SUPPLEMENTARY TEXT, TABLE AND FIGURES

Manuscript entitled "**Macrophage polarization drives granuloma outcome during *Mycobacterium tuberculosis* infection**".

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Macrophage Polarization Ratio - R_{MP} Calculation

Macrophage stimulation is represented by 3 integer counters: pro-inflammatory STAT1counter, NFKBcounter, and anti-inflammatory STAT3counter. These are initialized to 1 and are incremented by 1 when stimulation events occur (see Figure 1A), up to a specified maximum value (STAT1MaxLevel, STAT3MaxLevel, NFkBMaxLevel). These counters are used to calculate the downstream metabolic events of variables stat3Genes, stat1Genes and nfkbGenes.

When stimulation occurs and the counter is increased, a linear decay function maps the change in counter into the signal dynamics shown in Figure 1E using the parameters β ("gene production") and δ ("gene degradation"). The gene levels (with a minimum set to 1) are calculated every 10 minutes of simulation based on the following equation (e.g, for STAT1):

$$\text{tempSTAT1} = \text{stat1Genes} + (\text{STAT1counter} * \beta_{STAT1}) - \text{stat1Genes} * \delta_{STAT1};$$

$$\text{stat1Genes} = \max(\text{tempSTAT1}, 1);$$

The Macrophage Polarization Ratio [R_{MP}] for each macrophage is then calculated as:

$$R_{MP} = (stat1Genes + NFkBGenes)/2*(stat3Genes)$$

For STAT1 (and similarly for the other two pathways) the max gene levels are calculated as:

$$maxSTAT1Gene = \log10(stat1MaxLevel * (\beta_{STAT1} / \delta_{STAT1})).$$

The maxGeneLevel is used to define the range [min,max] for R_{MP}. Log10 is used to prevent bias in signaling due to the range of β ("gene production") and δ ("gene degradation") parameters over orders of magnitude. The maximum value for R_{MP} is calculated as:

$$maxR_{MP} = \log10((maxSTAT1Gene + maxNFkBGene)/2*1).$$

The minimum value for the ratio is calculated as:

$$minR_{MP} = \log10(1/maxSTAT3Gene).$$

R_{MP} is normalized between 0 and 1 by defining a linear interpolation of R_{MP} using:

i) **slope**=1/($maxR_{MP}$ - $minR_{MP}$)

ii) **intercept**=-1*($minR_{MP}$ /($maxR_{MP}$ - $minR_{MP}$))

and adjusting R_{MP} as:

$$Normalized\_ R_{MP} = \textbf{slope}*\log10(R_{MP})+\textbf{intercept}$$

The Normalized_ R_{MP} is used to scale parameters related to immune functions (lifespan, killing and secretion parameters) for each individual macrophage.

TNF and IL-10 secretion

TNF is secreted by all macrophage phenotypes (except M0) and by T cells. The rates of secretion are defined by the parameters *ksynthMac* and *kRNAMac* (for macrophages) and *ksynthTcell* and *kRNATcell* (for T cells). These parameters are modulated by the macrophage polarization ratio (see the details in the Supplementary Text "*Macrophage Polarization Ratio - R_{MP} Calculation*").

IL-10 is secreted by all macrophage phenotypes (except M0) and by regulatory T cells. The rates of secretion are defined by the parameters *IkSynthMacInf* and *IkSynthMacAct* (for macrophages) and *dIL10* (for T cells). Similarly to TNF, these parameters are modulated by the macrophage polarization ratio (see the details in the Supplementary Text "*Macrophage Polarization Ratio - R_{MP} Calculation*").

As far as describing how IL-10 and TNF regulate macrophages, the reader is referred to Figure 1 of (2), where a schematic diagram illustrates all TNF and IL-10 mechanisms included in the ABM.

Tables S1: sensitivity analysis results obtained from calculating PRCCs on many different outputs measured on the in silico granulomas shown in Figure 3. Many time points post infection were considered (i.e., day 10, 20, 30, 40, 50, 100, 150 and 200). Each parameter listed in the tables has a PRCC significantly (i.e., p<1e-3) different from zero. The outputs are CFU/Granuloma,, Granuloma Polarization Ratio, total count of macrophages, unpolarized M0, infected, M1, M2, M1M2 macrophages, total TNF molecules, total IL10 molecules, lesion size, Caseation/necrosis and macrophage apoptosis. Details on the parameters can be found in Table 1.

