The Parasite Clearance Estimator

The parasite clearance estimator (PCE) determines the parasite clearance rate constant as follows (the descritption below was modifed from [3]):

1. Different regression models (typically linear, quadratic or cubic) are fit to an individual's log parasite-time data (see Figure 1 for typical log parasite-time profiles), and the "best" model is determined by the Akaike Information Criteria (AIC) or residual sum of squares.

2. If the best model is a linear model, then the parasite clearance rate constant K is simply the estimated slope from this model:

$$E(\log(P)) = \beta_0 + \beta_1 t,$$

   where P is the total parasite count, t is time (hours post initial treatment) and $K = \beta_1$.

3. If the best model is not the linear model (e.g. a quadratic or cubic model resulted in a lower AIC), then:

   (a) for each log parasitaemia predicted by the best model ($E(\log(P_j))$, with j being the j^{th} measurement of parasite burden at time t), calculate the slope S_j between this point and the preceding predicted value:

$$S_j = \frac{E(\log(P_j)) - E(\log(P_{j-1}))}{t_j - t_{j-1}}$$

   For example, if a patient had 6 measurements of parasite burden (including the intial value), there would be five slope values ($S_2, S_3, \ldots, S_6$).

   (b) Determine the S_j with the most extreme negative value, S_{max}.

   (c) For each slope S_j, calculate $Sn_j = S_j/S_{max}$. Note that a negative Sn_j implies a rise in the parasite count.

   (d) Determine K using the flow chart in Figure S1.

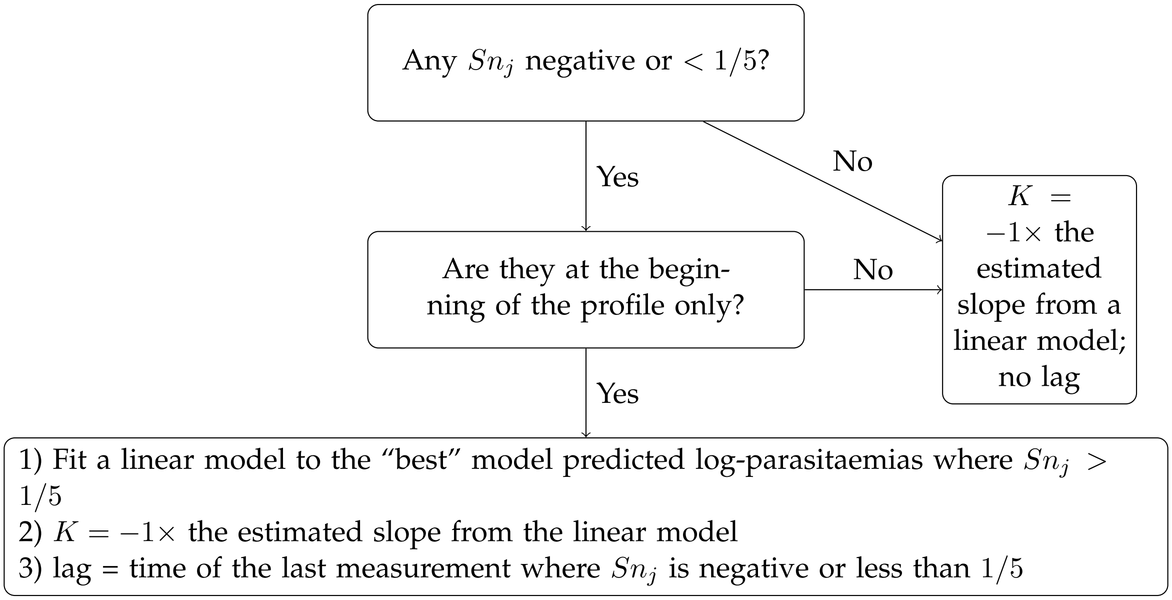

Figure S1: Flow chart for calculation of the parasite clearance rate constant via the Parasite Clearance Estimator

Simulation models used in the evaluation procedure

The equations below display the simulation models used in the evaluation procedure. For all equations, P_{ij} represents the total parasite count for the j^{th} observation of the i^{th} individual, and t indicates time (hours post initial treatment).

$$\begin{aligned}
\log(P_{ij}) &= (10.5 + b_{0i}) - (0.214 + b_{1i})t + \varepsilon_{ij} \\
b_{0i} &\sim N(0, 0.50^2) \\
b_{1i} &\sim N(0, 0.02^2) \\
\varepsilon_{ij} &\sim N(0, 0.41^2)
\end{aligned}$$

$$\begin{aligned}
\log(P_{ij}) &= (10.6 + b_{0i}) + (0.066 + b_{1i})t - (0.0034 + b_{2i})t^2 + \varepsilon_{ij} \\
b_{0i} &\sim N(0, 0.50^2) \\
b_{1i} &\sim N(0, 0.02^2) \\
b_{2i} &\sim N(0, 0.0005^2) \\
\varepsilon_{ij} &\sim N(0, 0.41^2)
\end{aligned}$$

$$\begin{aligned}
\log(P_{ij}) &= (13.3 + b_{0i}) + (0.207 + b_{1i})t - (0.026 + b_{2i})t^2 + 0.00038t^3 + \varepsilon_{ij} \\
b_{0i} &\sim N(0, 0.50^2) \\
b_{1i} &\sim N(0, 0.01^2) \\
b_{2i} &\sim N(0, 0.001^2) \\
\varepsilon_{ij} &\sim N(0, 0.41^2)
\end{aligned}$$