Supplemental Table 1: Clinical Characteristics of study patients

	Age at Diagnosis	Age at Study Enrollment	Sex	KPS at Diagnosis	Location	Prior Immunotherapy	Prior Chemotherapy	Initial Surgery	Recurrence #	Study Surgery	Study Dose	Progression at Time of Publication	Alive at the Time of Publication	Progression Free Survival	Overall Survival	On Cycle # when stopped	1p Status	19q Status	IDH Mutation Status	MGMT Methylation Status	Ki 67 Percent	EGFR Amplification	P53 Percent Reactivity Percent
1	56	57	M	90	Right frontal	No	Yes	Biopsy	1	STR	300	Yes	No	5.5	17.5	5	Loss	Intact	Wild Type	Unmethylated	40	No	10
2	64	65	M	80	Left parietal	No	No	NTR	1	NTR	150	Yes	No	9.2	14.1	10	Loss	Loss	Wild Type	Unmethylated	70	Yes	25
3	67	70	F	90	Left occipital	Yes	No	NTR	2	NTR	300	Yes	No	1.8	29.7	2	Intact	Intact	Wild Type	Methylated	50	Yes	25
4	63	64	F	80	Left frontal	Yes	No	GTR	1	NTR	150	Yes	No	5.3	35.4	5	Intact	Intact	Wild Type	Unmethylated	50	Yes	10
5	38	40	F	90	Right frontal	No	Yes	GTR	2	GTR	150	No	Yes	27.8	36.6	30	NA	NA	Mutated	Methylated	12	NA	75
6	58	59	M	90	Right temporal	No	Yes	Biopsy	2	NTR	300	Yes	No	5.8	22.1	6	Intact	Intact	Wild Type	Unmethylated	40	Yes	5
7	58	59	M	80	Right frontal	No	No	NTR	1	GTR	150	Yes	No	5.1	14.9	4	NA	NA	Wild Type	Methylated	30	NA	NA
8	Removed from trial after surgical pathology results showed no disease progression																						
9	56	58	M	90	Right parietal	No	No	GTR	1	GTR	450	Yes	No	1.8	11.9	2	Intact	Intact	Wild Type	Unmethylated	70	Yes	10
10	60	61	F	80	Left frontal	Yes	Yes	GTR	2	NTR	450	Yes	No	8.5	21.6	9	Intact	Intact	Wild Type	Methylated	9	No	10
11	45	46	F	90	Left Parietal	No	No	GTR	1	STR	450	No	Yes	13.9	22.3	14	Intact	Loss	Wild Type	Methylated	80	No	5
12	48	49	M	90	Right temporal	No	No	Laser	1	GTR	450	Yes	Yes	6.2	12.9	7	Intact	Intact	Wild Type	Unmethylated	40	No	20

Abbreviations: M: male; F: female; KPS: Karnofsky Performance Scale; STR: subtotal resection; NTR: near-total resection; GTR: gross-total resection; IDH: isocitrate dehydrogenase; MGMT: O-6-methylguanine-DNA methyltransferase; EGFR: epidermal growth factor receptor

Supplemental Table 2: Study Calendar

Required Assessments	Pre- study	Pre-op	Post op (Day 1)	Cycle 1 (Day 1)[1]	Cycle 2+ (Day 1)[1]	End of Treatment	30-Day Follow up[10]
Informed Consent	X						
Demographics	X						
Medical History	X			X	X	X	X
Weight	X	X[11]		X	X	X	X
Vitals	X	X[11]		X	X	X	X
Physical Exam	X			X	X	X	X
Con Meds	X			X	X	X	X
KPS	X			X	X	X	X
Baseline Symptoms	X						
AE Assessment	X	X[11]		X	X	X	X
CBC/diff	X			X	X	X	
CMP	X			X	X	X	
Urine P/C ratio	X				X[9]		
PT/INR	X						
Pregnancy test[8]	X						
ECG	X						
MRI[7]	X				X	X	
Capecitabine		X[3]		X	X		
Bevacizumab					X[2]		
Correlative Studies		X[4,5,12]	X	X[4]	X[4,6]		

1 – ± 3 days
2 – Days 1 and 15 (± 3 days)
3 – Capecitabine to start 5-7 days before surgery with last dose on morning of surgery
4 – Perform up to 3 days before starting chemotherapy
5 – Tissue studies on resected specimen
6 – Repeat through Cycle 6 and thereafter at the discretion of the investigator
7 – MRI to be done with gadolinium. Repeat MRI before (up to 5 days) even cycles beginning with Cycle 2. Perfusion MRI scanning will be done according to the discretion of the treating investigator.
8 – Only if not done pre-op and if child-bearing potential; serum or urine test allowed
9 – Omit test on Cycle 2, Day 1
10 – ± 2 weeks
11 – May be combined with Pre-study assessments
12 – Blood sample preoperatively on day of surgery