CFU/granuloma

Days	PARAMETERS							
10	$prob_{KillExtMtb-M0}$							
	-0.0861							
20	$prob_{KillExtMtb-M0}$							
	-0.1201							
30	$prob_{KillExtMtb-M0}$	$time_{Rec}$						
	-0.1441	0.3914						
40	$\delta_{NfκB}$	$prob_{KillExtMtb-M0}$	$k_{NFκB}$	$time_{Rec}$				
	-0.2779	-0.1001	0.1674	0.5753				
50	$\delta_{NfκB}$	$\tau_{NFkB-TNF}$	$\delta_{NfκB}$	$Synth_{IL10-MI}$	$\beta_{NFκB}$	$k_{NFκB}$	$time_{Rec}$	
	-0.3671	-0.1171	-0.1058	-0.0901	0.1167	0.2346	0.5860	
100	$\delta_{NfκB}$	$prob_{KillIntMtb}$	$\tau_{NFkB-TNF}$	$prob_{KillExtMtb-M0}$	$\beta_{NFκB}$	kNfkB	$time_{Rec}$	$prob_{STAT1-Tγ}$
	-0.3604	-0.1603	-0.1247	0.0959	0.1972	0.2540	0.2670	0.5365
150	$\delta_{NfκB}$	$prob_{KillIntMtb}$	$\tau_{STAT3-IL10}$	$\tau_{NFkB-TNF}$	$time_{Rec}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1-Tγ}$
	-0.2209	-0.1578	-0.1054	-0.0904	0.1449	0.1695	0.1770	0.5214
200	$\delta_{NfκB}$	$prob_{KillIntMtb}$	$\tau_{STAT3-IL10}$	$time_{Rec}$	IkSynτhMA	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1-Tγ}$
	-0.1641	-0.1439	-0.1284	0.0977	0.1032	0.1383	0.1398	0.4834

Granuloma Polarization Ratio

Days	PARAMETERS								
10	$\delta_{NfκB}$	$\tau_{NFkB-TNF}$	$k_{NFκB}$	$\beta_{NFκB}$					
	-0.7330	-0.0950	0.2606	0.7653					
20	$\delta_{NfκB}$	$Synth_{IL10-MI}$	$Synth_{IL10-MA}$	$\tau_{NFkB-TNF}$	$prob_{KillExtMtb-M0}$	$\tau_{STAT3-IL10}$	$\beta_{NFκB}$		
	-0.7038	-0.4258	-0.1714	0.0865	0.1111	0.2547	0.6543		
30	$\delta_{NfκB}$	$Synth_{IL10-MI}$	$Synth_{IL10-MA}$	$k_{STAT3-IL10}$	δ_{STAT1}	β_{STAT1}	$time_{Rec}$	$\tau_{STAT3-IL10}$	$\beta_{NFκB}$
	-0.6186	-0.5011	-0.2377	-0.1020	-0.0946	0.2209	0.2432	0.2881	0.5674
40	$Synth_{IL10-MI}$	$\delta_{NfκB}$	$Synth_{IL10-MA}$	$time_{Rec}$	$prob_{STAT1-Tγ}$	$prob_{KillExtMtb-M0}$	$\tau_{STAT3-IL10}$	β_{STAT1}	$\beta_{NFκB}$

	-0.4246	-0.3837	-0.2612	-0.1393	-0.1202	0.0922	0.2360	0.2562	0.7238	
50	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}Tγ}$	δ_{STAT1}	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	β_{STAT1}	$\beta_{NFκB}$	
	-0.4458	-0.3658	-0.2565	-0.1554	-0.1201	-0.1036	0.2184	0.2329	0.7142	
100	$\delta_{NfκB}$	$prob_{STAT1\text{-}Tγ}$	$Synth_{IL10\text{-}MI}$	δ_{STAT1}	$Synth_{IL10\text{-}MA}$	Act_Time_{STAT3}	$\tau_{STAT3\text{-}IL10}$	$time_{Rec}$	β_{STAT1}	$\beta_{NFκB}$
	-0.5887	-0.2859	-0.2349	-0.2031	-0.1253	0.1016	0.1061	0.1684	0.3287	0.4804
150	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	δ_{STAT1}	$Synth_{IL10\text{-}MA}$	$k_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$	$\tau_{STAT3\text{-}IL10}$	β_{STAT1}	$\beta_{NFκB}$	
	-0.4806	-0.2339	-0.2116	-0.1563	-0.1030	0.1156	0.1357	0.2960	0.4492	
200	$\delta_{NfκB}$	δ_{STAT1}	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{STAT3\text{-}IL10}$	Act_Time_{STAT1}	$prob_{STAT1\text{-}Tγ}$	β_{STAT1}	$\beta_{NFκB}$	
	-0.4231	-0.2154	-0.1682	-0.0990	0.0915	0.0965	0.2048	0.3112	0.4302	

