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Erratum

Erratum to "Quantifying cell turnover using CFSE data" [J. Immunol. Methods (298) (2005) 183]

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1. Correction

Previously, we used the analytical solution of the Smith-Martin model to fit the data on the dynamics of naive T cells transferred into irradiated hosts (Ganusov et al., 2005). After we have reported the results of the fittings, several errors have been noticed. We have found that there was an error in implementing the solution of the SM model in the nonlinear regression routine. This led to incorrect estimates for the model parameters λ, d_A and d_B (shown in Table 1, first column). Correcting this error resulted in new values for these parameters (shown in Table 1, second column). Now the fits predict a smaller mean estimate for the recruitment rate λ, truly zero death rate d_B and close to zero death rate d_A. Importantly, the estimates for the average division time T and the probability of cell death per division δ remain relatively insensitive to these changes, and if compared to other methods used in Ganusov et al. (2005); the direct fitting method slightly underestimates the probability of cell death per division δ.

As the fits of the model to the data show, there is a consistent underestimation of the number of undivided cells at earliest time points (Fig. 1A for $n=0$). We tried to correct for this by assuming that the number of cells at earlier time points should be taken from the data and not approximated assuming exponential growth as we have

Table 1
Estimates of the parameters of the SM model obtained by direct fitting of the model solution to the data

Parameters	Previous estimates, $A_0(0)=6.1\times10^4$	New estimates, $A_0(0)=6.1\times10^4$	New estimates, $A_0(0)=7.38\times10^4$
	Mean (67% CIs)	Mean (67% CIs)	Mean (67% CIs)
λ, day^{-1}	1.57 (0.62, 1.49)	0.62 (0.51, 0.71)	0.57 (0.51, 0.71)
Δ, day	1.13 (0.92, 1.25)	0.97 (0.80, 1.04)	0.94 (0.80, 1.05)
d_A, day^{-1}	0.00 (0.0, 0.0)	0.0 (0, 0.06)	0.025 (0.0, 0.095)
d_B, day^{-1}	0.09 (0.02, 0.16)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
T, day	2.31 (2.03, 2.58)	2.6 (2.47, 2.80)	2.68 (2.47, 2.80)
δ	0.09 (0.01, 0.15)	0.0 (0.0, 0.094)	0.04 (0.0, 0.095)

Column 1: estimates of parameters shown in Ganusov et al. (2005). Column 2: corrected estimates using the initial condition $A_0(0)=6.1\times10^4$ as in Ganusov et al. (2005). Column 3: new estimates obtained with a changed initial condition, $A_0(0)=7.38\times10^4$. Confidence intervals were calculated by bootstrapping the residuals with 1000 simulations.

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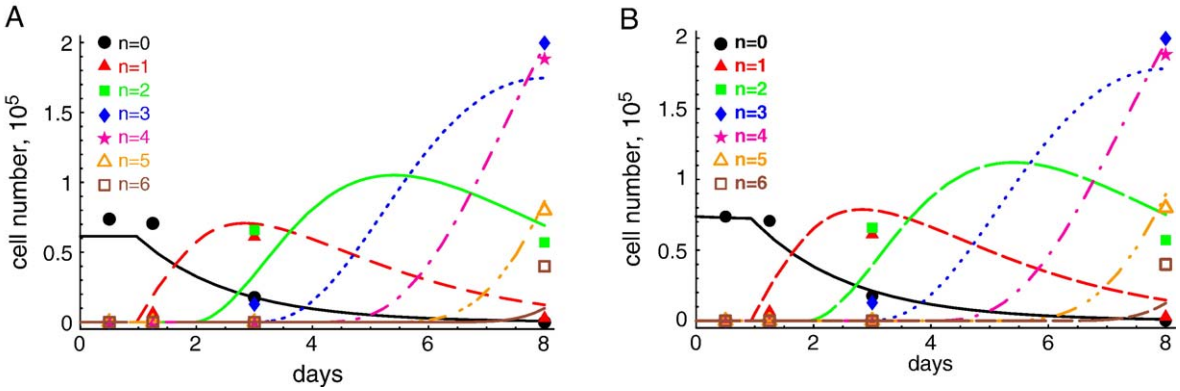

Fig. 1. Fits of the SM model to the data on the dynamics of naive T cells in irradiated hosts. Panel A shows the best fit of the model assuming that initial number of cells, $A_0(0)=6.1\times10^4$, as was fitted in Ganusov et al. (2005). Panel B shows the best fit of the model assuming that $A_0(0)=7.38\times10^4$ (the initial number of cells observed at $t=0.5$ days). The sum of squared residuals is 3.86×10^9 and 3.46×10^9 for the fits in panels A and B, respectively. Points show the data and lines are the model fits. We plot the number of cells undergone the same number of divisions as a function of time. Starting from the cohort of undivided cells (solid line with circles), cells undergone one (short-dashed line with triangles), two (long-dashed line with squares), three (dotted line with diamonds), four (dash-dotted line with stars), five (double dash-dotted line with open triangles), or six (long-short-dashed line with open boxes) divisions.

done previously (Ganusov et al., 2005). We reasoned that small estimates for the death rates obtained above might have been due to underestimating the initial number of cells grafted into the mice. By assuming that $A_0(0)=7.38\times10^4$, we found slightly different mean estimates for all parameters with the death rate d_A being now nonzero. Quality of the model fit to the data as judged by mean square is slightly better in this case than obtained by assuming $A_0(0)=6.1\times10^4$. Parameter estimates obtained by these two methods are relatively similar, and thus, we believe, they do not affect main conclusions of our paper.

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References

Ganusov, V.V., Pilyugin, S.S., de Boer, R.J., Murali-Krishna, K., Ahmed, R., Antia, R., 2005. Quantifying cell turnover using CFSE data. J. Immunol. Methods 298, 183.

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