

Tutorial: [Typical Simulation Workflow with Simulx 2021](#)

1. Turn over model for single dose

```
[LONGITUDINAL]
input = {Tlag, ka, V, Cl, Imax, IC50, Rin, kout}
```

EQUATION:

```
k = Cl/V
p1 = amtDose*ka/(V*(ka-k))
t1 = max(t-Tlag-tDose, 0)
Cc = p1*(exp(-k*t1) - exp(-ka*t1))
E_0 = Rin/kout
ddt_E = Rin*(1-Imax*Cc/(Cc+IC50)) - kout*E
```

OUTPUT:

```
output = {Cc, E}
```

The model describes the calculation of concentration (Cc) and response (E) of Warfarin based on the input parameters (Tlag, ka, V, Cl, Imax, IC50, Rin, kout) and the equations provided.

Cc :

The concentration values are calculated using the turnover model equations, taking into account the dose (amtDose), absorption (ka), distribution (V), elimination (Cl), and time delay (Tlag, tDose).

E :

The response values are calculated based on the concentration values (Cc) using the equation: $ddt_E = Rin * (1 - Imax * Cc / (Cc + IC50)) - kout * E$. This equation represents the rate of change of the response variable (ddt_E) based on the concentration (Cc), maximum response (Imax), half-maximal inhibitory concentration (IC50), and other parameters (Rin, kout).

2. What is warfarin?

Warfarin is an anticoagulant (blood thinner). Warfarin reduces the formation of blood clots. Warfarin is used to treat or prevent blood clots in veins or arteries, which can reduce the risk of stroke, heart attack, or other serious conditions. ([Source link](#))

3. Single dose regimen:

Give the patient 1mg at $t=0$ and plot the C_c and the E

4. Multidose regimen:

From $t=0$ to $t=96$ hours and for each 24 hours, we add to the patient 1mg of warfarin to the existing dose.

Then, plot the curves.

5. Initial values :

Taken from monolix website. (You can check estimates.txt in drive folder.)

```
Tlag = 0.918
ka = 1.48
V = 8.06895
Cl = 0.133
Imax = 0.94313
IC50 = 1.33276
Rin = 4.97013
kout = 0.05196
```

6. The Code and results:

[Single-dose VS multidose.ipynb](#)