Additional File 5: List of parameters of the mathematical models A and B, respectively.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>Differentiation rate from $C_-$ to $C_+$</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$r_1$</td>
<td>Maximum shedding rate for non-infected CD163 positive cells, i.e. transition rate from $C_-$ to $C_+$.</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$f_r$</td>
<td>Half saturation concentration of compound P for receptor shedding</td>
<td>[1]</td>
<td>estimated</td>
</tr>
<tr>
<td>$m_-, m_+, m_--$</td>
<td>Mortality rates for non-infected $C_-, C_+ and C_-$. cells, respectively</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$c_1, c_2$</td>
<td>Proportion of $C_-$ and $C_+$ cells, respectively, at start of incubation (time = 0)</td>
<td>[1]</td>
<td>estimated</td>
</tr>
<tr>
<td>$b_{\text{max}}$</td>
<td>Maximum infection rate</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$f_b$</td>
<td>Half saturation concentration of compound Q for infection</td>
<td>[1]</td>
<td>estimated</td>
</tr>
<tr>
<td>$p_P, p_Q$</td>
<td>Production rate of compounds P and Q, respectively</td>
<td>[1/h]</td>
<td>0.5*</td>
</tr>
<tr>
<td>$s_P, s_Q$</td>
<td>Decay rates of compounds P and Q, respectively</td>
<td>[1/h]</td>
<td>0.5*</td>
</tr>
<tr>
<td>$r_2$</td>
<td>Maximum shedding rate for infected CD163 positive cells, i.e. transition rate from $C^-<em>* to C^+</em>*$.</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$a_+, a_-$</td>
<td>Mortality rates for infected $C^-<em>*$ and $C^+</em>*$ cells, respectively</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
</tbody>
</table>

**MODEL B**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\delta_1$</td>
<td>Differentiation rate from C.M. to C.$^+_M$.</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$\delta_2$</td>
<td>Differentiation rate from C.$^-_M$ to C.$^-_M$.</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$\sigma_{1,\text{max}}$</td>
<td>Max. (de) activation rate between C.M. and C.$^-_M$.</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>$\sigma_{2,\text{max}}$</td>
<td>Max. (de) activation rate between C.$+_M$. and C.$+_M$.</td>
<td>[1/h]</td>
<td>estimated</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Symbol</td>
<td>Unit</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>$\varepsilon$</td>
<td>Constant determining how gradual the susceptibility state switches as $F$ approaches $F_T$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_T$</td>
<td>Threshold value for compound $F$</td>
<td></td>
<td>[1]</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>Production rate for compound $F$</td>
<td></td>
<td>[1/h]</td>
</tr>
<tr>
<td>$\omega$</td>
<td>Decay rate for compound $F$</td>
<td></td>
<td>[1/h]</td>
</tr>
<tr>
<td>$\mu_1, \mu_2, \mu_3, \mu_4$</td>
<td>Mortality rates for non-infected C.M., C+M. and C+M+ cells, respectively</td>
<td></td>
<td>[1/h]</td>
</tr>
<tr>
<td>$\lambda_1, \lambda_2, \lambda_3$</td>
<td>Proportion of C.M., C+M. and C+M+ cells, respectively, at start of incubation ($t=0$)</td>
<td></td>
<td>[1]</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>Infection rate for C.M. cells, i.e. transition rate from C.M. to C.$^<em>M_+^</em>$</td>
<td></td>
<td>[1/h]</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>Infection rate for C.M. cells, i.e. transition rate from C+M. to C.$^<em>M_+^</em>$</td>
<td></td>
<td>[1/h]</td>
</tr>
<tr>
<td>$\alpha_3, \alpha_4$</td>
<td>Mortality rates for infected C.$^<em>M_+^</em>$ and C.$^<em>M_+^</em>$ cells, respectively</td>
<td></td>
<td>[1/h]</td>
</tr>
</tbody>
</table>

Identifiability analysis revealed poor identifiability of model parameters controlling the density dependent effects of autocrine substances (i.e. quantities $P, Q$ in model A and $F$ in model B) and confounding between the shedding and infection rates ($f, Q_b$ in model A) and switching rates ($F_T$ in model B) with the respective production rates (parameters $p_P, p_Q$ in model A, and $\gamma$ in model B) and decay rates (parameters $s_P, s_Q$ in model A and $\omega$ in model B) of these compounds. To remedy this issue, we fixed all production and decay rates of these compounds to the arbitrary constant value of 0.5 and estimated the remaining parameters through model fitting. For similar reasons, the constant $\varepsilon$ in model B was set to the arbitrary value of 0.1.