Total Macrophages

Days	**PARAMETERS**									
10	$\delta_{NfκB}$	$k_{NFκB}$								
	-0.1050	0.1387								
20	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MA}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$			
	-0.6476	-0.2519	-0.1832	-0.0979	0.1198	0.1918	0.3078			
30	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	sτaτ3GeneDeg	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$		
	-0.6977	-0.2883	-0.1638	-0.1060	0.1226	0.2006	0.3459	0.4872		
40	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$prob_{KillExtMtb\text{-}M0}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$			
	-0.5982	-0.1923	-0.1715	0.1190	0.1431	0.3006	0.8334			
50	$\delta_{NfκB}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MI}$	τimeRec	Act_t_{STAT1}	$\tau_{AgeTrans}$	$\beta_{NFκB}$	$prob_{KillExtMtb\text{-}M0}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$
	-0.4799	-0.1530	-0.1501	-0.1345	0.0899	0.1053	0.1333	0.1853	0.2415	0.9031
100	δ_{STAT1}	τimeRec	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{AgeTrans}$	δ_{STAT3}	$prob_{STAT1\text{-}Tγ}$			
	-0.1416	-0.1320	-0.1302	-0.1051	0.0952	0.1047	0.9431			
150	δ_{STAT1}	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	$prob_{KillIntMtb}$	$prob_{STAT1\text{-}Tγ}$					
	-0.2276	-0.1385	0.0859	0.1142	0.9219					
200	δ_{STAT1}	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$\tau_{STAT3\text{-}IL10}$	$\tau_{NFkB\text{-}TNF}$	$prob_{KillIntMtb}$	$prob_{STAT1\text{-}Tγ}$			
	-0.2347	-0.1535	-0.1426	0.0855	0.0928	0.1046	0.8845			

Total Infected Macrophages

Days	**PARAMETERS**								
10	$prob_{KillExtMtb\text{-}M0}$								
	-0.0973								
20	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$				
	-0.2420	-0.1688	-0.1203	0.1620	0.2725				
30	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	$prob_{KillExtMtb\text{-}M0}$	$\tau_{STAT3\text{-}IL10}$	timeRec			
	-0.2760	-0.1710	-0.1545	-0.1094	0.1638	0.2038			
40	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$	timeRec	

	-0.5393	-0.2214	-0.1316	0.0872	0.1524	0.2917	0.3555	0.3705
50	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$\beta_{NFκB}$	τimeRec	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$	
	-0.4900	-0.1593	-0.1457	0.1744	0.2033	0.2861	0.6081	
100	$\delta_{NfκB}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$prob_{STAT1\text{-}Tγ}$				
	-0.1050	-0.0941	0.1366	0.6733				
150	$\beta_{NFκB}$	$prob_{STAT1\text{-}Tγ}$						
	0.0882	0.5701						
200	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}Tγ}$						
	0.0948	0.5553						

Total M0

Days	**PARAMETERS**												
10	$\delta_{NfκB}$	$k_{NFκB}$											
	-0.0871	0.1286											
20	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$						
	-0.5600	-0.3076	-0.1779	-0.1327	0.1673	0.1915	0.1953						
30	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	τimeRec	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	$k_{STAT3\text{-}IL10}$	δ_{STAT1}	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$	
	-0.6391	-0.3889	-0.1955	-0.1185	-0.1144	-0.1027	-0.0903	0.1100	0.1949	0.2125	0.2807	0.4087	
40	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MA}$	$prob_{KillExtMtb\text{-}M0}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$				
	-0.5763	-0.3077	-0.1485	-0.1175	0.1171	0.1325	0.1531	0.2752	0.8330				
50	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	τimeRec	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	$k_{STAT3\text{-}IL10}$	Act_t_{STAT1}	$\tau_{AgeTrans}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$prob_{KillExtMtb\text{-}M0}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$
	-0.4529	-0.2740	-0.1357	-0.1292	-0.1281	-0.0887	0.0873	0.0922	0.1155	0.1462	0.1695	0.2228	0.9003
100	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	timeRec	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$								
	-0.3026	-0.2768	-0.1233	0.1925	0.8568								
150	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	δ_{STAT1}	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$								
	-0.2891	-0.2624	-0.0930	0.1926	0.7781								
200	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	δ_{STAT1}	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$							
	-0.2607	-0.2435	-0.0989	-0.0973	0.1551	0.7381							

Total M1

Days	**PARAMETERS**											
10	$\delta_{NfκB}$	$\tau_{NFkB\text{-}TNF}$	$k_{NFκB}$									
	-0.3702	-0.1537	0.2676									
20	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MA}$	δ_{STAT1}	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$				
	-0.6823	-0.4716	-0.2045	-0.1748	0.1164	0.2199	0.2308	0.4671				
30	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	δ_{STAT3}	$\tau_{NFkB\text{-}TNF}$	$\tau_{STAT3\text{-}IL10}$	δ_{STAT1}	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$	τimeRec
	-0.5489	-0.4790	-0.2127	-0.0923	-0.0908	-0.0885	0.1103	0.1272	0.2514	0.3284	0.4280	0.4319
40	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT1}	$\beta_{NFκB}$	$prob_{KillExtMtb\text{-}M0}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}Tγ}$		
	-0.4147	-0.3481	-0.1808	-0.1170	0.0877	0.1074	0.1696	0.1712	0.2394	0.7597		

50	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$k_{NFκB}$	$prob_{KillExtMtb\text{-}M0}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$
	-0.3512	-0.3119	-0.1862	0.1657	0.1792	0.1877	0.8253
100	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	kSTAT3IL10	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$
	-0.3105	-0.2962	-0.2392	-0.1118	0.0902	0.2056	0.8231
150	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	δ_{STAT1}	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$
	-0.3152	-0.2944	-0.2328	-0.1223	0.1071	0.2094	0.8230
200	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$		$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$
	-0.2773	-0.2589	-0.2525	-0.1241	0.1089	0.1950	0.8178

