONCENTRATION (mg/dl)	240	240	176	111	18
9	GLUCOSE CONSUMPTION IN (mg/ml)		0	64	129	222
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE		0.00E + 00	3.20E + 08	6.45E + 08	1.11E + 09
11	VIABILITY		100%	100%	100%	98%
12	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT		1.25E + 07	2.65E + 08	6.55E + 08	9.88E + 08

Fig. 17E

ROW			DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	6.25E + 04				
2	SURFACE AREA OF GROWTH SURFACE (cm ²)		100	100	100	100
3	MEDIUM VOLUME (ml)		1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)		10	10	10	10
5	MEDIA HEIGHT (cm)		10	10	10	10
6	SURFACE DENSITY (cells/cm ²)		6.25E + 04	4.00E + 05	1.24E + 06	1.63E + 06
7	CELL DENSITY (cells/ml)		6.25E + 03	4.00E + 04	1.24E + 05	1.63E + 05
8	GLUCOSE CONCENTRATION (mg/dl)	240	240	232	202	184
9	GLUCOSE CONSUMPTION IN (mg/ml)		0	8	38	56
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE		0.00E + 00	4.00E + 07	1.90E + 08	2.80E + 08
11	VIABILITY		100%	100%	100%	100%
12	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT		6.25E + 06	4.00E + 07	1.24E + 08	1.63E + 08

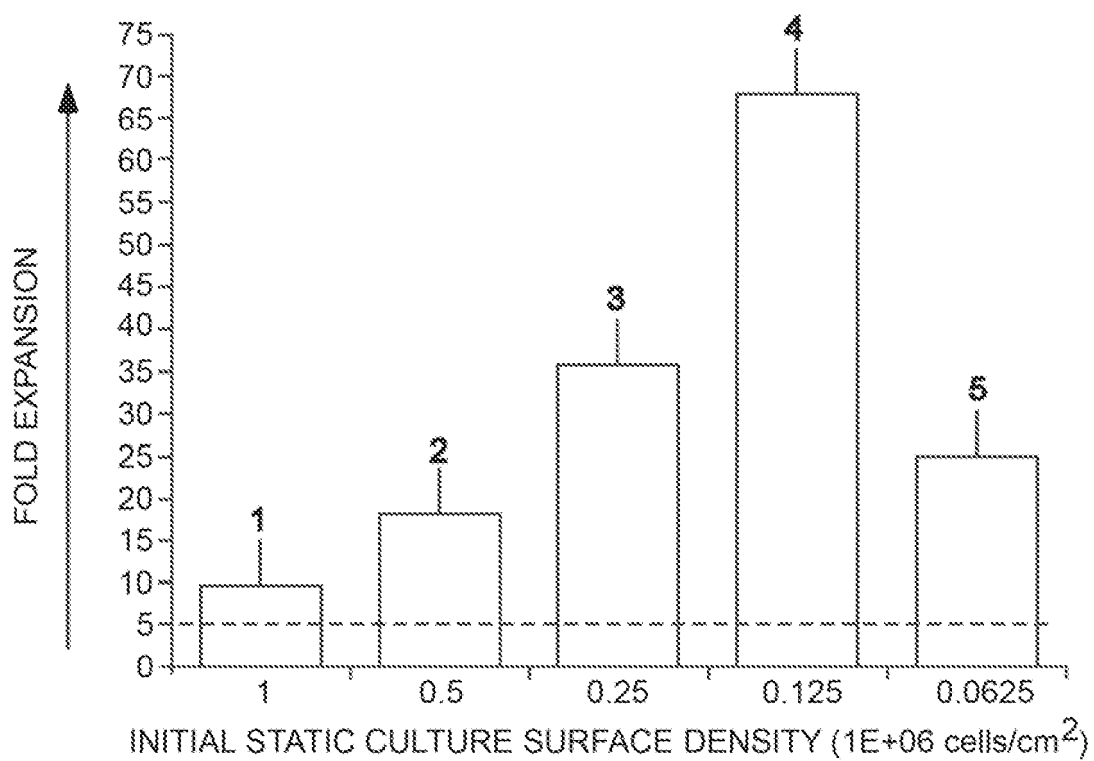
Fig. 18

Fig. 19A

ROW		DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	1.25E + 05			
2	SURFACE AREA OF GROWTH SURFACE (cm ²)	100	100	100	100
3	MEDIUM VOLUME IN ml	1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (mls/cm ²)	10	10	10	10
5	MEDIA HEIGHT (cm)	10	10	10	10
6	SURFACE DENSITY (cells/cm ²)	1.25E + 05	2.65E + 06	6.55E + 06	9.88E + 06
7	CELL DENSITY (cells/ml)	1.25E + 04	2.65E + 05	6.55E + 05	9.88E + 05
8	GLUCOSE CONCENTRATION (mg/dl)	240	176	111	18
9	GLUCOSE CONSUMPTION (mg/ml)	0	64	129	222
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE	0.00E + 00	3.00E + 08	6.19E + 08	1.07E + 09
11	VIABILITY	100%	100%	100%	98%
12	TOTAL LIVE CELLS	1.25E + 07	2.65E + 08	6.55E + 08	9.88E + 08
ROW		DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²)	1.25E + 05			
2	SURFACE AREA OF GROWTH SURFACE (cm ²)	100	100	100	100
3	MEDIUM VOLUME IN ml	1000	1000	1000	1000
4	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (mls/cm ²)	10	10	10	10
5	MEDIA HEIGHT (cm)	10	10	10	10
6	SURFACE DENSITY (cells/cm ²)	1.25E + 05	5.13E + 06	9.26E + 06	1.05E + 07
7	CELL DENSITY (cells/ml)	1.25E + 04	5.13E + 05	9.26E + 05	1.05E + 06
8	GLUCOSE CONCENTRATION (mg/dl)	475	374	287	256
9	GLUCOSE CONSUMPTION (mg/ml)	0	107	193	219
10	PREDICTED CELL NUMBER BY USE OF GLUCOSE	0.00E + 00	5.13E + 08	9.20E + 08	1.00E + 09
11	VIABILITY	100%	100%	100%	98%
12	TOTAL LIVE CELLS	1.25E + 07	5.13E + 08	9.26E + 08	1.05E + 09