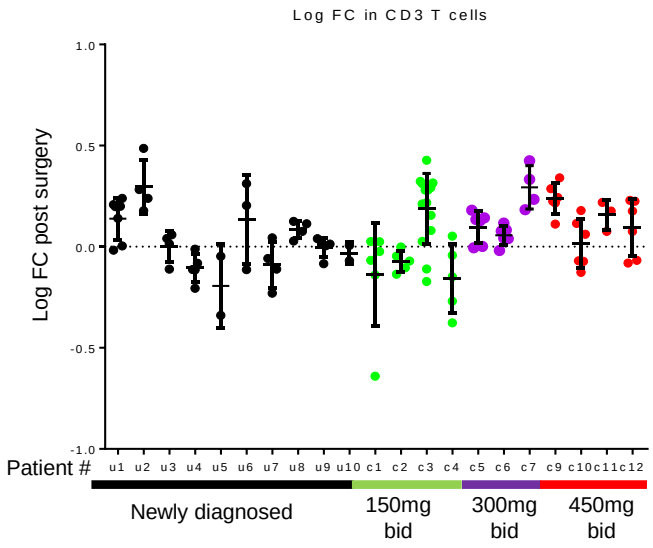
Supplemental Figure 1

A

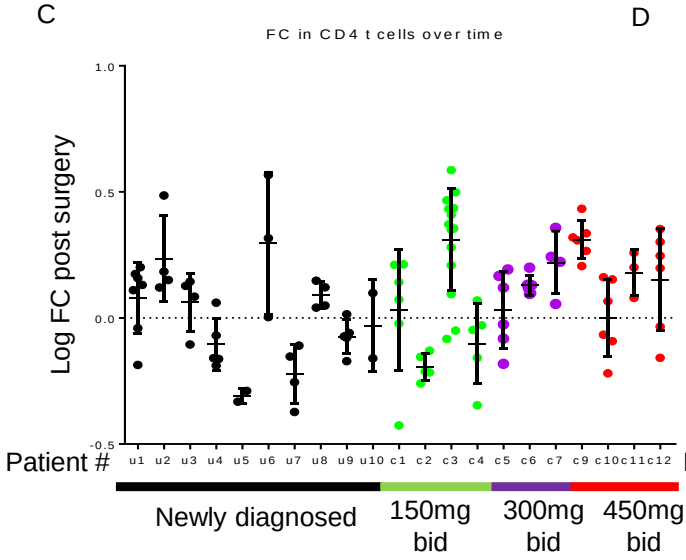
MDSC panel		
Ab	Fluorophore	cat #
CD11b	AF700	CD11b29
HLA-DR	APC	559866
CD14	APC H7	560180
CD15	PerCP	555400
CD33	PE	555450

T cell panel		
Ab	Fluorophore	Cat #
CD4	PerPC	347324
CD3	488	555332
CD25	PE	555432
CD8	PE cy7	557746
CD107a	APC-H7	561343
Cd127	Af647	558598

