Supplementary Materials for "A Bayesian Phase I/II Trial Design for Immunotherapy" by Suyu Liu, Beibei Guo and Ying Yuan

Specification of admissibility probability cutoffs

In our simulation studies, we used cutoffs $C_T = C_E = 0.05$. To investigate the effect of higher cutoffs, we did sensitivity studies with $C_T = C_E = 0.15$ and $C_T = C_E = 0.3$. Results are shown in Table S1. With higher cutoffs, the results are significantly worse for some scenarios such as scenarios 3 and 5 which had high percentages of inconclusive trials. Cutoffs $C_T = C_E = 0.3$ yielded even worse results than cutoffs $C_T = C_E = 0.15$.

Table S1: Simulation results with higher cutoffs C_T and C_E.

	dose level					%	dose level					%
	1	2	3	4	5	inconclusive	1	2	3	4	5	inconclusive
	$C_T = C_E = 0.15$						$C_T = C_E = 0.3$					
						scenario 1						
Sel %	0.21	**0.68**	0.09	0.00	0.00	0.01	0.24	**0.66**	0.07	0.00	0.00	0.03
# patients	16.9	**17.1**	14.4	7.5	3.7		17.3	**17.9**	14.5	5.8	3.3	
						scenario 2						
Sel %	0.13	0.11	**0.70**	0.04	0.00	0.01	0.15	0.13	**0.63**	0.04	0.00	0.04
# patients	14.3	14.7	**15.2**	10.0	5.4		16.4	15.9	**14.9**	7.4	3.6	
						scenario 3						
Sel %	0.03	0.01	0.26	**0.49**	0.03	0.19	0.01	0.01	0.20	**0.24**	0.01	0.53
# patients	8.4	9.2	14.8	**14.4**	7.1		6.4	7.1	11.8	**10.4**	4.1	
						scenario 4						
Sel %	0.02	0.01	0.01	0.27	**0.66**	0.03	0.01	0.02	0.03	0.21	**0.53**	0.19
# patients	8.7	8.5	12.0	14.7	**15.1**		8.1	7.6	10.6	12.1	**12.3**	
						scenario 5						
Sel %	0.02	0.05	**0.40**	**0.34**	0.09	0.10	0.03	0.05	**0.36**	**0.27**	0.04	0.24
# patients	12.2	13.0	**12.0**	**10.6**	8.1		11.5	12.6	**11.9**	**8.7**	5.5	
						scenario 6						
Sel %	0.02	0.01	0.11	**0.33**	**0.51**	0.02	0.01	0.01	0.09	**0.39**	**0.43**	0.07
# patients	10.3	11.2	12.2	**12.7**	**12.7**		10.2	10.6	11.9	**12.7**	**11.4**	
						scenario 7						
Sel %	0.20	0.03	0.04	0.11	**0.63**	0.00	0.25	0.02	0.05	0.08	**0.57**	0.03
# patients	13.9	11.9	11.2	11.2	**11.7**		15.8	11.7	10.9	10.3	**10.0**	
						scenario 8						
Sel %	0	0	0	0	0	1	0	0	0	0	0	1
# patients	3.3	3.0	1.7	0.6	0.1		3.0	1.7	0.3	0.1	0.0	

Table S2: Simulation results with alternative prior estimates of $\alpha's$ in the Emax model.