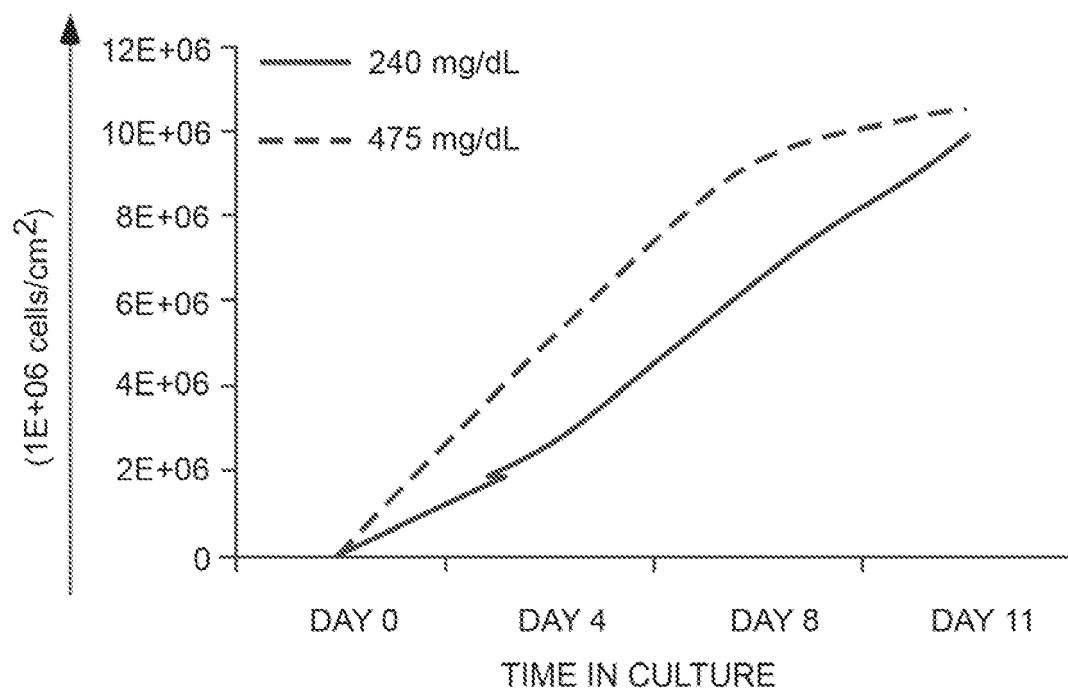
Fig. 19B

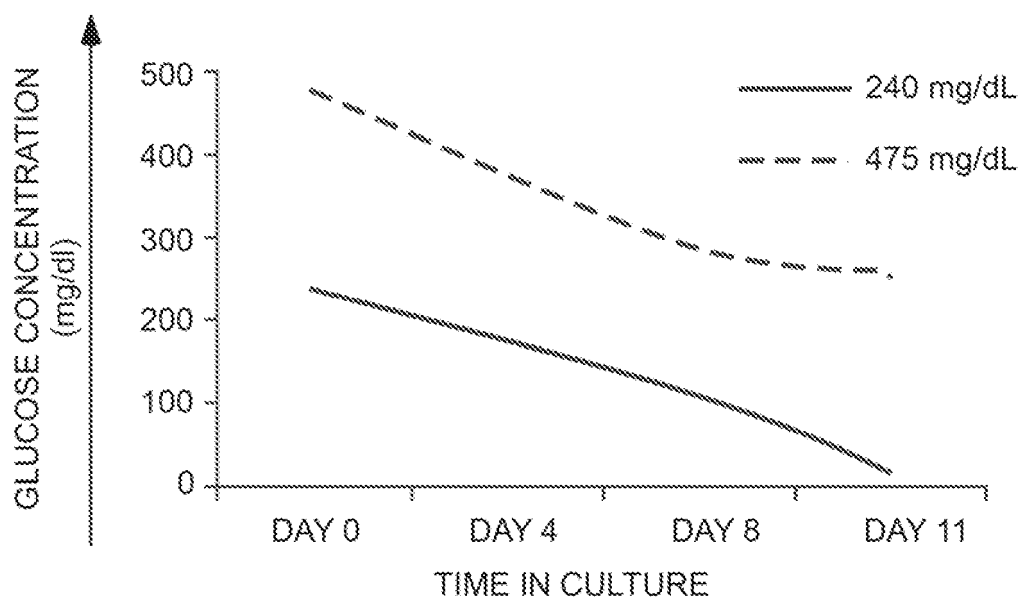
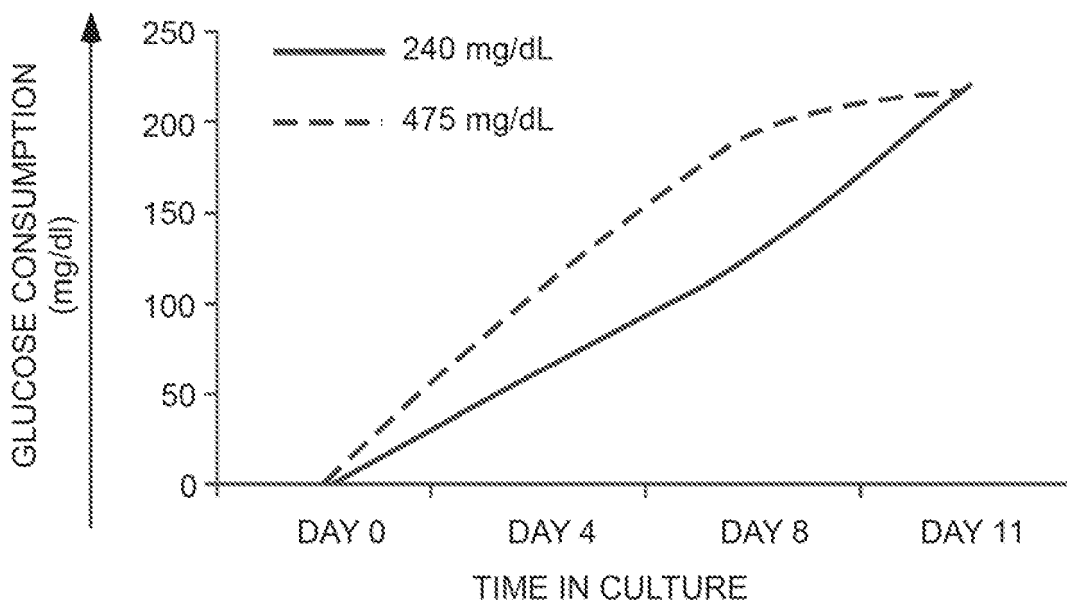
Fig. 19C**Fig. 19D**