Total M1

Days	**PARAMETERS**						
10	$Synth_{IL10\text{-}MI}$						
	0.0911						
20	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$\beta_{NfκB}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	
	-0.3921	-0.1328	-0.0891	0.1416	0.1913	0.6243	
30	$\tau_{STAT3\text{-}IL10}$	τimeRec	δ_{STAT1}	$k_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	
	-0.4855	-0.1462	-0.0948	0.0943	0.2534	0.6908	
40	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$	δ_{STAT1}	$prob_{STAT1\text{-}Tγ}$	$k_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$
	-0.5085	-0.1563	-0.0861	0.0871	0.1072	0.2366	0.5914
50	$\tau_{STAT3\text{-}IL10}$	$k_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}Tγ}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$		
	-0.4670	0.0885	0.1481	0.2374	0.5450		
100	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}Tγ}$	$Synth_{IL10\text{-}MI}$			
	-0.3636	0.1665	0.2934	0.4669			
150	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}Tγ}$	$Synth_{IL10\text{-}MI}$			
	-0.3806	0.1764	0.2292	0.5406			
200	$\tau_{STAT3\text{-}IL10}$	$k_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}Tγ}$	$Synth_{IL10\text{-}MI}$		
	-0.3560	0.1035	0.1732	0.2363	0.4918		

Total M1M2

Days	**PARAMETERS**						
10	NONE						
20	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$				
	-0.4781	0.1272	0.7512				
30	$\tau_{STAT3\text{-}IL10}$	δ_{STAT1}	$prob_{KillExtMtb\text{-}M0}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$		
	-0.5708	-0.1002	-0.0903	0.1772	0.7644		
40	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$	$prob_{STAT1\text{-}Tγ}$	$k_{NFκB}$	$k_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$
	-0.5852	-0.1704	0.0897	0.1144	0.1172	0.1940	0.6639

50	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$	$k_{NFκB}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}T\gamma}$	$Synth_{IL10\text{-}MI}$
	-0.5477	-0.1566	0.0956	0.1268	0.2038	0.6208
100	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}T\gamma}$	$Synth_{IL10\text{-}MI}$		
	-0.3808	0.1536	0.3276	0.4927		
150	$\tau_{STAT3\text{-}IL10}$	$k_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}T\gamma}$	$Synth_{IL10\text{-}MI}$	
	-0.3930	0.0908	0.1308	0.2424	0.5409	
200	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$prob_{STAT1\text{-}T\gamma}$	$Synth_{IL10\text{-}MI}$		
	-0.3837	0.1625	0.2249	0.5282		

Total TNF

Days	**PARAMETERS**											
10	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$k_{NFκB}$									
	-0.1738	-0.0939	0.1467									
20	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	sτaτ3Beτa	$\delta_{NfκB}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$		
	-0.5845	-0.5720	-0.1753	-0.1656	-0.1122	0.0918	0.1721	0.1975	0.2593	0.4117		
30	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	δ_{STAT3}	$\beta_{NFκB}$	$\delta_{NfκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$	τimeRec		
	-0.5612	-0.4848	-0.2268	-0.1147	0.1403	0.1424	0.2463	0.3125	0.3876	0.5299		
40	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	τimeRec	$\delta_{NfκB}$	$prob_{KillExtMtb\text{-}M0}$	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$
	-0.4723	-0.4519	-0.2017	-0.1261	-0.0930	0.1103	0.1291	0.1300	0.1348	0.1655	0.2476	0.7225
50	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$\delta_{Nfκ3}$	$\tau_{NFkB\text{-}TNF}$	$k_{STAT3IL10}$	$\delta_{NfκB}$	$\beta_{NFκB}$	$prob_{KillExtMtb\text{-}M0}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$
	-0.4444	-0.3448	-0.1967	-0.1049	-0.0868	-0.0867	0.1097	0.1122	0.1664	0.1821	0.1978	0.8173
100	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	$k_{STAT3IL10}$	$prob_{KillExtMtb\text{-}M0}$	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$		
	-0.3171	-0.2689	-0.2355	-0.1132	-0.0963	0.0903	0.1196	0.1526	0.1731	0.8931		
150	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	δ_{STAT3}	$\delta_{NfκB}$	$\beta_{NFκB}$	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}T\gamma}$			
	-0.3257	-0.2906	-0.2427	-0.1096	-0.0970	0.0886	0.1612	0.1669	0.8929			
200	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	δ_{STAT3}	$\delta_{NfκB}$	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$			
	-0.2760	-0.2473	-0.2460	-0.1165	-0.1029	0.1109	0.1400	0.1673	0.8903			

Total IL10

Days	**PARAMETERS**							
10	$Synth_{IL10\text{-}MI}$							
	0.6776							
20	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$			
	-0.1652	-0.1475	0.0941	0.2918	0.8953			
30	τimeRec	$\delta_{NfκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$prob_{STAT1\text{-}T\gamma}$	
	-0.3206	-0.2603	-0.1976	0.1068	0.2759	0.5882	0.5954	
40	$\delta_{NfκB}$	$\tau_{STAT3\text{-}IL10}$	$\tau_{NFkB\text{-}TNF}$	$k_{NFκB}$	timeRec	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$prob_{STAT1\text{-}T\gamma}$
	-0.2925	-0.1749	-0.0989	0.1242	0.1527	0.2934	0.4156	0.7594