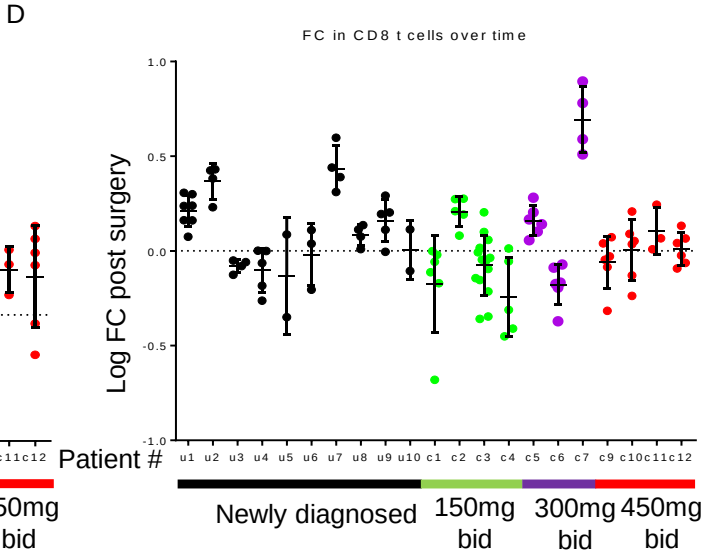
B



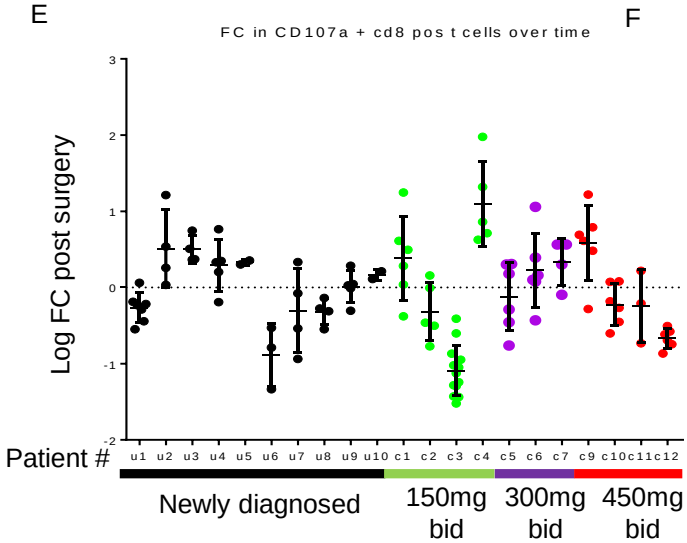
C



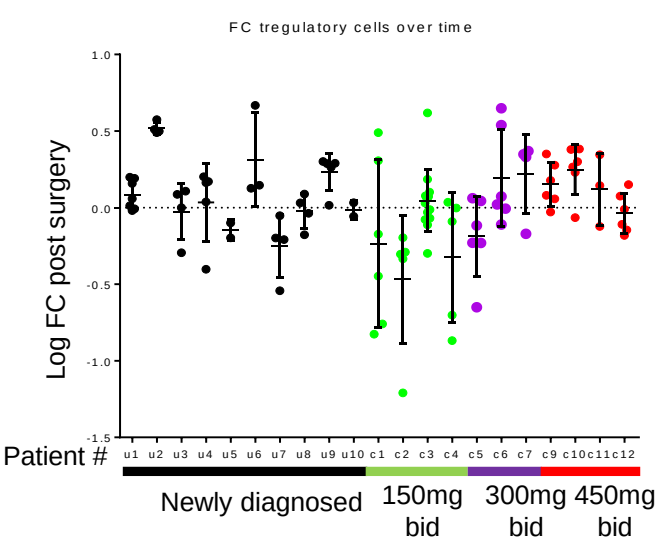
D



E



F

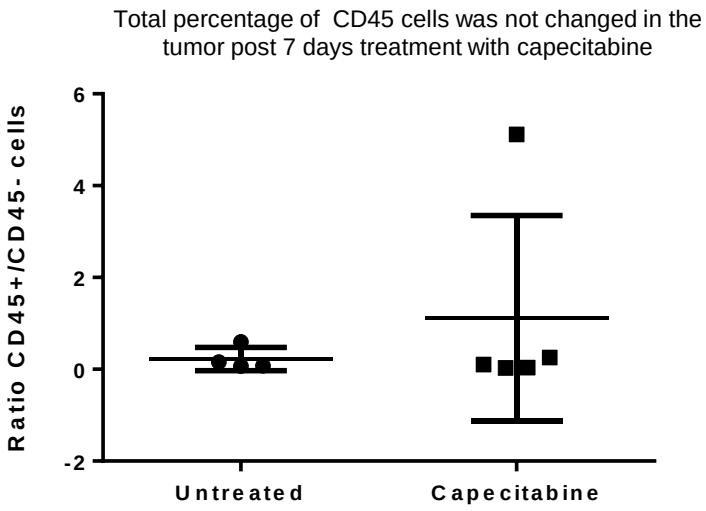


Supplemental Figure 2

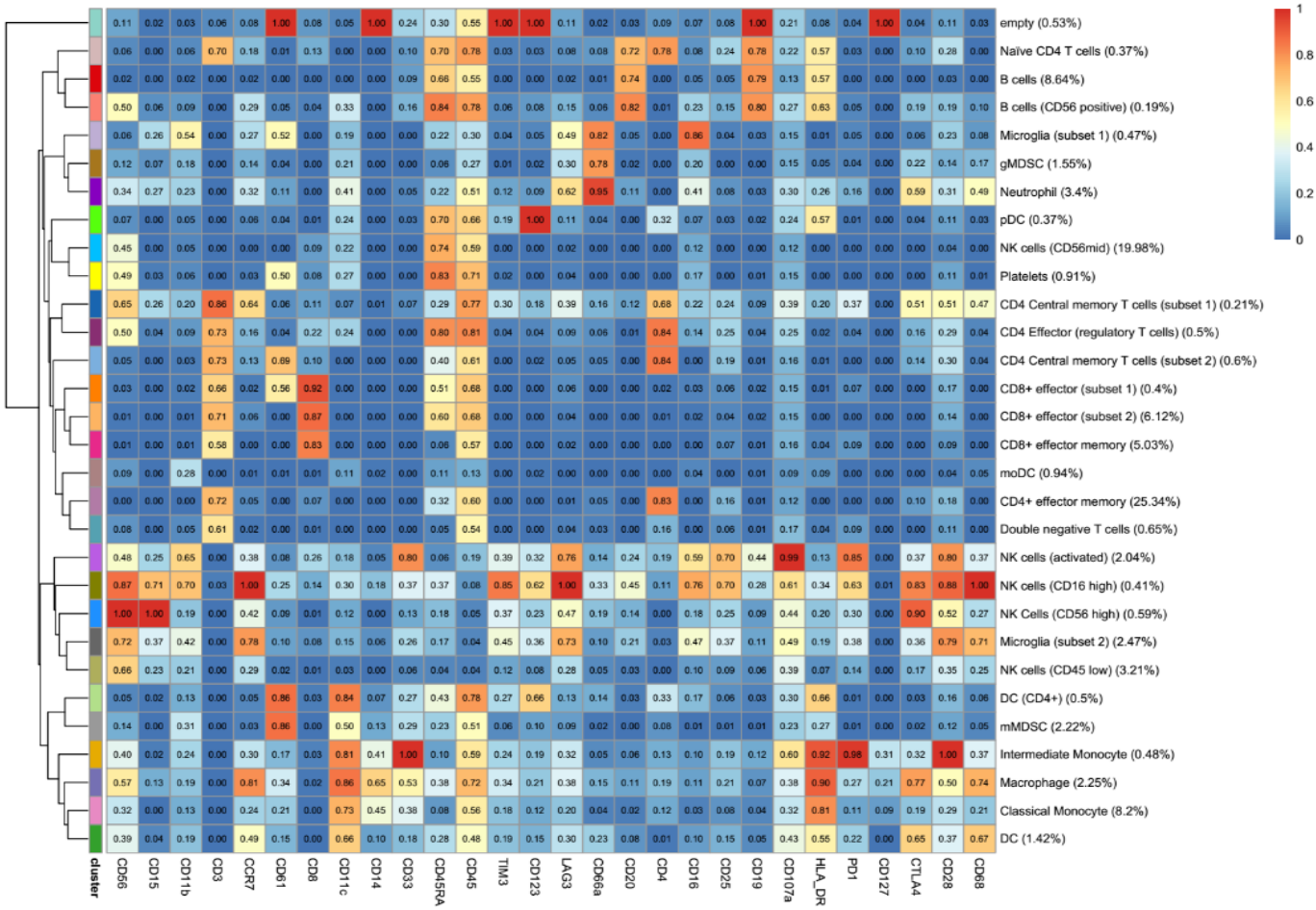
A

label	target	Clone #	Cat #
209Bi	CD11b (Mac-1)	ICRF44	3209003B
170Er	CD3	UCHT1	3170001B
167Er	CD197 (CCR7)	G043H7	3167009A
165Ho	CD61	VI-PL2	3165010B
164Dy	CD15 (SSEA-1)	W6D3	3164001B
163Dy	CD56 (NCAM)	NCAM16.2	3163007B
146Nd	CD8a	RPA-T8	3146001B
159Tb	CD11c	Bu15	3159001B
158Gd	CD33	WM53	3158001B
169Tm	CD45RA	HI100	3169008B
89Y	CD45	HI30	3089003B
153Eu	TIM-3	F38-2E2	3153008B
151Eu	CD123 (IL-3R)	6H6	3151001B
150Nd	CD223 (LAG-3)	11C3C65	3150030B
149Sm	CD66a	CD66a-B1.1	3149008B
148Nd	CD16	3G8	3148004B
147Sm	CD20	2H7	3147001B
145Nd	CD4	RPA-T4	3145001B
143Nd	CD25 (IL-2R)	M-A251	555430
142Nd	CD19	HIB19	3142001B
139La	CD107a (LAMP1)	H4A3	328635
174Yb	HLA-DR	L243	3174001B
155Gd	CD279 (PD-1)	EH12.2H7	3155009B
176Yb	CD127 (IL-7Ra)	A019D5	3176004B
160Gd	CD28	CD28.2	3160003B
161Dy	CD152 (CTLA-4)	14D3	3161004B
175Lu	CD14	M5E2	3175015B
171Yb	CD68	Y1/82A	3171011B