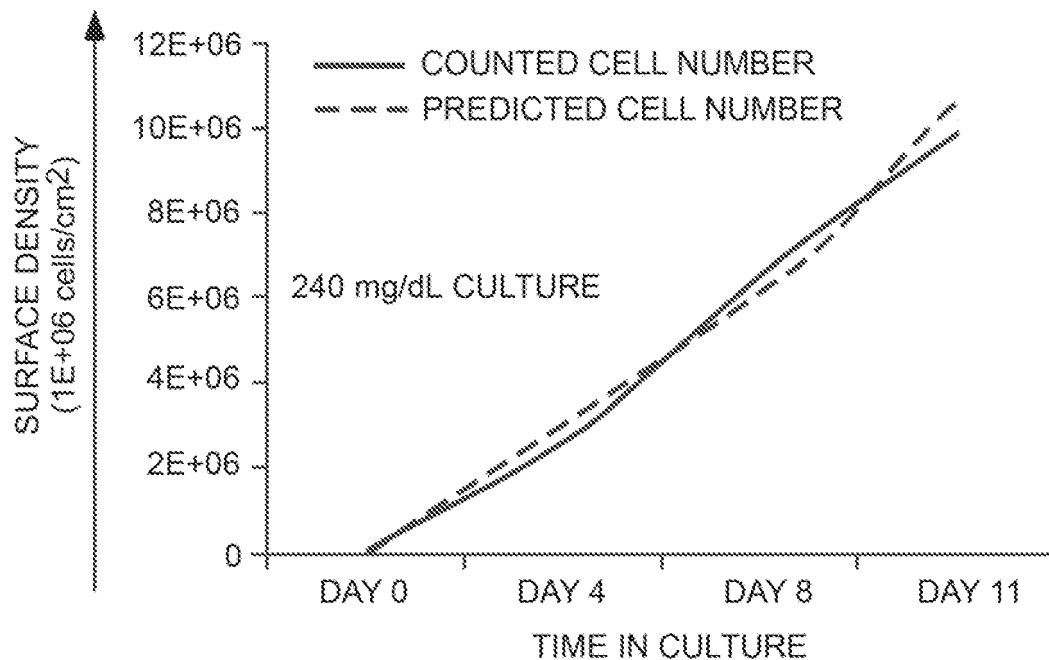
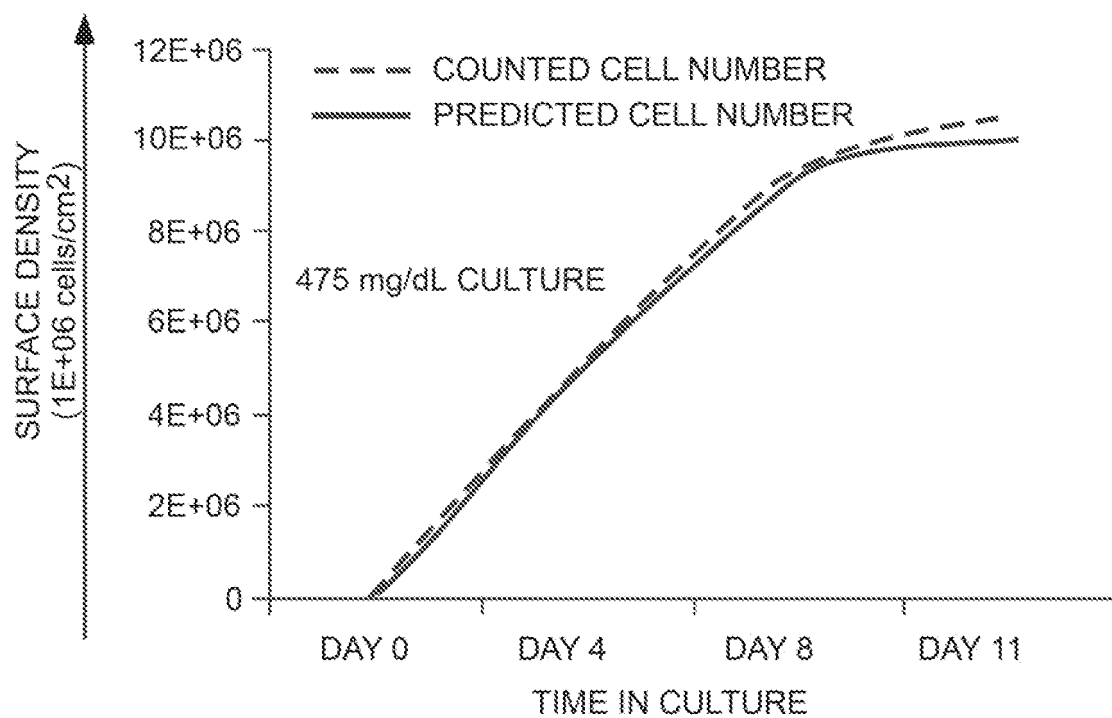
Fig. 19E**Fig. 19F**

Fig. 20

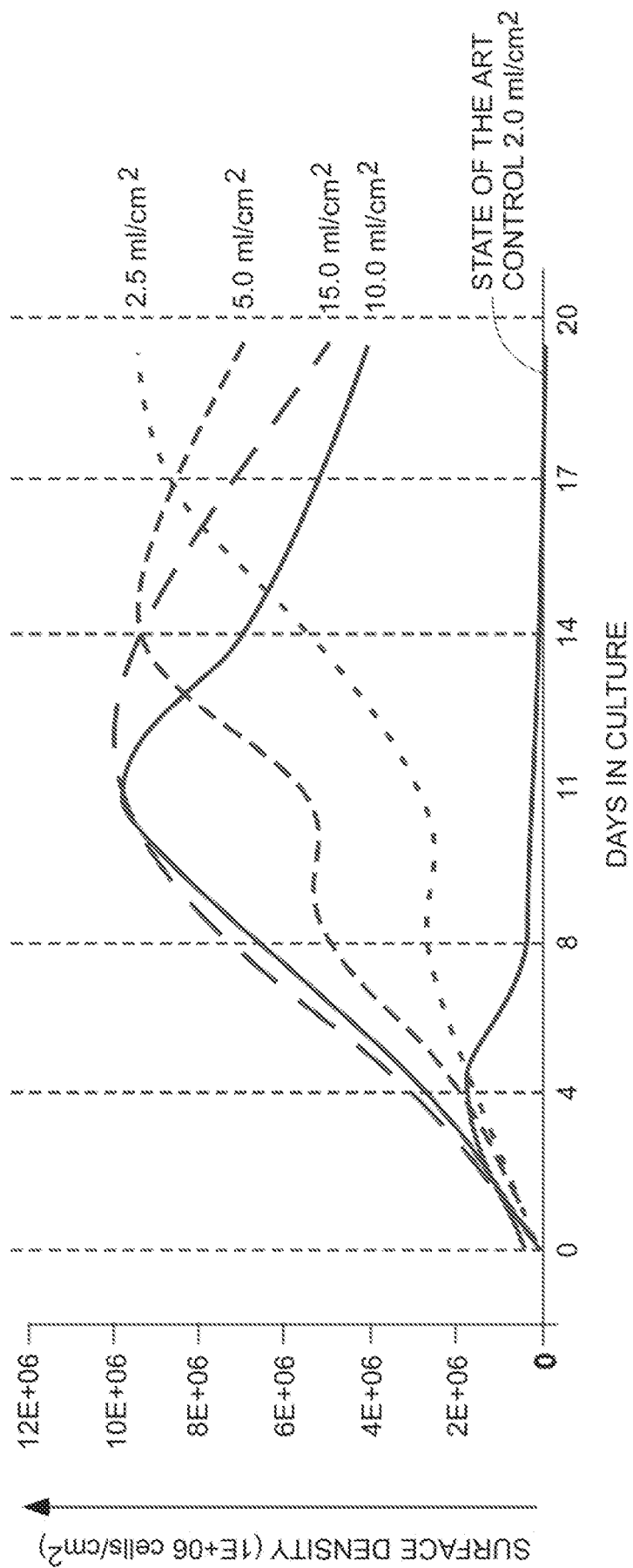


Fig. 21

CMV-CTL POPULATION EXPANSION					
ROW		DAY 0	DAY 9	DAY 16	
1	SURFACE DENSITY OF PBMCs AT CULTURE ONSET (cells/cm ²)	5.00E+05			
2	SURFACE DENSITY OF CELL COMPOSITION (cells/cm ²)	5.00E+05	1.32E+06	2.21E+08	
3	PERCENTAGE OF ANTIGEN SPECIFIC T CELLS IN THE CELL COMPOSITION (%)	0.8	27.9	48.7	
4	ENRICHMENT OF ANTIGEN SPECIFIC T CELLS (CMV SPECIFIC T CELLS)	0	34.88	1.75	
5	PERCENTAGE OF NON SPECIFIC T CELLS IN THE CELL COMPOSITION	99.2	72.1	51.3	
6	TOTAL NUMBER OF CELLS IN CULTURE	5.00E+07	1.32E+08	2.21E+10	
7	FOLD INCREASE IN CELL COMPOSITION POPULATION EXPANSION	0	2.64E+00	442	
8	FOLD INCREASE IN CELL IN CMV SPECIFIC POPULATION	0	69.7	69.8	
9	AREA OF GROWTH SURFACE (cm ²)	100	100	100	
10	MEDIUM VOLUME (ml)	1000	1000	1000	
11	MEDIA HEIGHT (cm ²)	10	10	10	
12	CELL DENSITY (cells/ml)	5.00E+04	1.32E+05	2.21E+07	
13	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)	10	10	10	
14	GLUCOSE CONCENTRATION	240	110	19	
15	GLUCOSE CONSUMPTION	0	130	221	
16	PREDICTED CELL NUMBER BY USE OF GLUCOSE	0	1.30E+08	2.21E+08	
18	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT	5.00E+07	1.32E+08	2.21E+08	
19	PERCENTAGE DIFFERENCE BETWEEN PREDICTED POP. AND HEMOCYTOMETER COUNTS		1.54%	0.00%	

