

Supplementary Table S1: Simulation results for Scenario 1. This table reports the true DLT probability at each combination, the true RSP probability at each combination, the percentage of trials in which each combination was recommended as the optimal combination, and the average number of participants treated in a simulated study. The true OBD and OBA are indicated in italicized bold type.

Cohort 1					
	CD40	Truth		%OBD Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group A	50	5%	50%	10%	5.48
	200	10%	60%	15%	5.98
	600	15%	75%	39%	8.99
	1200	20%	75%	36%	7.33
CD27 (+) Group B	50	10%	50%	11%	5.64
	200	15%	60%	13%	5.81
	600	20%	80%	45%	9.80
	1500	25%	80%	35%	7.12
Average trial size: Group A = 28.16; Group B = 28.40. Overall DLT rate: 15.8%; Overall response rate: 69.1%					
Cohort 2					
	Mel12.1 +	Truth		%OBA Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group C	IFA	5%	50%	20%	5.68
	Poly	5%	50%	23%	5.71
	Poly+IFA	10%	65%	57%	8.63
CD27 (+) Group D	IFA	10%	55%	21%	5.76
	Poly	10%	60%	26%	6.10
	Poly+IFA	15%	70%	53%	8.04
Average trial size: Group C = 20.02; Group D = 19.90 Overall DLT rate: 9.6%; Overall response rate: 59.8%					

Supplementary Table S2: Simulation results for Scenario 2. This table reports the true DLT probability at each combination, the true RSP probability at each combination, the percentage of trials in which each combination was recommended as the optimal combination, and the average number of participants treated in a simulated study. The true OBD and OBA are indicated in italicized bold type.

Cohort 1					
	CD40	Truth		%OBD Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group A	50	10%	60%	15%	6.26
	200	15%	80%	42%	9.37
	600	25%	80%	24%	6.70
	1200	35%	85%	20%	5.17
CD27 (+) Group B	50	15%	65%	11%	8.01
	200	20%	85%	14%	9.98
	600	30%	90%	43%	6.82
	1200	40%	90%	21%	2.85
Average trial size: Group A = 27.49; Group B = 27.68 Overall DLT rate: 21.6%; Overall response rate: 78.6%					
Cohorts 2 & 3					
		Truth		%OBA Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group C	IFA	1%	50%	14%	4.94
	Poly	8%	50%	13%	4.89
	Poly+IFA	15%	75%	73%	10.09
CD27 (+) Group D	IFA	5%	60%	14%	5.13
	Poly	10%	65%	20%	5.75
	Poly+IFA	20%	80%	66%	9.13
Average trial size: Group C = 20.01; Group D = 19.92 Overall DLT rate: 11.5%; Overall response rate: 66.9%					

Supplementary Table S3: Simulation results for Scenario 3. This table reports the true DLT probability at each combination, the true RSP probability at each combination, the percentage of trials in which each combination was recommended as the optimal combination, and the average number of participants treated in a simulated study. The true OBD and OBA are indicated in italicized bold type.

Cohort 1					
	CD40	Truth		%OBD Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group A	50	11%	60%	25%	7.67
	200	20%	80%	54%	10.54
	600	35%	80%	15%	5.34
	1200	45%	85%	6%	2.86
CD27 (+) Group B	50	12%	65%	31%	9.39
	600	22%	85%	50%	10.20
	500	36%	90%	17%	4.84
	1200	50%	90%	2%	1.58
Average trial size: Group A = 26.39; Group B = 26.03 Overall DLT rate: 23.3%; Overall response rate: 76.9%					
Cohorts 2 & 3					
		Truth		%OBA Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group C	IFA	1%	50%	14%	4.84
	Poly	8%	50%	17%	5.29
	Poly+IFA	15%	75%	70%	9.80
CD27 (+) Group D	IFA	25%	60%	52%	9.64
	Poly	40%	65%	27%	5.46
	Poly+IFA	50%	80%	21%	4.81
Average trial size: Group C = 19.93; Group D = 19.91 Overall DLT rate: 22.1%; Overall response rate: 64.2%					

Supplementary Table S4: Simulation results for Scenario 4. This table reports the true DLT probability at each combination, the true RSP probability at each combination, the percentage of trials in which each combination was recommended as the optimal combination, and the average number of participants treated in a simulated study. The true OBD and OBA are indicated in italicized bold type.

Cohort 1					
	CD40	Truth		%OBD Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group A	50	10%	50%	26%	7.69
	200	15%	55%	21%	6.62
	600	25%	60%	36%	7.92
	1200	35%	75%	16%	4.77
CD27 (+) Group B	50	15%	55%	36%	10.19
	200	20%	60%	28%	7.50
	600	30%	75%	28%	6.36
	1200	40%	75%	8%	2.82
Average trial size: Group A = 26.97; Group B = 26.90 Overall DLT rate: 21.5%; Overall response rate: 64.5%					
Cohorts 2 & 3					
		Truth		%OBA Selection	Average #pts
		%DLT	%RSP		
CD27 (-) Group C	IFA	5%	50%	21%	5.84
	Poly	5%	50%	24%	5.6
	Poly+IFA	10%	65%	56%	8.47
CD27 (+) Group D	IFA	10%	50%	20%	5.98
	Poly	10%	50%	23%	5.51
	Poly+IFA	15%	65%	57%	8.51
Average trial size: Group C = 19.91; Group D = 20.00 Overall DLT rate: 9.5%; Overall response rate: 56.3%					