50	$\delta_{NfκB}$	$\tau_{STAT3\text{-}IL10}$	$\tau_{NFkB\text{-}TNF}$	timeRec	$k_{NFκB}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$prob_{STAT1\text{-}T\gamma}$
	-0.2647	-0.2077	-0.1067	0.1002	0.1398	0.2413	0.3920	0.7843
100	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$	timeRec	$k_{NFκB}$	$\beta_{NFκB}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$prob_{STAT1\text{-}T\gamma}$
	-0.1495	-0.1262	-0.0898	0.0914	0.1110	0.1384	0.3096	0.8295
150	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$	Act_t_{STAT3}	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$prob_{STAT1\text{-}T\gamma}$		
	-0.1327	-0.1064	-0.0858	0.1748	0.3601	0.7849		
200	$\tau_{STAT3\text{-}IL10}$	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$prob_{STAT1\text{-}T\gamma}$				
	-0.1390	0.1580	0.3584	0.7607				

Lesion Size

Days	**PARAMETERS**									
10	$k_{NFκB}$									
	0.1373									
20	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MA}$	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$			
	-0.5973	-0.2830	-0.1724	-0.1166	0.1327	0.2047	0.3255			
30	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MA}$	δ_{STAT3}	δ_{STAT1}	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$
	-0.6571	-0.3572	-0.1528	-0.1213	-0.1141	0.1014	0.1608	0.2098	0.3469	0.4816
40	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	$prob_{KillExtMtb\text{-}M0}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$		
	-0.5811	-0.2393	-0.1676	-0.0920	0.1099	0.1421	0.3030	0.8234		
50	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$\tau_{NFkB\text{-}TNF}$	timeRec	$\beta_{NFκB}$	$prob_{KillExtMtb\text{-}M0}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$		
	-0.4616	-0.2011	-0.1484	-0.0967	0.1336	0.1843	0.2456	0.8944		
100	$Synth_{IL10\text{-}MI}$	δ_{STAT1}	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	$\beta_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$				
	-0.1721	-0.1554	-0.1505	-0.1416	0.0951	0.9501				
150	δ_{STAT1}	$Synth_{IL10\text{-}MA}$	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$prob_{STAT1\text{-}T\gamma}$					
	-0.2591	-0.1638	-0.1316	-0.0950	0.9422					
200	δ_{STAT1}	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}T\gamma}$					
	-0.2746	-0.1825	-0.1695	0.0926	0.9302					

Caseation/Necrosis

Days	**PARAMETERS**		
10	NONE		
20	NONE		
30	NONE		
40	$prob_{STAT1\text{-}T\gamma}$	τimeRec	$\delta_{NfκB}$
	-0.1511	-0.1313	0.1140

50	$prob_{STAT1\text{-}T\gamma}$	τimeRec	$prob_{KillExtMtb\text{-}M0}$	$k_{NFκB}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	$\tau_{STAT3\text{-}IL10}$	$\delta_{NfκB}$
	-0.4270	-0.2712	-0.2338	-0.1701	-0.1658	0.1302	0.1329	0.3591
100	$\delta_{NfκB}$	$prob_{KillExtMtb\text{-}M0}$	$Synth_{IL10\text{-}MI}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	timeRec		
	-0.2990	-0.1865	-0.1572	0.1012	0.1152	0.3466		
150	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$prob_{KillIntMtb}$	$\tau_{NFkB\text{-}TNF}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$	
	-0.2955	-0.1489	-0.1470	-0.1117	0.1267	0.1843	0.5631	
200	$\delta_{NfκB}$	$prob_{KillIntMtb}$	$\tau_{NFkB\text{-}TNF}$	$Synth_{IL10\text{-}MI}$	$\beta_{NFκB}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$	
	-0.2297	-0.1572	-0.0944	-0.0929	0.1324	0.1694	0.5966	