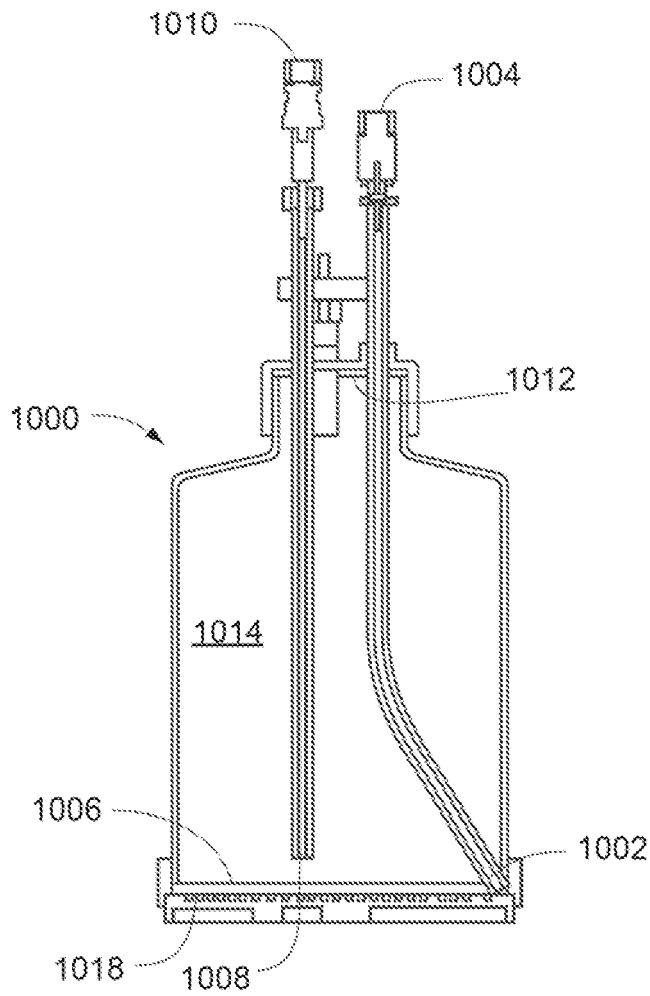
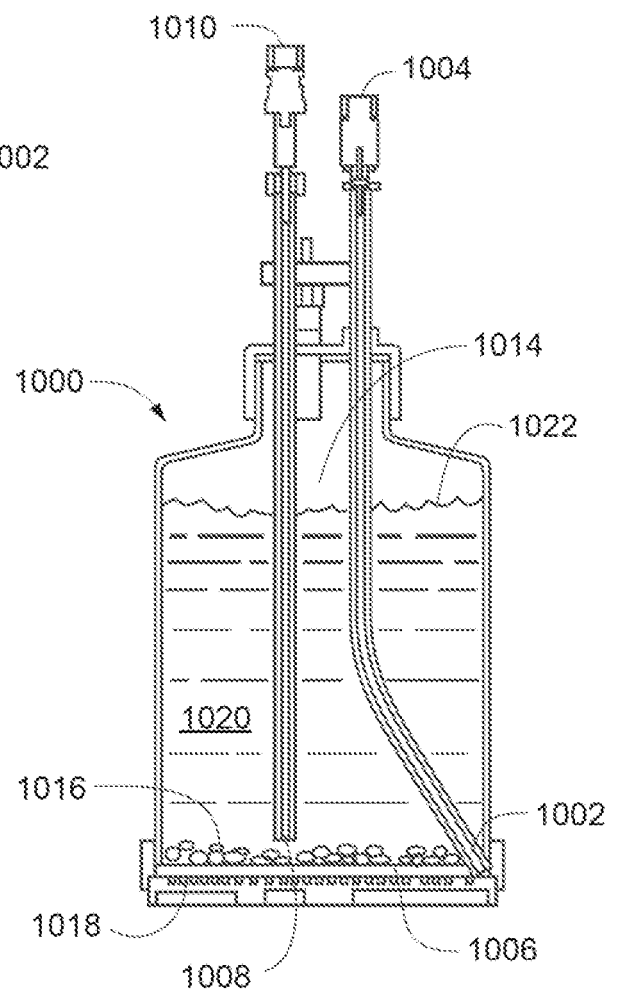
Fig. 22A**Fig. 22B**

