Modelling the effects of lymph node swelling on T-cell response.

Supplementary File 2.

Parameter tables citing the parameter range, the assumed distribution and source data where relevant.

2.1 Parameters that were not varied in the global sensitivity analysis

Table 1: Parameters that were not varied in the global sensitivity analysis

Symbol	Parameter	Value	Reference
	Model Geometry		
r_p	Initial paracortex radius	200μm	[1,2]
-	Entry radius	0.5 r_p	[1,2]
-	Exit radius	0.07r_p	[1,2]
-	Sub Capsular Sinus height	0.7r_p	[1,2]
GS	Grid Size	6μm	-
	TC Properties		
-	Initial occupation	55%	[3]
-	Ratio CD4:CD8	0.7:0.3	[1,2]
-	Lifespan naive	0.5 r_p	[4]
-	Lifespan naive	0.5 r_p	[5]
-	TC entry Afferent:HEV ratio	0.1:0.9	[6,7]
Actl_{4+}	Slope of CD4$^+$ activation curve	-69.81	-
Actl_{8+}	Slope of CD4$^+$ activation curve	-80.71	-
Difl_{4+}	Slope of CD4$^+$ differentiation curve	-17.26	-
Difl_{8+}	Slope of CD8$^+$ differentiation curve	-13.58	-
	T cell movement		
β	Probability of movement	0.6	[8–12]
P_e	Probability of egress	0.0126	-
γ	Max cells per grid	2	-
T_{res}	TC residence time	24hrs	[13,14]
	DC properties		
-	DC span	2 grids	[15,16]
-	DC Lifespan	2.5days	[17–19]

2.2 Parameters that were varied in the global sensitivity analysis

Table 2: Parameters varied in the global sensitivity analysis. Continued overleaf.

Symbol	Parameter Description	Default	Min	Max	Mean	SD	Distrib.	Ref
	TC response parameters							
$Act\mu_4$	$CD4^+$ activation curve mean	120	70	230	-	-	Unif	[20–25]
$Act\mu_8$	$CD8^+$ activation curve mean	140	90	250	-	-	Unif	[20–25]
$Dif\mu_4$	$CD4^+$ differentiation curve mean	60	30	90	-	-	Unif	[20–25]
$Dif\mu_8$	$CD8^+$ differentiation curve mean	40	20	60	-	-	Unif	[20–25]
TP_4	Min time between $CD4^+$ proliferations (hrs)	11	-	-	11	1.16	Norm	[26–29]
TP_8	Min time between $CD8^+$ proliferations (hrs)	7	-	-	7	0.88	Norm	[26,28]
Max_{P8}	Max proliferations $CD8^+$	16	-	-	16	1.2	Norm	[30–33]
Max_{P4}	Max proliferations $CD4^+$	10	-	-	10	1.2	Norm	[27–29]
Dif_{early}	Early Memory:Effector cell differentiation	0.01	0.001	0.02	0.01	-	Exp	[34]
Dif_{late}	Late Memory:Effector cell differentiation	0.04	0.01	0.08	-	-	Unif	[34]
	TC interaction dynamics							
T_{NC}	Mean non-cognate T-DC interaction (min)	3.5	-	-	3.5	1	Norm	[19,35]
T_{short}	Short cognate TC-DC interaction (min)	10-15	-	-	10	3	Norm	[19,35,36]
T_{long}	Long cognate TC-DC interaction (min)	50-70	-	-	50	12	Norm	[36–39]
T_{change}	Time TCs switch to long interactions (hr)	8	-	-	8	1	Norm	[36–39]
B_{max}	Max TCs a DC can bind per-step	3	1	5	-	-	Unif	-
B_{step}	Max TCs a DC can bind	15	4	20	-	-	Unif	[40]
	TC Stimulation							
K_s	Stim. gain coefficient	0.015	0.005	0.02	-	-	Unif	-
λ	TC stim. decay factor	0.99	0.99545	0.9999	-	-	Unif	-
MHC_i	Initial MHCI/II	250	150	350	-	-	Unif	[41–44]
$MHCI_{1/2}$	MHCI half life (hrs)	19.7	-	-	19.7	6	Norm	[41,42]
$MHCII_{1/2}$	MHCII half life (hrs)	60	-	-	60	6	Norm	[43,44]
F_{cog}	Frequency of cognate TCs that enter	1e-4	5e-5	1.5e-4	-	-	Unif	[27,45–47]
Φ_{DC}	Total DCs entering as % of initial TCs	0.04	0.02	0.06	-	-	Unif	[17]
T_{DCin}	DC entry duration (days)	2.5	0.5	4.5	-	-	Unif	[17]

Symbol	Parameter Description	Default	Min	Max	Mean	SD	Distrib.	Ref
	Sphingosine-1-phosphate receptor regulation							
SP_{entry}	$S1P_1r$ expression post entry	0.1	0.01	1	-	-	Unif	[48–50]
SP_{act}	$S1P_1r$ expression when activated	0.01	0.001	0.02	-	-	Unif	[48–51]
$S1_{early}$	Effector $S1P_1r$ (Proliferation<=6)	0.4	0.01	1	-	-	Unif	[48,51]
SP_{late}	Effector $S1P_1r$ (Proliferation>6)	0.8	0.3	1.3	-	-	Unif	[48,51]
SP_{mem}	Memory $S1P_1rr$	1	-	-	1	0.1	Norm	[48,51]
SP_{IF}	$S1P_1r$ on all TCs during inflam.	0.4	0.2	0.8	-	-	Unif	-
T_{Entry}	Time $S1P_1rr$ is low post-entry (min)	60	13	120	-	-	Unif	-
T_{Inflam}	Time to alter $S1P_1r$ during inflam.(hr)	4	1	7.5	-	-	Unif	-
	T cell recruitment							
RT1	recruitment increase stim. threshold	2e4	2e4	1e5	-	-	Unif	[52–55]
RT2	Stim. threshold for max. recruitment	4e5	2e5	2e6	-	-	Unif	[52–55]
R_F	Recruitment Factor	3e-6	1e-6	4e-6	-	-	Unif	[52–55]
	Paracortex expansion							
V_{Max}	Max fold-volume increase	1.00	2.00	2.50	-	-	Unif	-
l	Rate of volume change around m	7e-05	3e-05	1e-04	-	-	Unif	-
T_{mid}	No. of TCs for 50% max-volume	120000	90000	150000	-	-	Unif	-

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