TNF-induced Apoptosis of Macrophages

Days	**PARAMETERS**											
10	$k_{NFκB}$											
	0.0976											
20	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	β_{STAT3}	δ_{STAT1}	$\tau_{STAT3\text{-}IL10}$	$\beta_{NFκB}$	$k_{NFκB}$		
	-0.4613	-0.4500	-0.1411	-0.1288	-0.0983	0.1093	0.1314	0.1373	0.1843	0.3635		
30	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	β_{STAT3}	$prob_{STAT1\text{-}T\gamma}$	δ_{STAT1}	$\tau_{STAT3\text{-}IL10}$	τimeRec	$\beta_{NFκB}$	$k_{NFκB}$
	-0.6030	-0.5616	-0.2095	-0.1495	-0.1299	0.0964	0.1029	0.1733	0.2240	0.2268	0.2335	0.4129
40	$\delta_{NfκB}$	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\tau_{NFkB\text{-}TNF}$	δ_{STAT3}	δ_{STAT1}	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}T\gamma}$	τimeRec	$k_{NFκB}$	
	-0.5963	-0.5838	-0.2256	-0.1479	-0.1405	0.1678	0.2079	0.2213	0.2370	0.2820	0.3872	
50	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	δ_{STAT3}	$\tau_{NFkB\text{-}TNF}$	$k_{STAT3IL10}$	δ_{STAT1}	τimeRec	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$
	-0.5665	-0.5429	-0.2277	-0.1516	-0.1453	-0.0947	0.1718	0.1799	0.1814	0.2228	0.3462	0.4826
100	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$k_{STAT3IL10}$	δ_{STAT3}	$\tau_{NFkB\text{-}TNF}$	δ_{STAT1}	$prob_{KillExtMtb\text{-}M0}$	$\beta_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$k_{NFκB}$	$prob_{STAT1\text{-}T\gamma}$
	-0.4827	-0.3608	-0.2879	-0.1284	-0.1216	-0.1188	0.1086	0.1176	0.1288	0.2226	0.2335	0.8051
150	$Synth_{IL10\text{-}MI}$	$\delta_{NfκB}$	$Synth_{IL10\text{-}MA}$	$k_{STAT3IL10}$	δ_{STAT3}	$\tau_{NFkB\text{-}TNF}$	$prob_{KillExtMtb\text{-}M0}$	$\beta_{NFκB}$	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}T\gamma}$	
	-0.4452	-0.3256	-0.3253	-0.1226	-0.1213	-0.0968	0.0905	0.1211	0.2191	0.2385	0.8400	
200	$Synth_{IL10\text{-}MI}$	$Synth_{IL10\text{-}MA}$	$\delta_{NfκB}$	δ_{STAT3}	$k_{STAT3IL10}$	$\beta_{NFκB}$	$k_{NFκB}$	$\tau_{STAT3\text{-}IL10}$	$prob_{STAT1\text{-}T\gamma}$			
	-0.4191	-0.3361	-0.3162	-0.1414	-0.1104	0.1193	0.2159	0.2310	0.8541			