Fig. 22C

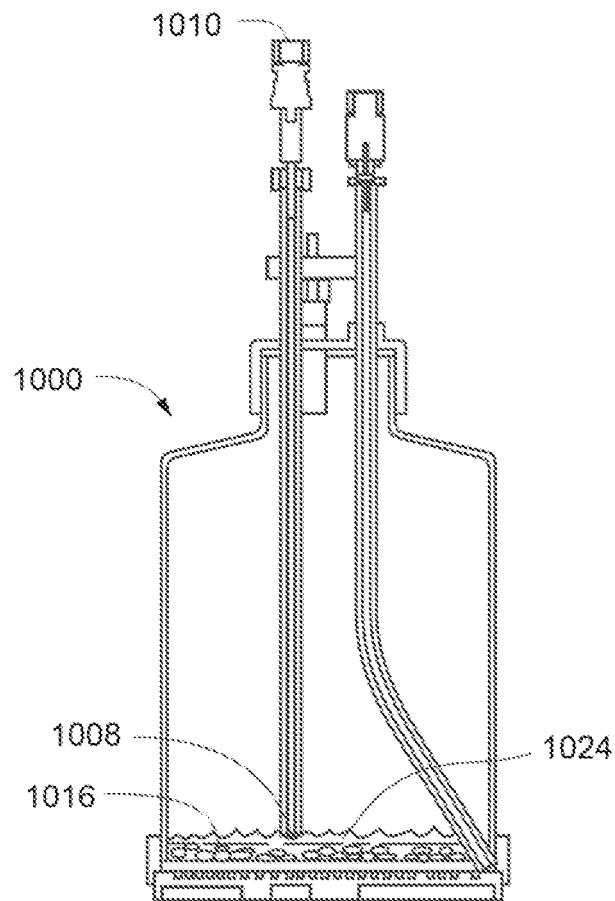


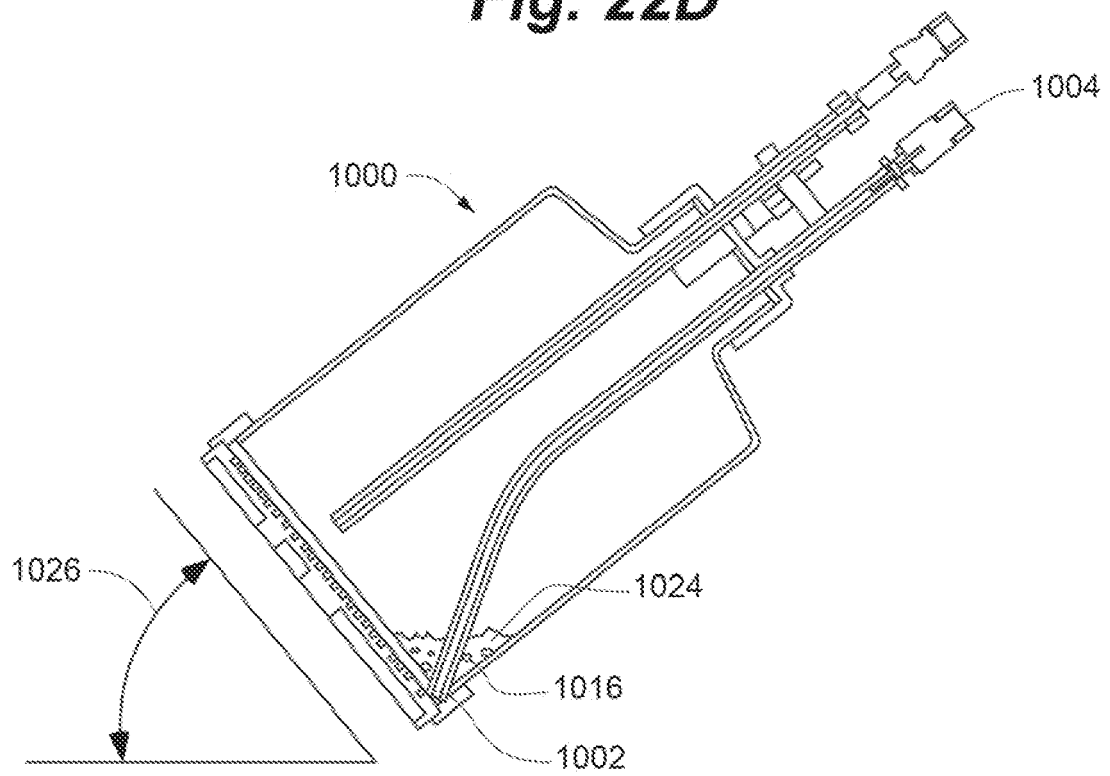
Fig. 22D

Fig. 23A

ROW	EVALUATION A	DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²) OF CAR T CELLS	2.50E+05			
2	SURFACE DENSITY ON DAY 0 (cells/cm ²) OF APC (K562-PSCA/CD80/41BB)	5.00E+05	1.00E+04	0.00E+00	0.00E+00
3	TOTAL SURFACE DENSITY ON DAY 0 (cells/cm ²)	7.50E+05			
4	SURFACE AREA OF GROWTH SURFACE (cm ²)	100	100	100	100
5	MEDIUM VOLUME (ml)	1000	1000	1000	1000
6	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)	10	10	10	10
7	MEDIA HEIGHT (cm)	10	10	10	10
8	SURFACE DENSITY OF CAR T CELLS (cells/cm ²)	2.50E+05	1.10E+06	1.80E+07	2.46E+07
9	CELL DENSITY OF CAR T CELLS (cells/cm ²)	2.50E+04	1.10E+05	1.80E+06	2.46E+06
10	GLUCOSE CONCENTRATION (mg/dl)	286	176	106	46
11	GLUCOSE CONSUMPTION IN (mg/dl)	0	-176	-106	-46
12	PREDICTED CELL NUMBER BY USE OF GLUCOSE	0	1.10E+08	1.80E+09	2.40E+09
13	VIABILITY	100	94	100	100
14	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT	2.50E+07	1.10E+08	1.80E+09	2.46E+09
15	TOTAL LIVE CELLS FOLD EXPANSION	0	4.40E+00	7.20E+01	9.84E+01
16	CAR EXPRESSION	40%	42%	68%	80%
17	FOLD EXPANSION OF CAR T CELLS				1.97E+02

Fig. 23B

ROW	EVALUATION B	DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²) OF CAR T CELLS	2.50E+05			
2	SURFACE DENSITY ON DAY 0 (cells/cm ²) OF APC (K562-PSCA/CD80/41BB)	NONE			
3	TOTAL SURFACE DENSITY ON DAY 0 (cells/cm ²)	2.50E+05			
4	SURFACE AREA OF GROWTH SURFACE (cm ²)	100	100	100	100
5	MEDIUM VOLUME (ml)	1000	1000	1000	1000
6	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)	10	10	10	10
7	MEDIA HEIGHT (cm)	10	10	10	10
8	SURFACE DENSITY OF CAR T CELLS (cells/cm ²)	2.50E+05	5.00E+05	2.80E+06	5.40E+06
9	CELL DENSITY OF CAR T CELLS (cells/cm ²)	2.50E+04	5.00E+04	2.80E+05	5.40E+05
10	GLUCOSE CONCENTRATION (mg/dl)	286			
11	GLUCOSE CONSUMPTION IN (mg/dl)				
12	PREDICTED CELL NUMBER BY USE OF GLUCOSE				
13	VIABILITY	100	100	100	100
14	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT	2.50E+07	5.00E+07	2.80E+08	5.40E+08
15	TOTAL LIVE CELLS FOLD EXPANSION	0	2.00E+00	1.12E+01	2.16E+01
16	CAR EXPRESSION	40%	40%	40%	40%
17	FOLD EXPANSION OF CAR T CELLS				2.16E+01

Fig. 23C

ROW	EVALUATION C	DAY 0	DAY 4	DAY 8	DAY 11
1	SURFACE DENSITY ON DAY 0 (cells/cm ²) OF CAR T CELLS	2.50E+05			
2	SURFACE DENSITY ON DAY 0 (cells/cm ²) OF APC (K562-PSCA/CD80/41BB)	5.00E+05	1.00E+04	0.00E+00	0.00E+00
3	TOTAL SURFACE DENSITY ON DAY 0 (cells/cm ²)	7.50E+05			
4	SURFACE AREA OF GROWTH SURFACE (cm ²)	100	100	100	100
5	MEDIUM VOLUME (ml)	200	200	200	200
6	RATIO OF MEDIUM VOLUME TO GROWTH SURFACE AREA (ml/cm ²)	2	2	2	2
7	MEDIA HEIGHT (cm)	2	2	2	2
8	SURFACE DENSITY OF CAR T CELLS (cells/cm ²)	2.50E+05	4.30E+05	3.80E+05	1.80E+05
9	CELL DENSITY OF CAR T CELLS (cells/cm ²)	2.50E+04	4.30E+04	3.80E+04	1.80E+04
10	GLUCOSE CONCENTRATION (mg/dl)	286	46	0	0
11	GLUCOSE CONSUMPTION IN (mg/dl)	0	240	286	286
12	PREDICTED CELL NUMBER BY USE OF GLUCOSE	0	4.80E+07	4.80E+08	4.80E+08
13	VIABILITY	100	94	75	36
14	TOTAL LIVE CELLS AS DETERMINED BY HEMOCYTOMETER COUNT	2.50E+07	4.30E+07	3.80E+07	1.80E+07
15	TOTAL LIVE CELLS FOLD EXPANSION	0	1.72E+00	1.52E+00	7.20E-01
16	CAR EXPRESSION	40%	42%	68%	80%
17	FOLD EXPANSION OF CAR T CELLS				1.44E+00