B

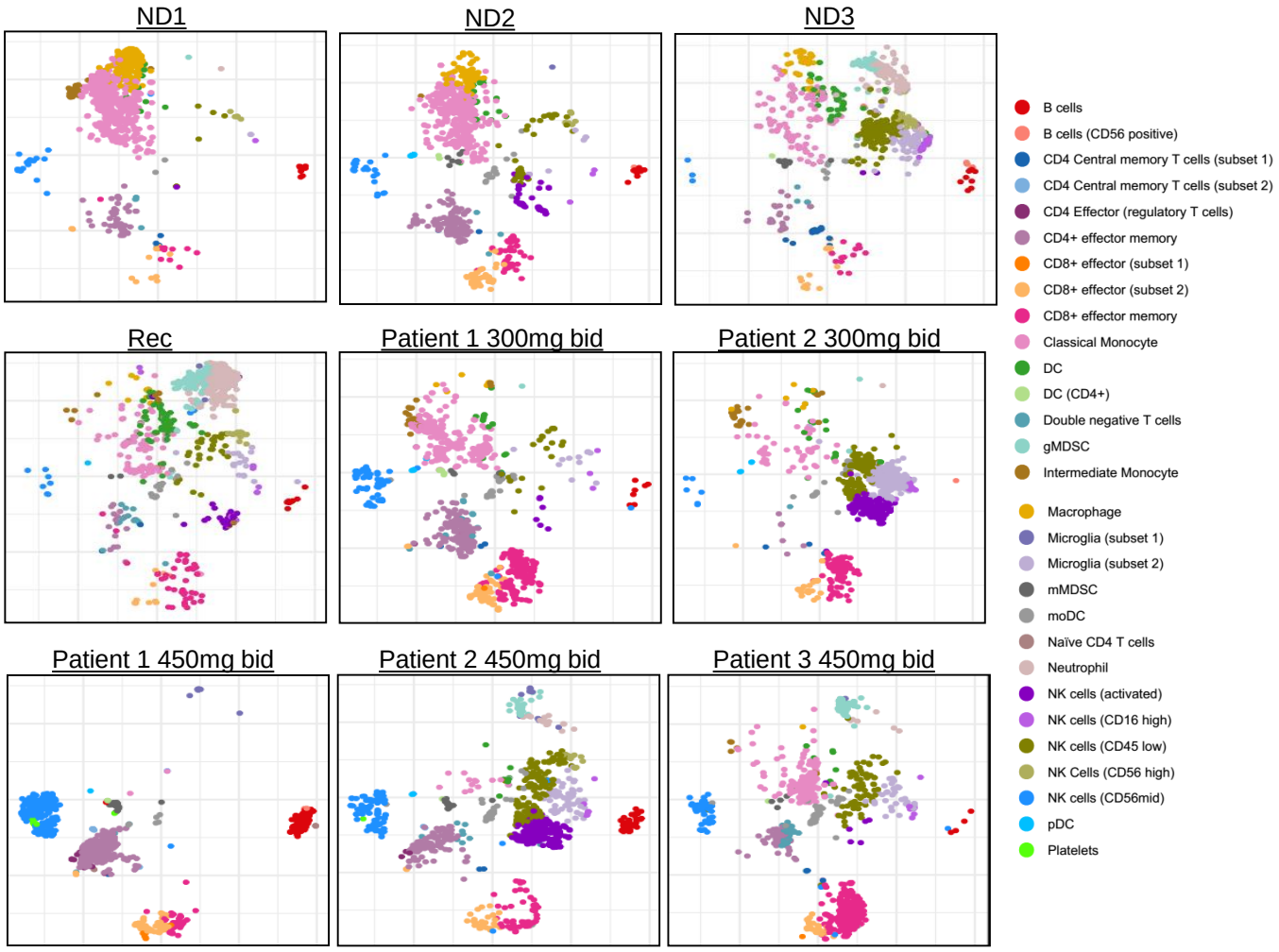


C

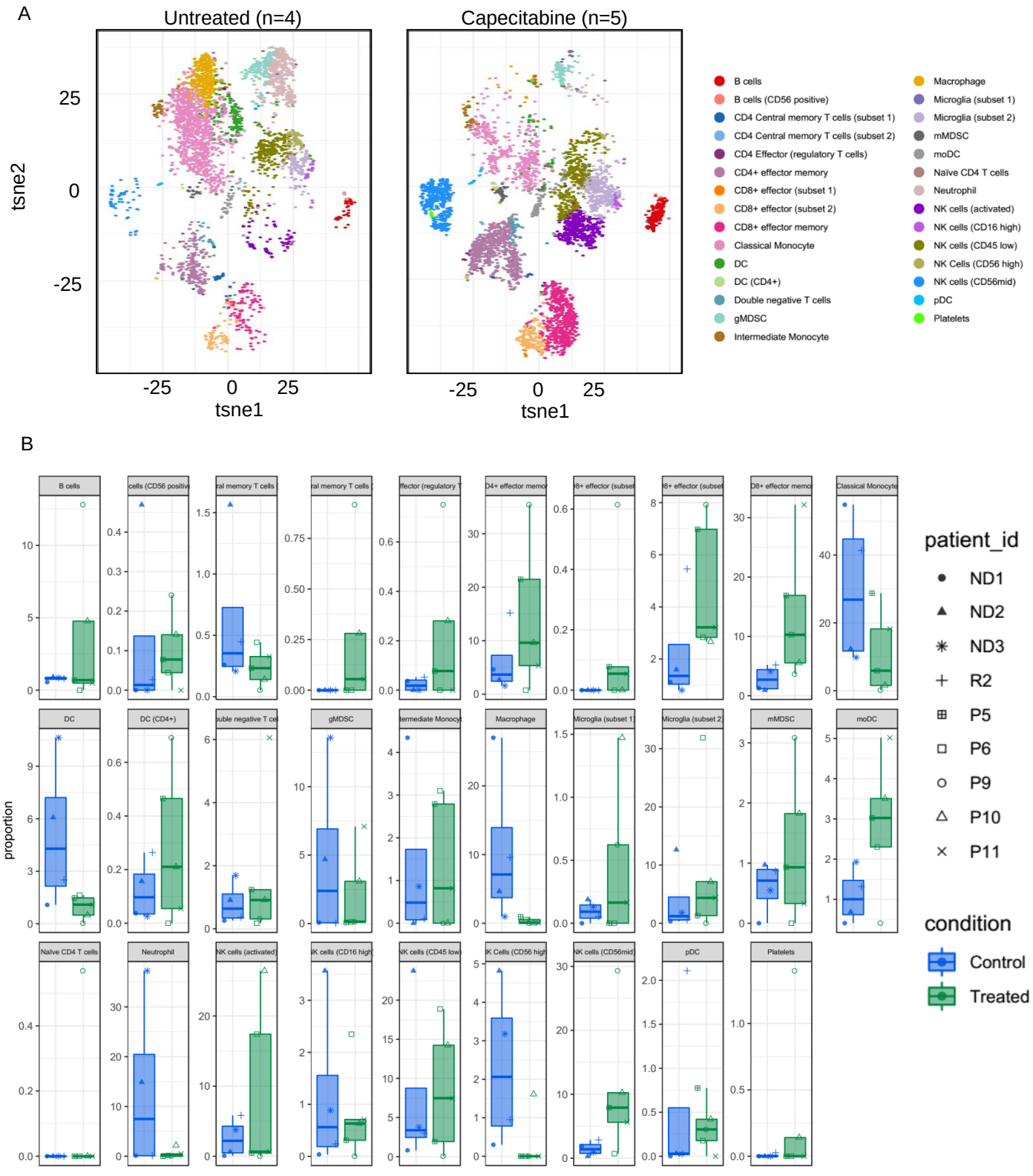


Supplemental Figure 3

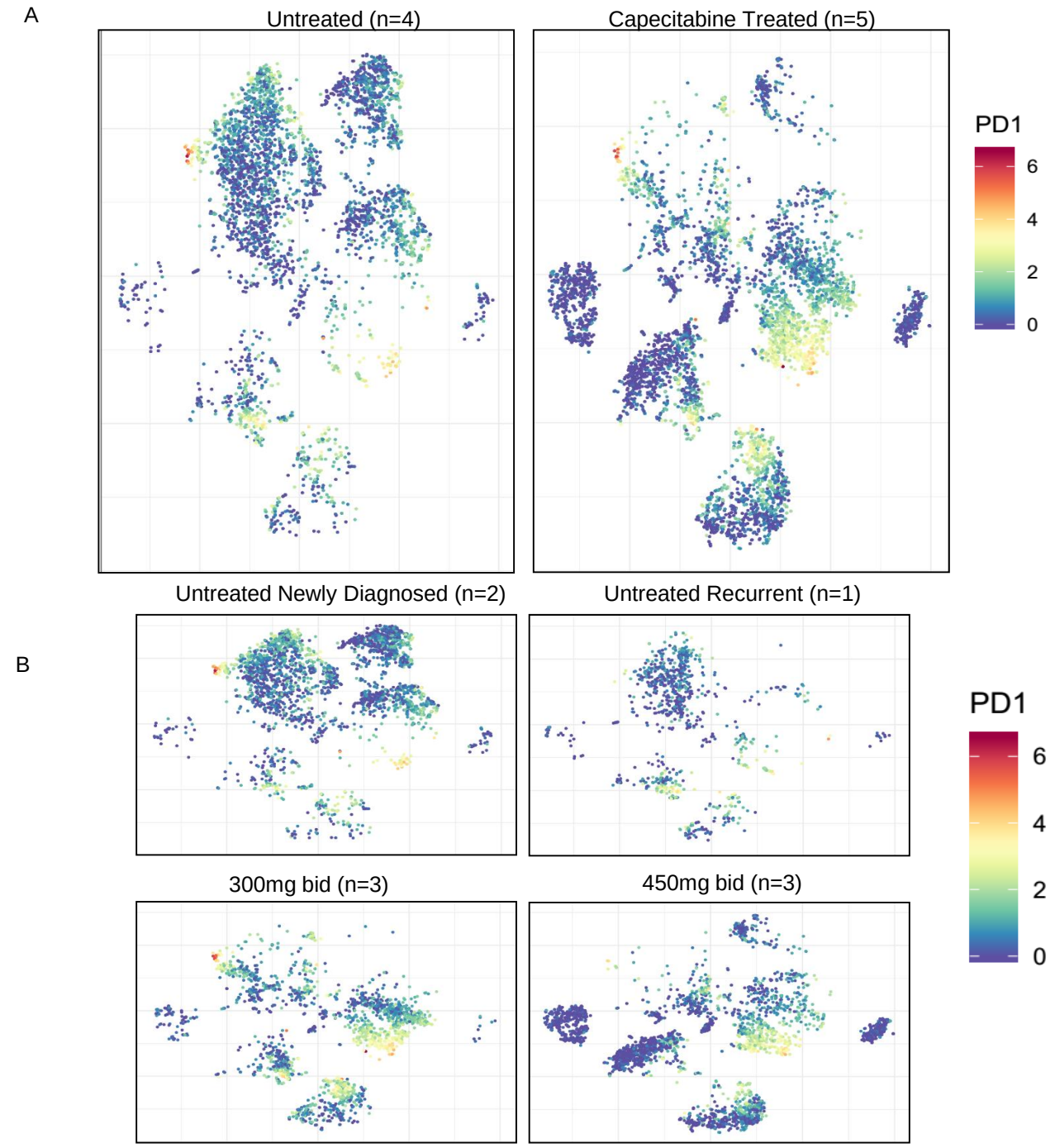
A

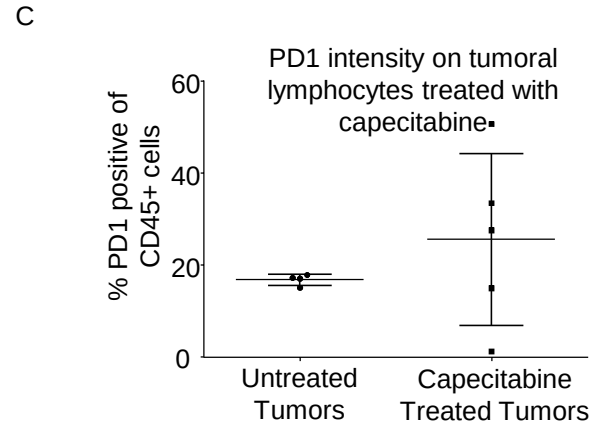


Supplemental Figure 4

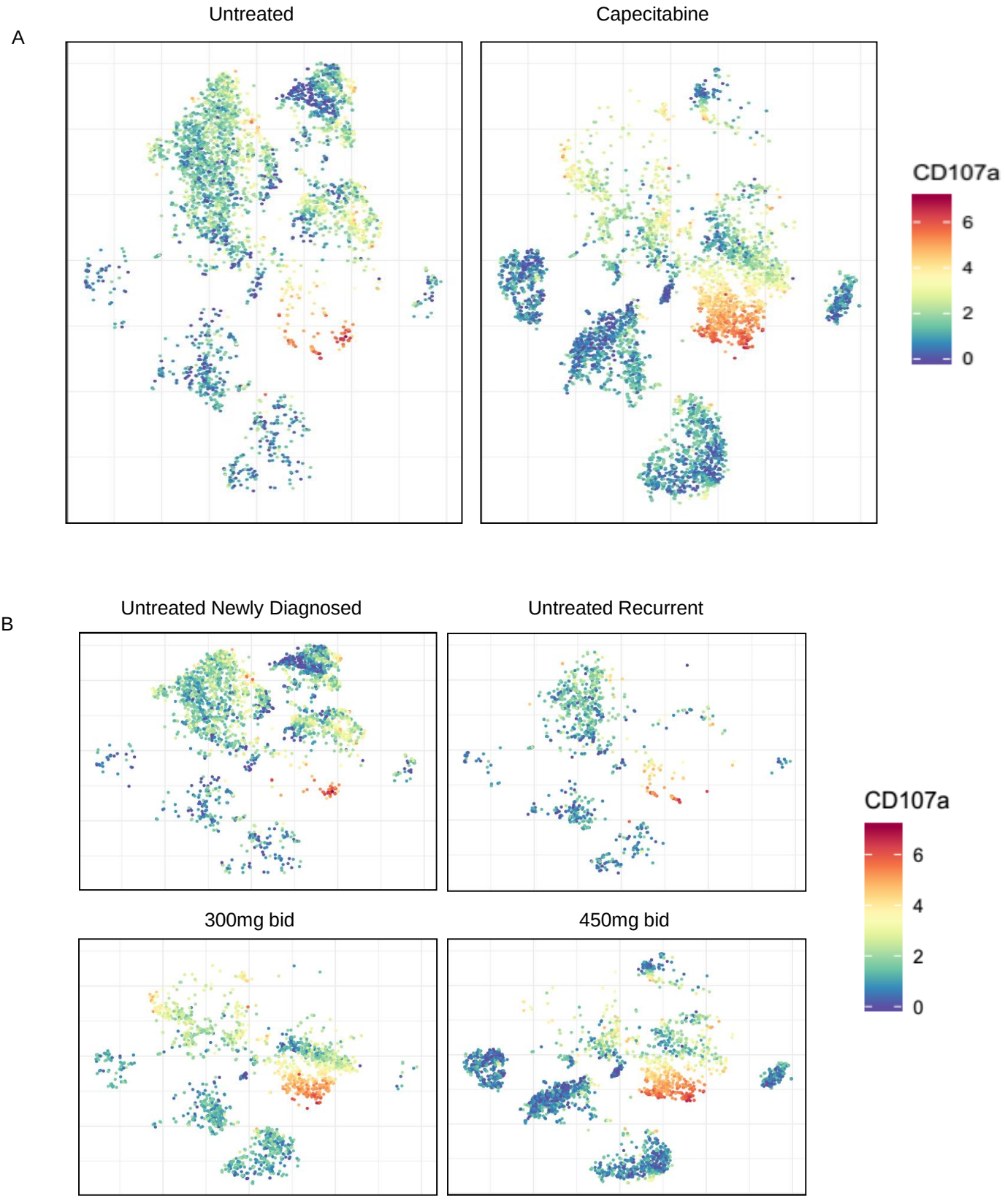


Supplemental Figure 5

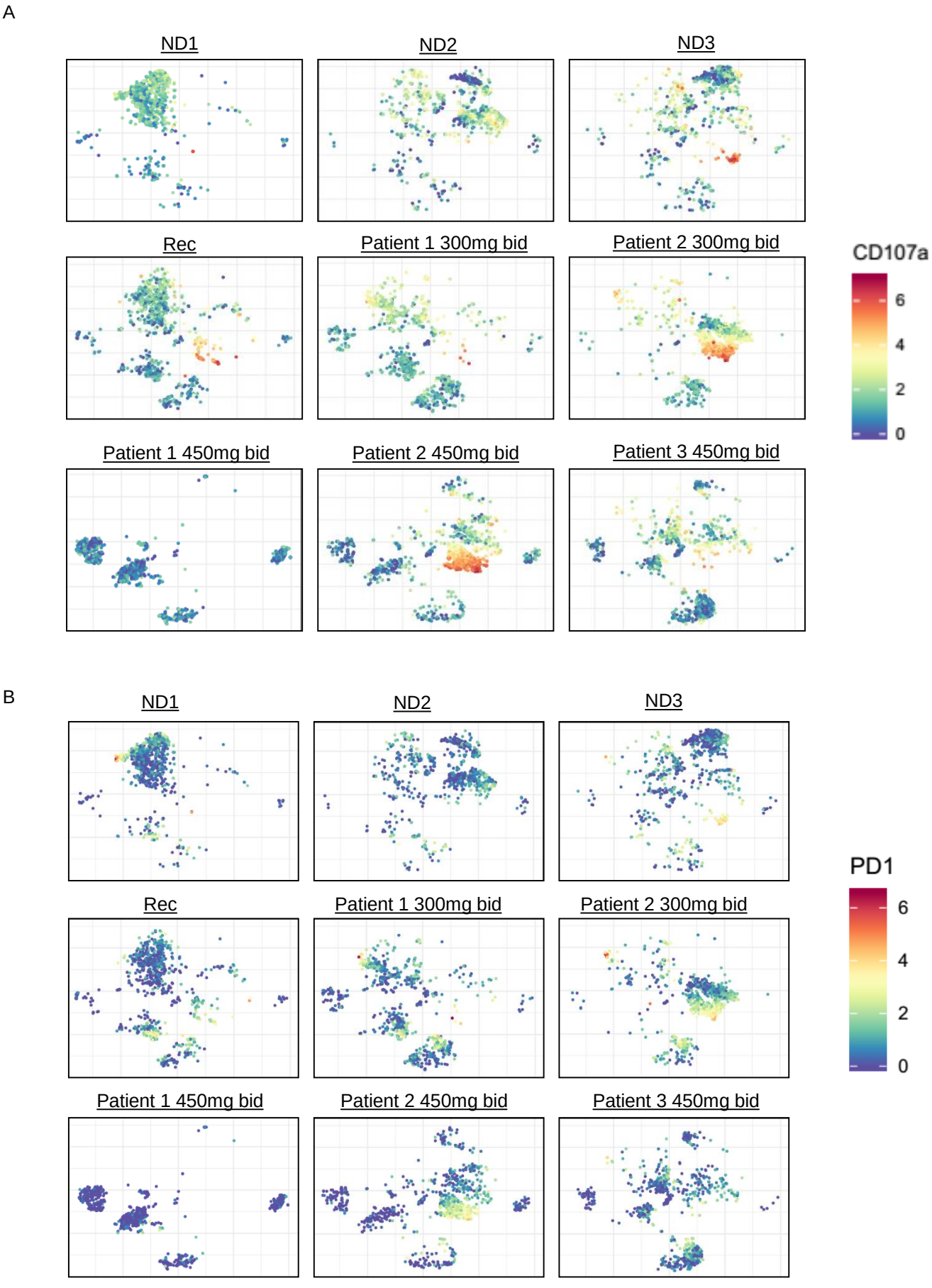




Supplemental Figure 6



Supplemental Figure 7



Supplemental Table Descriptions

Supplemental Table 1. Detailed characteristics, including demographics, clinical and treatment parameters, and tumor-specific markers, of the 11 evaluable patients.

Supplemental Table 2. Study calendar detailing the required assessments and their respective acquisition time points

Supplemental Figure Legends

Supplemental Figure 1. Post-surgical resection, the circulating T cell populations did not change compared to controls in response to capecitabine treatment. Flow cytometry was performed on PBMC samples collected using