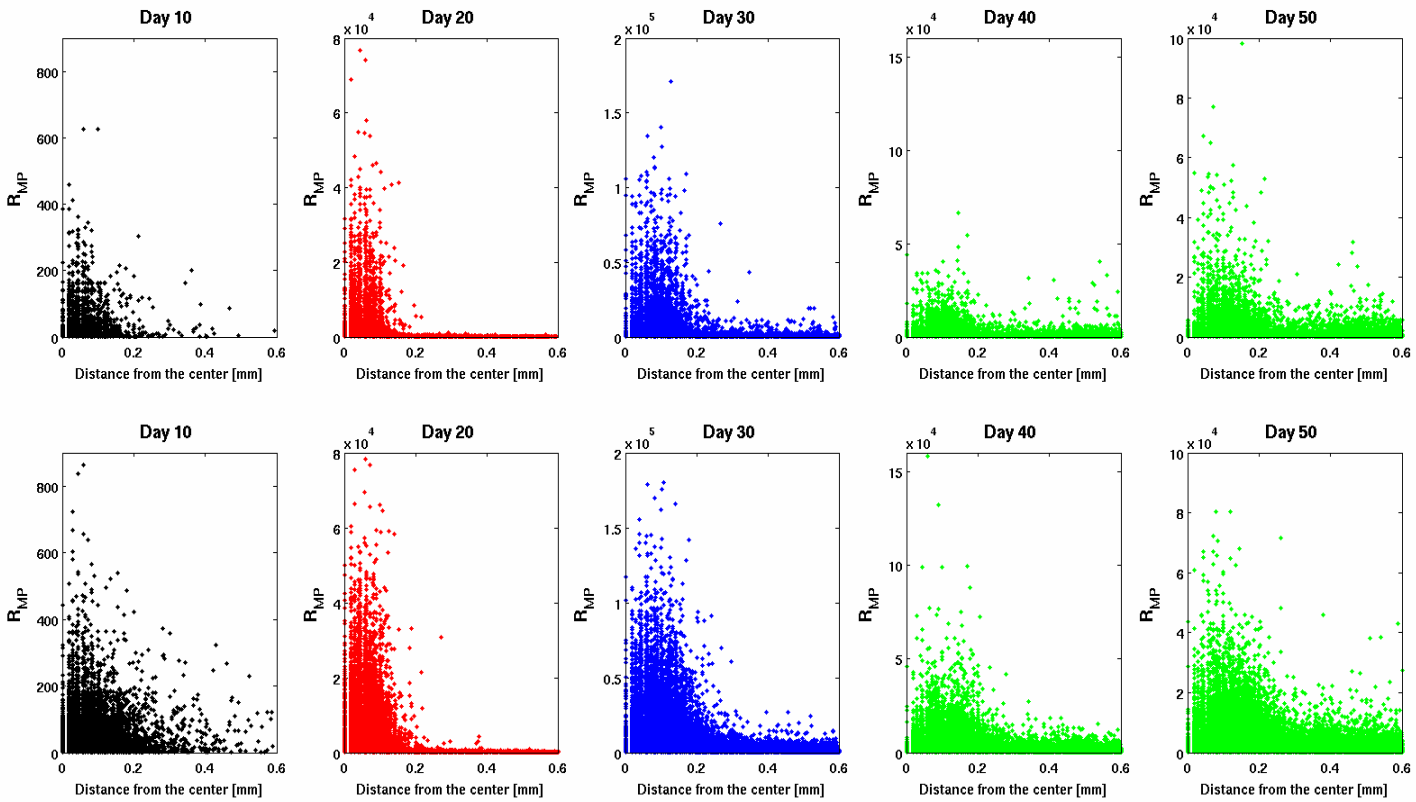

Figure S1: **Spatial distribution of Macrophage Polarization Ratio (R_{MP}, y-axis in all the panels) from day 10 to 50 post infection within granulomas.** Each dot represents a macrophage polarization ratio. The two rows represent the containment (top row) and dissemination (bottom row) clusters of granulomas, respectively (as shown in Figure 3). The x-axis is the distance each macrophage is from the center of the granuloma (shown here in mm), since we restrict our analysis to granuloma within 1-2 mm in diameter (here 0.6 mm is the radius of the lesion).

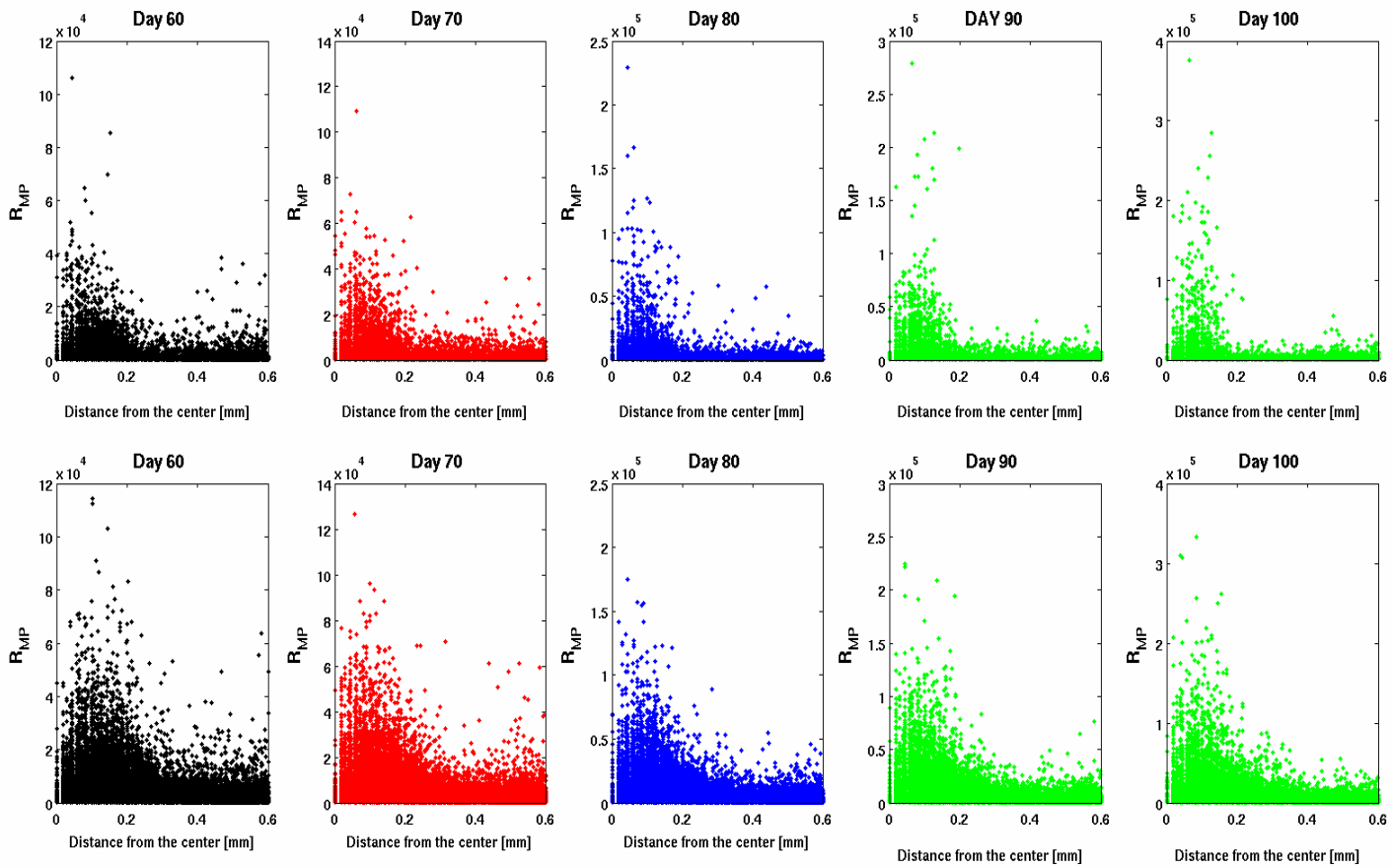

Figure S2: **Spatial distribution of Macrophage Polarization Ratio (R_{MP}, y-axis in all the panels) from day 60 to 100 post infection within granulomas.** Each dot represents a macrophage polarization ratio. The two rows represent the containment (top row) and dissemination (bottom row) clusters of granulomas, respectively (as shown in Figure 3). The x-axis is the distance each macrophage is from the center of the granuloma (shown here in mm), since we restrict our analysis to granuloma within 1-2 mm in diameter (here 0.6 mm is the radius of the lesion).

