Supplementary Text S3.

Relation between IC_{50} and EC_x

In this supplementary text we briefly outline the derivation of the formula that allows the computation of the prophylactic potency of drugs (e.g. EC_{50} or EC_{90}, where x = 50, 90 respectively) from their in vitro 50% inhibitory concentration IC_{50}, compare eq. (28) and eq. (32) (main article).

CRAs, RTIs and InIs.

We had previously derived

\[ \phi(\hat{V}) = \frac{R_0(\emptyset) - 1}{R_0(\emptyset) - 1} \cdot \frac{D^m}{IC_{50} \left( \frac{1}{x} \right) + D^m} \]  \hspace{1cm} (S3.1) 

\[ \phi(\hat{V}) = \frac{R_0(\emptyset)}{R_0(\emptyset) - 1} \cdot \frac{D^m}{IC_{50} + D^m} \]  \hspace{1cm} (S3.2) 

\[ \phi(\hat{V}) = \frac{R_0(\emptyset)}{R_0(\emptyset) - 1} \cdot \frac{D^m}{IC_{50} \left( \frac{1}{\theta} \right) + D^m} \]  \hspace{1cm} (S3.3) 

which we can rewrite as

\[ \phi(\hat{V}) = C \cdot \frac{D^m}{IC_{50} \cdot F + D^m}. \]  \hspace{1cm} (S3.4) 

Now, we define the concentration EC_x, where the prophylactic efficacy is \( \phi(\hat{V}) = x/100 \), e.g. \( x = 50 \). Rearranging yields

\[ C \cdot \frac{EC^m_x}{IC_{50} \cdot F + EC^m_x} = \frac{x}{100} \]  \hspace{1cm} (S3.5) 

\[ C \cdot EC^m_x = \frac{x}{100} \left( IC_{50}^m \cdot F + EC^m_x \right) \]  \hspace{1cm} (S3.6) 

\[ EC^m_x \cdot \left( C - \frac{x}{100} \right) = \frac{x}{100} \cdot IC_{50}^m \cdot F \]  \hspace{1cm} (S3.7) 

\[ EC^m_x \cdot \left( \frac{100 \cdot C - x}{100} \right) = \frac{x}{100} \cdot IC_{50}^m \cdot F \]  \hspace{1cm} (S3.8) 

\[ EC^m_x = \frac{x}{100 \cdot C - x} \cdot IC_{50}^m \cdot F \]  \hspace{1cm} (S3.9) 

and finally

\[ EC_x = IC_{50} \left( F \cdot \frac{x}{100 \cdot C - x} \right)^{\frac{1}{m}} \] \hspace{1cm} (S3.10) 

PIs.

We have

\[ \phi(\hat{V}) = \frac{1}{R_0(\emptyset) - 1} \cdot \frac{D^m}{IC_{50}} \] \hspace{1cm} (S3.11) 

Again, defining the concentration EC_x, where the prophylactic efficacy is \( \phi(\hat{V}) = x/100 \), e.g. \( x = 50 \), we get

\[ \frac{1}{G} \cdot \frac{EC^m_x}{IC_{50}} = \frac{x}{100} \] \hspace{1cm} (S3.12) 

\[ EC^m_x = IC_{50} \cdot G \cdot \frac{x}{100} \] \hspace{1cm} (S3.13)
and finally

\[ EC_x = IC_{50} \left( G \cdot \frac{x}{100} \right)^m, \tag{S3.14} \]

as shown in the main article.