Let $f(t) = Y_t$ be the activity at time t, normalized to time 0 and control

$$f(t) \geq 0, f(0) = 1, \lim_{x\to\infty} f(t) = d$$

HYPERACTIVITY

$$Y_t = f(t) = e^{bt}(at + 1 - d) + d \quad a > -b, b < 0, d \geq 0$$

Time of p% of control: $ETp = \frac{W\left(-\frac{-b(d-p)e^{(b-bd)/a}}{a}\right)}{b} + \frac{d-1}{a}$

e.g. $ET50$ is time required to obtain a 50% effect (Y_t=.5).
ETp undefined if p < d
W is the Lambert function's principal branch and was calculated using the 'lambertWn' function in the R pracma package (Borchers, 2022)

Time of Peak: $t_P = -\frac{a-bd+b}{ab}$

Peak activity value: $P = e^{-\frac{a-bd+b}{a}}\left(-\frac{a}{b}\right) + d$

Time of end of hyperactivity phase:

$$t_H = ET_1 \frac{W\left(-\frac{-b(d-1)e^{(b-bd)/a}}{a}\right)}{b} + \frac{d-1}{a}$$

Note: if *d*>1, i.e. activity remaines above the y=1 line for the study period (16 hours), replace *d* with .99999 in the above equation.

Minimum activity: *d*

HYPOACTIVITY

$$Y_t = f(t) = e^{bt}(1 - d) + d \qquad b < 0, d \geq 0$$

This is simply the hyperactivity model without the *a* parameter.

Time of p% of control: $ET_p = \frac{\log\left(\frac{d-p}{d-1}\right)}{b}$

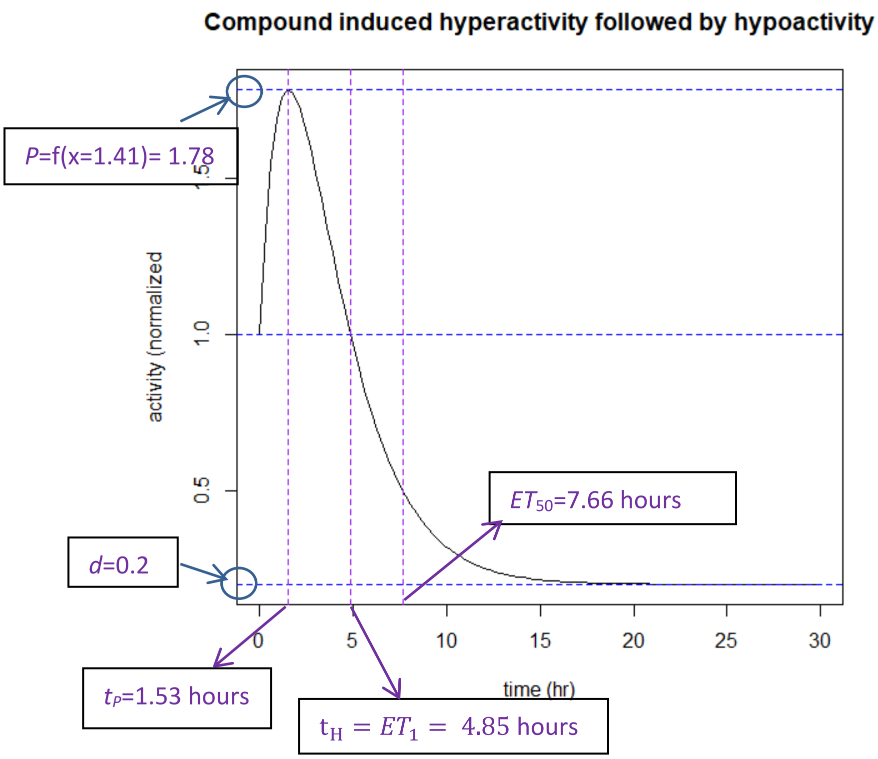
Time of Peak: N.A.

Peak activity value: N.A.

Time of end of hyperactivity phase: N.A.

Minimum activity: *d*

Example 1: Compound induced hyperactivity followed by hypoactivity. Hyperactivty model fit: a=1.7, b=-.5, d=.2



Example 2: Compound induced hypoactivity. Hyporactivty model fit: b=-.5, d=.2