	dose level					dose level				
	1	2	3	4	5	1	2	3	4	5
	$(\hat{\alpha}_0, \hat{\alpha}_1, \hat{\alpha}_2, \hat{\alpha}_3) = (2, 4, 0.4, 3)$					$(\hat{\alpha}_0, \hat{\alpha}_1, \hat{\alpha}_2, \hat{\alpha}_3) = (1.5, 6, 0.6, 2.5)$				
	scenario 1									
Selection %	0.254	**0.671**	0.073	0	0	0.271	**0.642**	0.087	0	0
# of patients	16.1	**16.1**	14.1	8.8	4.9	16.2	**15.8**	14.1	9.2	4.7
	scenario 2									
Selection %	0.121	0.106	**0.728**	0.042	0.003	0.123	0.109	**0.702**	0.062	0.002
# of patients	12.8	14.1	**14.5**	11.4	7.2	13.5	14.2	**14.8**	10.7	6.8
	scenario 3									
Selection %	0.016	0.001	0.296	**0.612**	0.043	0.03	0.007	0.276	**0.595**	0.05
# of patients	9.1	9.8	14.6	**16.0**	9.7	9.0	9.8	15.1	**15.5**	9.3
	scenario 4									
Selection %	0.001	0.001	0.006	0.262	**0.73**	0.012	0.001	0.01	0.264	**0.713**
# of patients	8.1	8.8	11.9	15.3	**15.9**	8.4	8.9	12.2	14.9	**15.6**
	scenario 5									
Selection %	0.032	0.042	**0.420**	**0.439**	0.053	0.026	0.044	**0.43**	**0.416**	0.07
# of patients	11.6	12.5	**13.0**	**12.3**	10.1	11.5	12.7	**13.0**	**12.3**	10.1
	scenario 6									
Selection %	0.002	0.009	0.091	**0.408**	**0.486**	0.005	0.01	0.1	**0.357**	**0.526**
# of patients	10.4	11.0	12.6	**13.1**	**12.8**	10.1	11.3	12.2	**13.1**	**13.1**
	scenario 7									
Selection %	0.17	0.03	0.036	0.09	**0.674**	0.178	0.01	0.036	0.07	**0.706**
# of patients	12.4	11.7	11.9	11.9	**12.2**	11.9	11.7	11.7	12.4	**12.2**
	scenario 8									
Selection %	0	0	0	0	0	0	0	0	0	0
# of patients	4.3	3.2	2.9	2.1	0.8	4.4	3.2	3.0	2.1	0.7

Table S3: Results using Gamma priors for β_1 and β_2.

	dose level					dose level				
	1	2	3	4	5	1	2	3	4	5
	scenario 1					scenario 2				
Selection %	0.273	**0.644**	0.079	0.000	0.002	0.162	0.103	**0.708**	0.026	0.003
# of patients	16.2	**16.0**	14.3	8.8	4.7	13.6	14.1	**15.0**	10.9	6.3
	scenario 3					scenario 4				
Selection %	0.033	0.001	0.326	**0.552**	0.028	0.007	0.003	0.026	0.401	**0.521**
# of patients	9.9	9.7	14.7	**15.4**	8.3	9.6	8.7	12.2	13.6	**13.7**
	scenario 5					scenario 6				
Selection %	0.034	0.042	**0.456**	**0.408**	0.044	0.020	0.004	0.074	**0.440**	**0.460**
# of patients	12.3	12.3	**13.1**	**12.0**	9.8	10.6	11.1	12.4	**12.8**	**13.1**
	scenario 7					scenario 8				
Selection %	0.261	0.028	0.052	0.135	**0.516**	0.000	0.000	0.000	0.000	0.000
# of patients	13.6	12.2	11.4	11.2	**11.2**	4.7	0.4	0.0	0.0	0.0

Table S4: Results using truncated normal priors for β_1 and β_2.

	dose level					dose level				
	1	2	3	4	5	1	2	3	4	5
	scenario 1					scenario 2				
Selection %	0.251	**0.658**	0.087	0.001	0.001	0.149	0.103	**0.718**	0.029	0.001
# of patients	15.9	**16.1**	14.3	8.9	4.7	13.9	14.6	**15.0**	10.6	5.9
	scenario 3					scenario 4				
Selection %	0.036	0.004	0.350	**0.534**	0.028	0.018	0.002	0.026	0.462	**0.462**
# of patients	10.3	10.5	14.8	**14.9**	7.8	11.0	9.7	11.7	13.0	**13.0**
	scenario 5					scenario 6				
Selection %	0.028	0.046	**0.558**	**0.340**	0.012	0.007	0.021	0.103	**0.453**	**0.414**
# of patients	12.5	12.8	**13.1**	**11.9**	9.2	10.6	11.4	12.6	**12.9**	**12.4**
	scenario 7					scenario 8				
Selection %	0.256	0.030	0.072	0.132	**0.502**	0.000	0.000	0.000	0.000	0.000
# of patients	14.0	12.2	11.6	10.5	**11.2**	4.9	0.3	0.0	0.0	0.0

Figure S1: Selection percentage and the average number of patients treated at each dose level under cohort sizes of 3 and 1. Each row represents a scenario. In each plot, the two bars from left to right represent cohort size of 3 and 1, respectively.