FIG. 23D

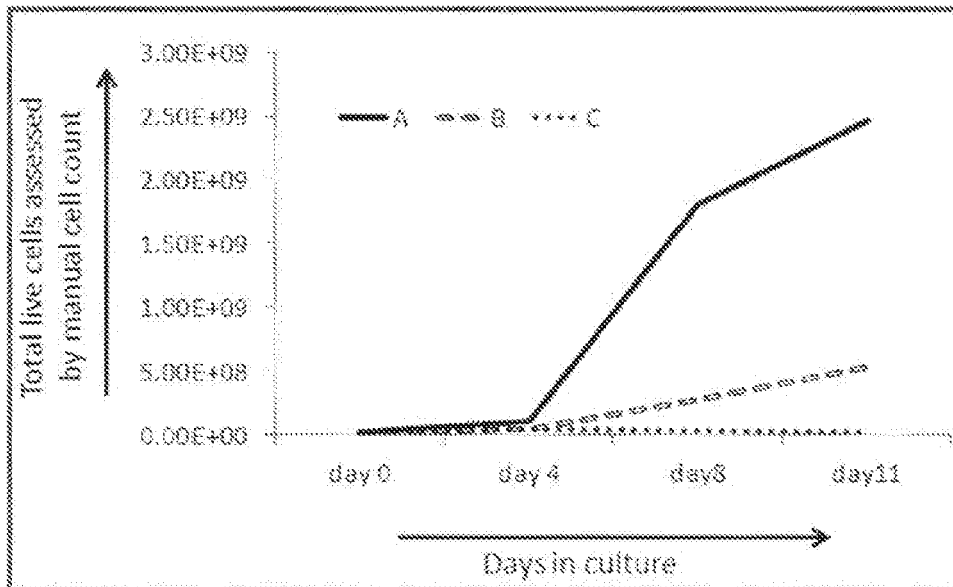


FIG. 23E

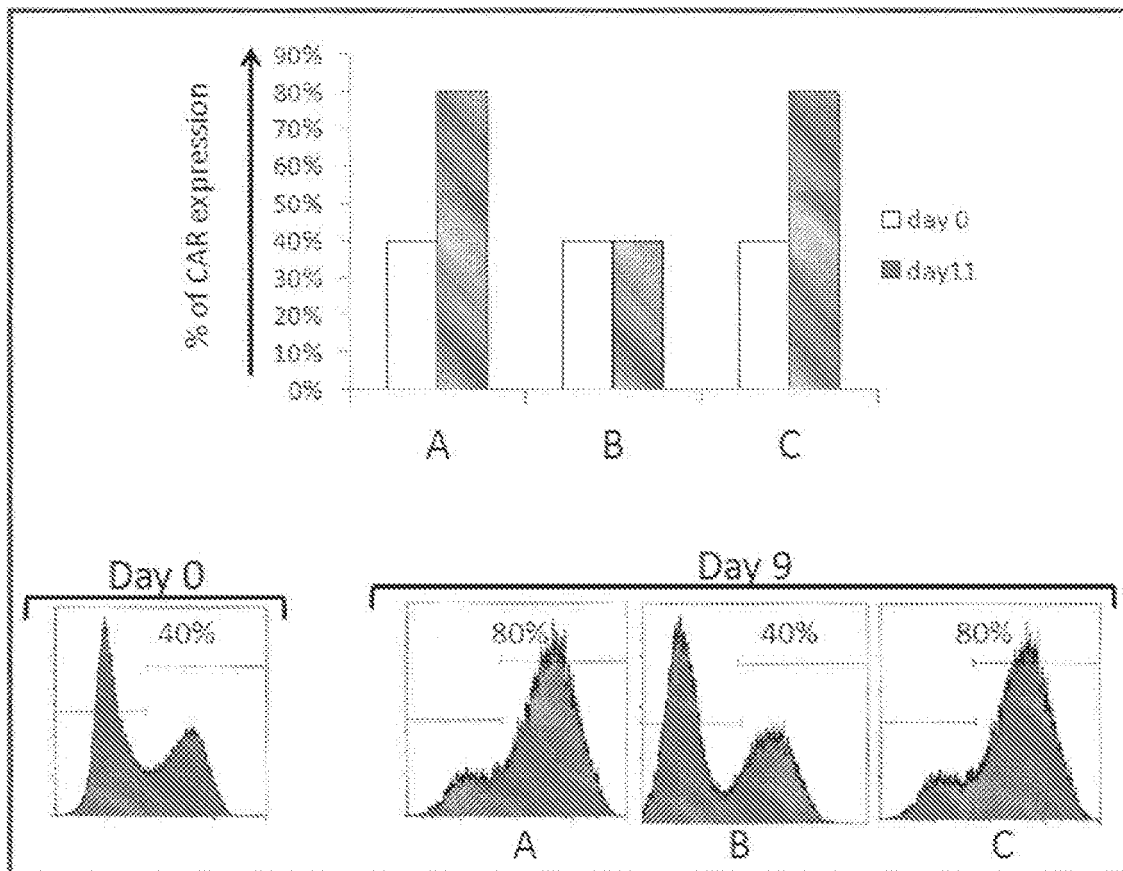


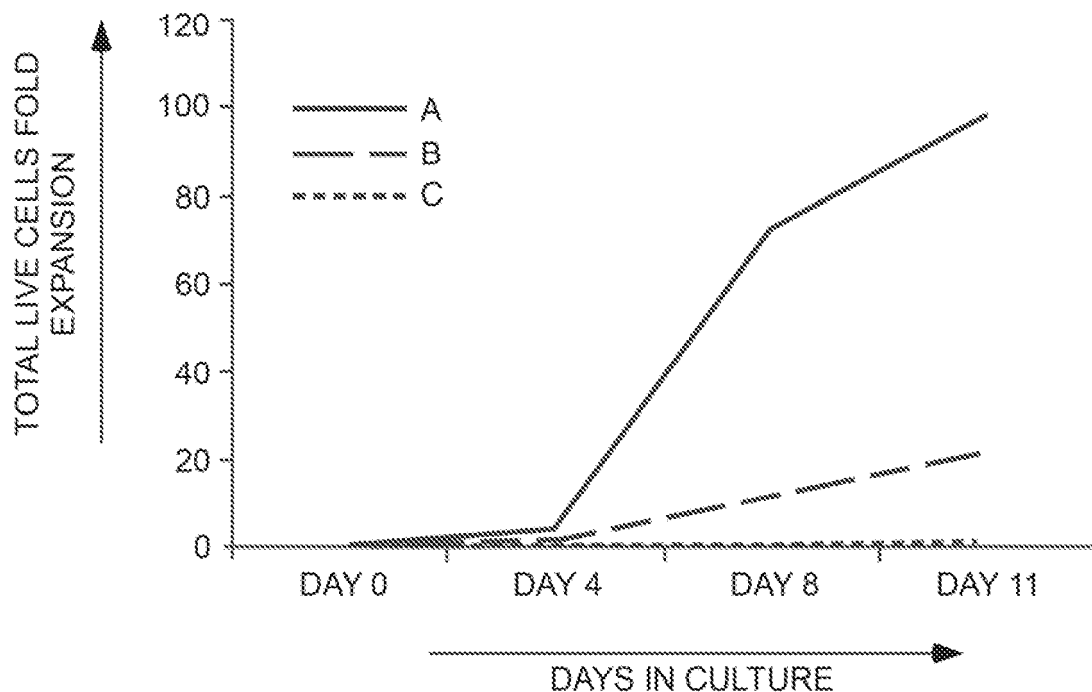
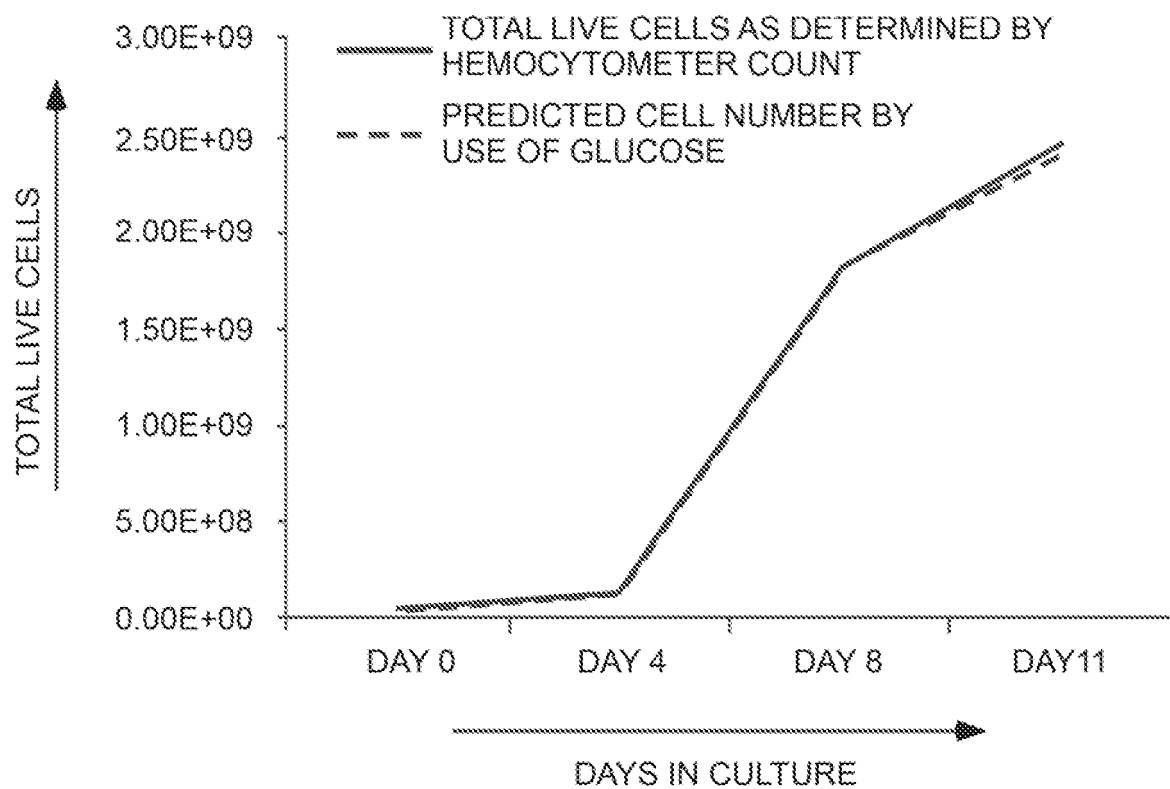
Fig. 23F**Fig. 23G**

