

## @param: Model parameters (Population averages)

```
1 @param begin
2      $\theta_1$   $\in$  RealDomain(lower=0.1, init=2.77, upper=5.0)
3      $\theta_2$   $\in$  RealDomain(lower=0.008, init=0.0781, upper=0.5)
4      $\theta_3$   $\in$  RealDomain(lower=0.004, init=0.0363, upper=0.9)
5      $\Omega$   $\in$  PSDDomain(2, init=diag([5.55, 0.515]))
6      $\sigma_2$   $\in$  RealDomain(lower=0.0, init=0.388)
7 end
```

This specifies the parameters of the model, and their domains:

- RealDomain: real values (possibly subject to upper/lower bounds)
- VectorDomain: vector of real values
- PSDDomain: symmetric positive-definite matrices (e.g. for covariance matrices)
- PDiagDomain: positive-valued diagonal matrices

## @random: Random effects (Individual differences)

```
1 @random begin
2      $\eta$   $\sim$  MvNormal( $\Omega$ )
3 end
```

Specifies the random effects, dependent on parameters. The random effects are defined by a distribution from Distributions.jl.

## @pre: pre-processing

```
1 @pre begin
2     Ka =  $\theta_1$ *exp( $\eta[1]$ )
3     K  =  $\theta_2$ 
4     CL =  $\theta_3$ *wt*exp( $\eta[2]$ )
5     V  = CL/K
6     SC = V/wt
7 end
```

This determines how the model parameters, random effects and covariates are combined before the differential equations solver.

## @init: Initial values (optional)

```
1 @init begin
2     Depot    = 0.0
3     Central  = 0.0
4 end
```

Specifies the starting values of the differential equations at the time of first dose.