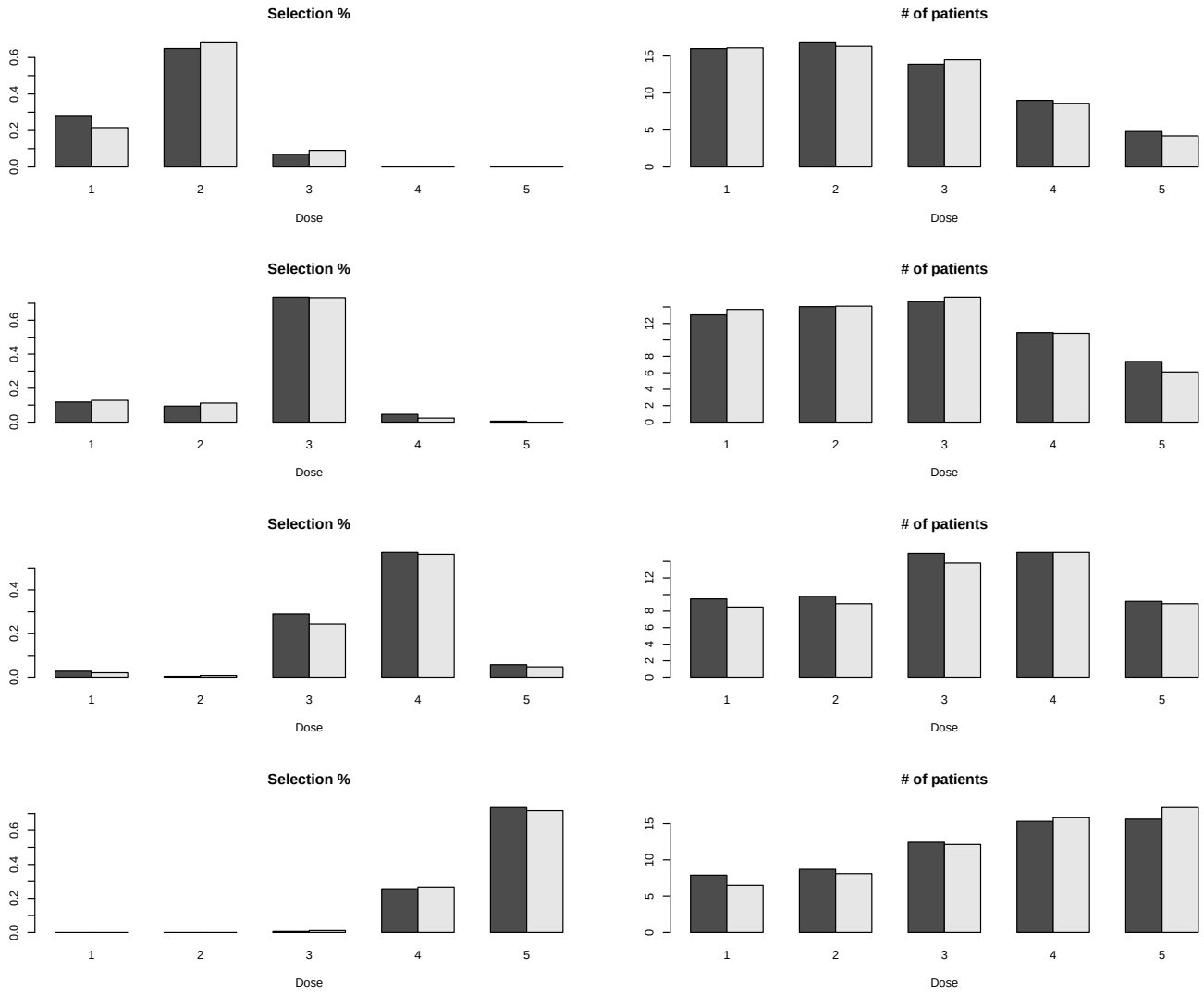

Figure S1 continued.