FIG. 23H

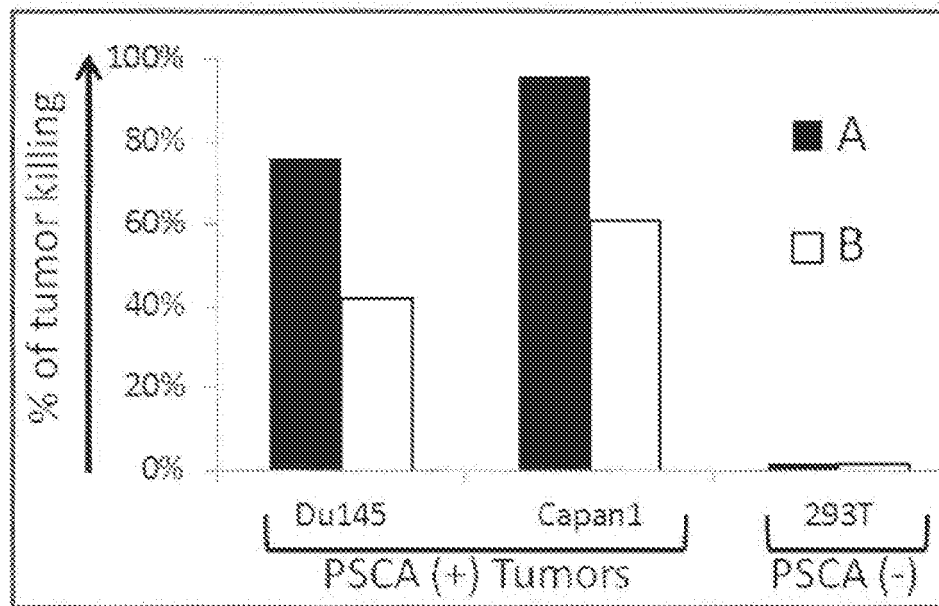


FIG. 24

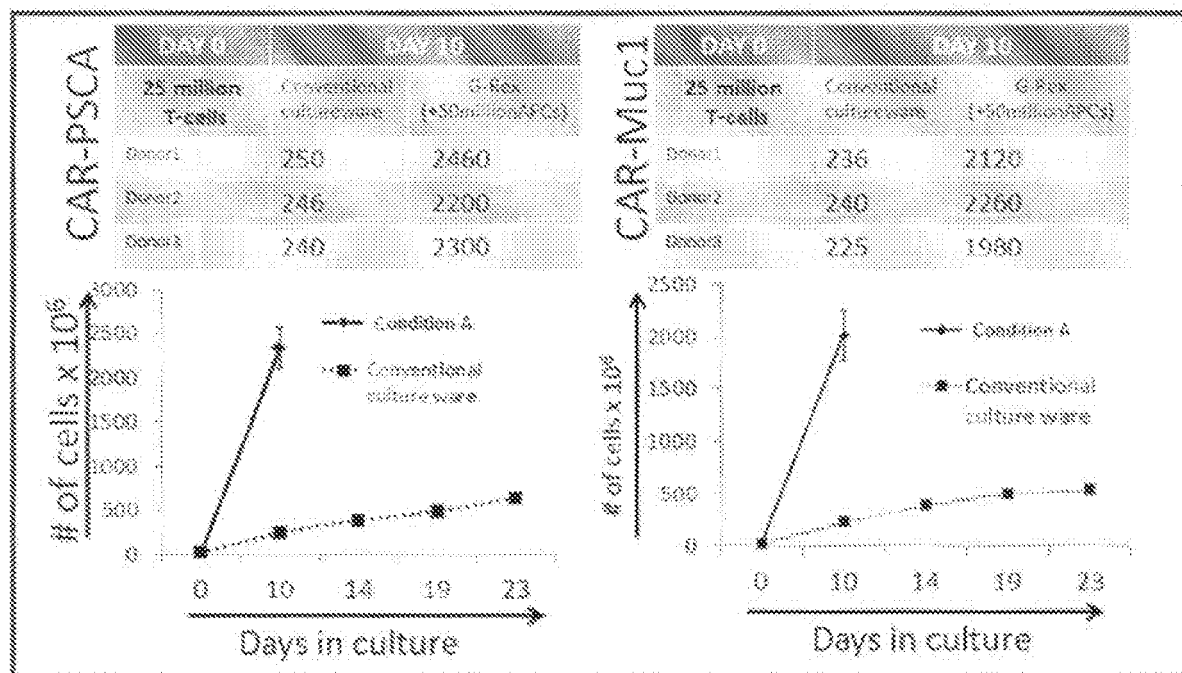


FIG. 24A

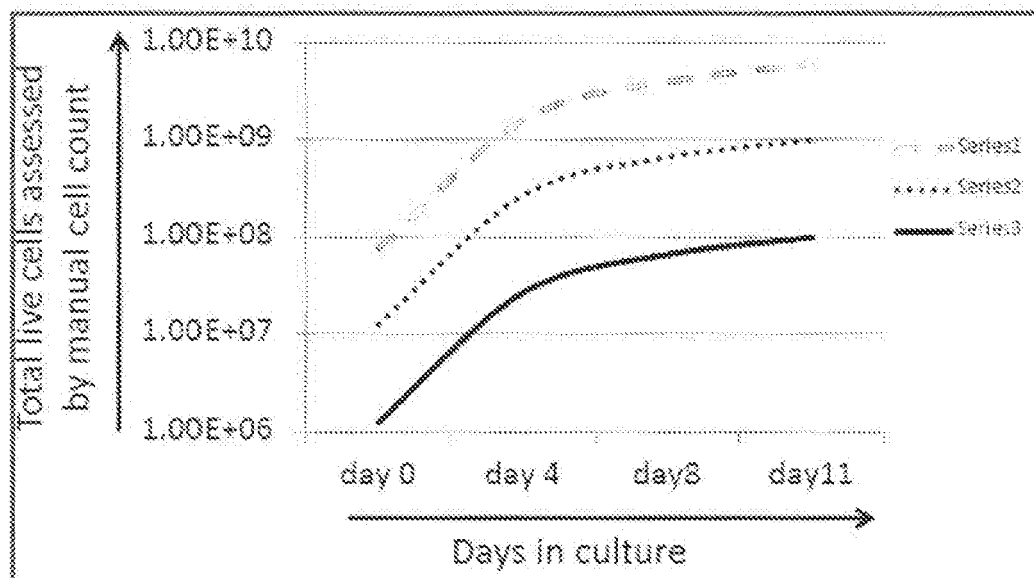