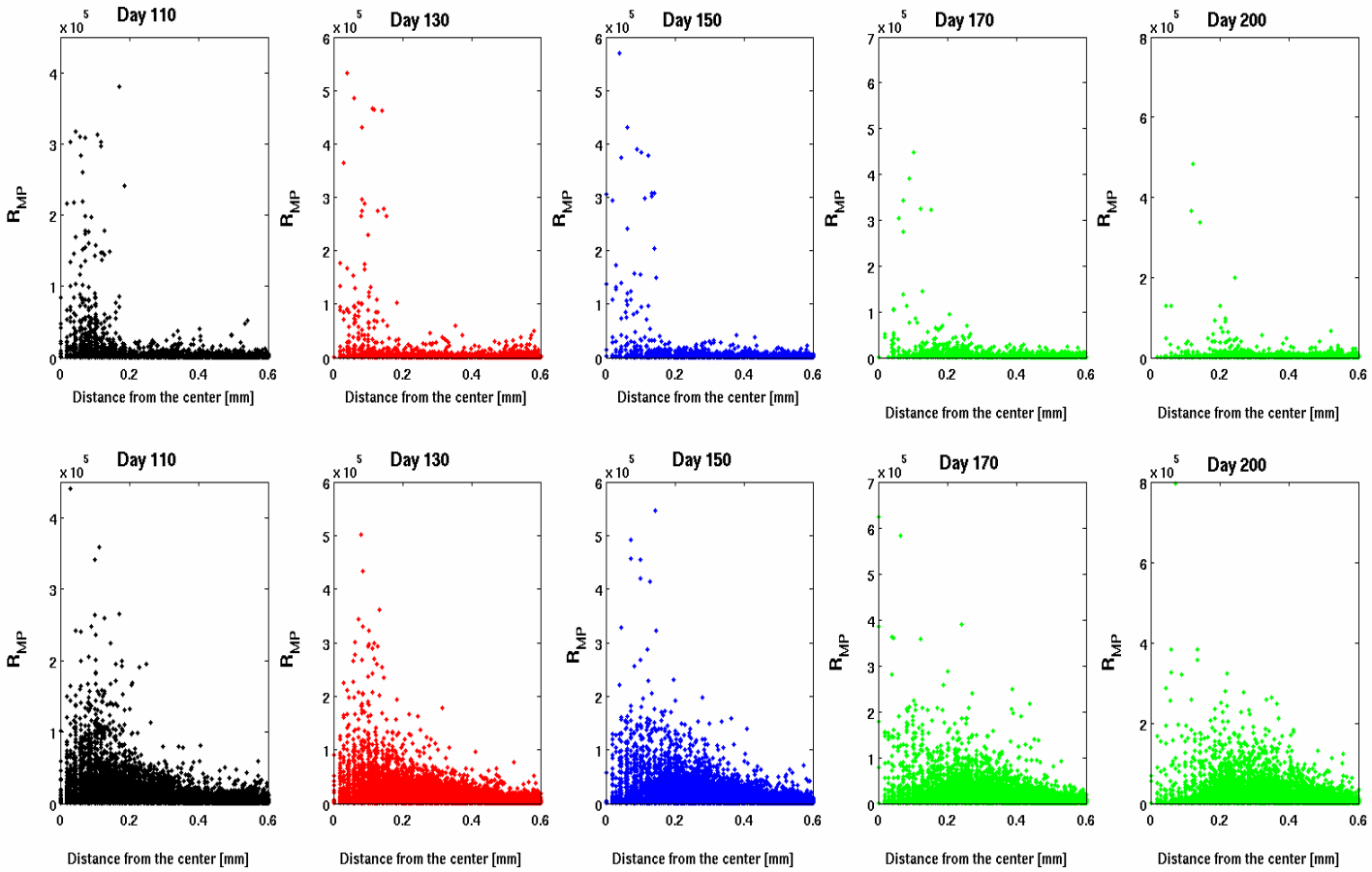

Figure S3: **Spatial distribution of Macrophage Polarization Ratio (R_{MP}, y-axis in all the panels) from day 100 to 200 post infection within granulomas.** Each dot represents a macrophage polarization ratio. The two rows represent the (top row) containment and dissemination (bottom row) clusters of granulomas, respectively (as shown in Figure 3). The x-axis is the distance each macrophage is from the center of the granuloma (shown here in mm), since we restrict our analysis to granuloma within 1-2 mm in diameter (here 0.6 mm is the radius of the lesion).