two flow cytometry panels (MDSC panel, and T cell panel) (**A**). Log fold change in total CD3+ T cells from surgical resection over time showing a newly diagnosed cohort of patients not treated with capecitabine (**B**). ($CD3^+$, $CD4^+$) CD4+ T cells, ($CD3^+$, $CD8^+$) T cells, ($CD3^+$, $CD8^+$, $CD107a^+$) cytotoxic T cells, and ($CD3^+$, $CD4^+$, $CD127^-$, $CD25^+$) T regulatory cells were also analyzed over time in each patient, demonstrating no trend upon capecitabine treatment in any of these lymphocyte populations (**C-F**).

Supplemental Figure 2. CyTOF immune panel analysis. CyTOF analysis utilized an immune panel consisting of the immune markers listed in (**A**). The CyTOF was performed on whole dissociated tumor samples, with an initial step of separating CD45+ cells from CD45- cells. The total number of CD45+ cells was not different between the untreated and capecitabine-treated patients (**B**). Unbiased clustering was used to identify the following immune populations by heatmap analysis for each marker of the panel (**C**). All error bars represent the standard deviation. Unpaired student's t-test was used for all comparisons, where *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Supplemental Figure 3. CyTOF comparison of capecitabine-treated vs untreated patients. Comparison of treated (n=5) vs control samples (n=4) samples represented as a tSNE plot (**A**). The various immune population names are denoted to the right in the figure key. Graphical representation of treated vs untreated patients with each of the 29 immune populations identified (**B**).

Supplemental Figure 4. Multidimensional plots of immune populations from individual patients (**A**). Individual population color key is located to the right of the figures.

Supplemental Figure 5. PD-1 levels of untreated and treated patients were compared using tSNE multidimensional plots, with PD-1 expression levels colored according to the key to the right of the figure (**A**). Subdividing the tSNE plots of treated and untreated patients for PD-1 levels of newly diagnosed patients, recurrent patients, 300 mg bid capecitabine, and 450 mg bid capecitabine (**B**). Quantification of PD-1+ cells of the CD45+ lymphocytes did not identify any significant differences between untreated and treated tumor samples.

Supplemental Figure 6. CD107a levels of untreated and treated patients were compared using tSNE multidimensional plots, with CD107a expression levels colored according to the key to the right of the figure (**A**). Subdividing the tSNE plots of treated and untreated patients for CD107a levels for newly diagnosed patients, recurrent patient, 300 mg bid capecitabine, and 450 mg bid capecitabine (**B**).

Supplemental Figure 7. CD107a and PD-1 levels are depicted using individual patient-based tSNE plots (**A, B**).