FIG. 24B

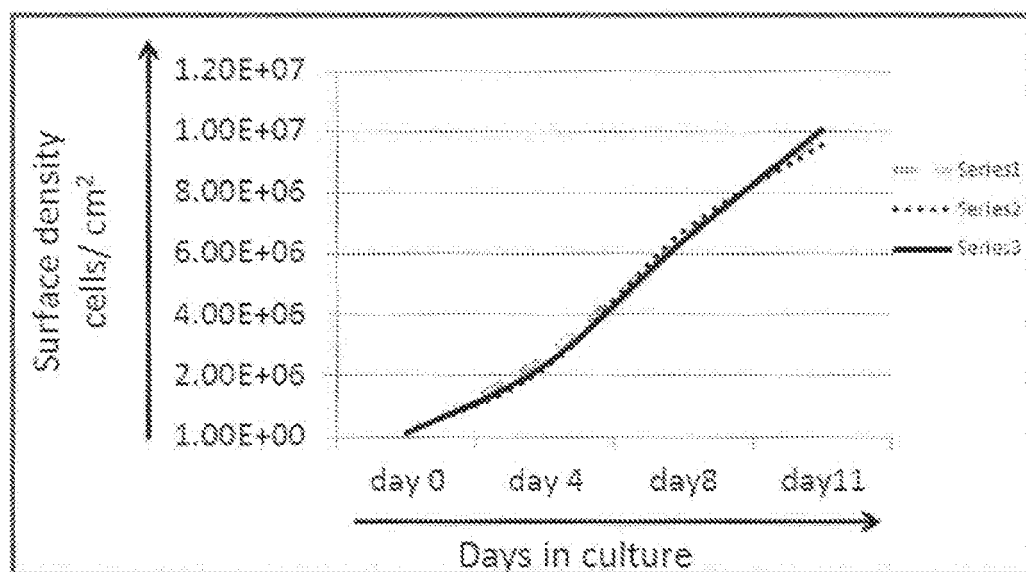
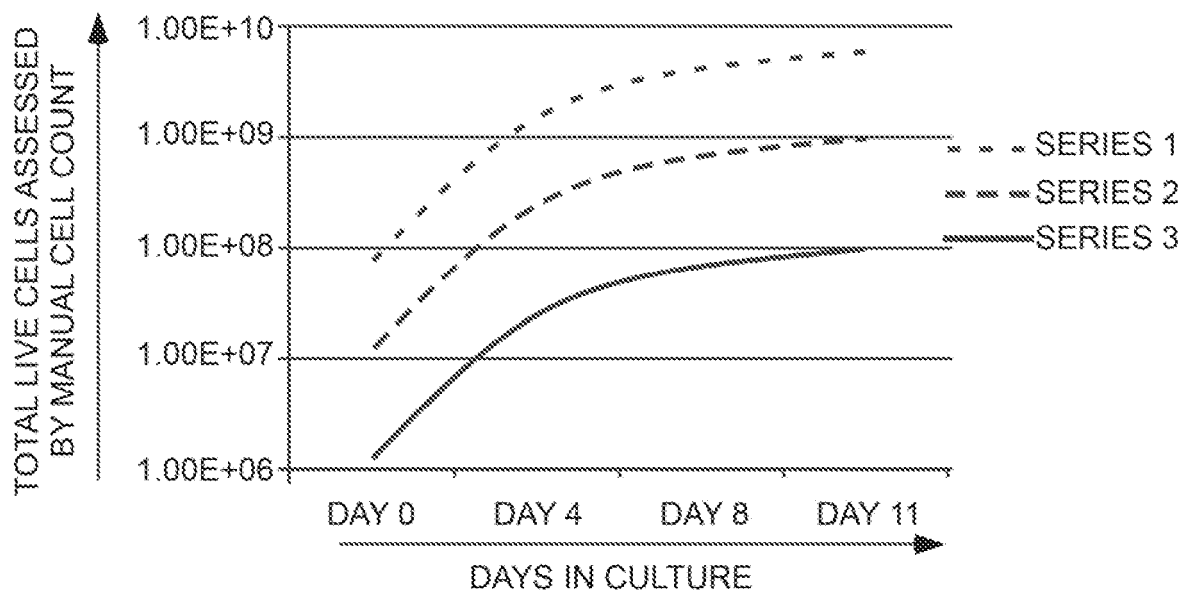


Fig. 24E**Fig. 24F**