

# INFUSION TESTS

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```
Sys.setenv(RSTUDIO_PANDOC = "/usr/lib/rstudio-server/bin/pandoc")

.libPaths("/data/Rlibs")
library(mrgsolve)

## Loading required package: methods
library(dplyr)

##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##   filter, lag
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union

library(readr)
library(ggplot2)

carry <- c("cmt", "amt", "ii", "addl", "rate", "evid", "ss")

to_data_set <- function(x) {
  x <- as.data.frame(x)
  x <- mutate(x, C = '.', DV = '.', cmt = if_else(cmt==0, 2, cmt))
  dplyr::select(x, "C", everything())
}

sv <- function(x, file) {
  write.csv(file = file, row.names = FALSE, quote = FALSE, x)
}

nonr <- metrumrg::NONR
run <- function(number) {
  nonr(number, project = "model", command = "/opt/NONMEM/nm73/nmqual/autolog.pl", checkrunno=FALSE)
  return(tabread(number))
}

tabread <- function(number) {
  tab <- file.path("model", number, "TAB")
  if(file.exists(tab)) return(read_table(tab, skip=1))
  stop("the run failed")
}

sim <- function(x, e, ...) {
  mrgsim(x, events = e, carry.out = carry, digits = 5, ...)
}
```

```

code <- '
$SET req = ""
$PARAM CL = 1, V = 30, KA = 1.5
LAGT = 0, MODE = 0, DUR2 = 2, RAT2 = 10, BIOAV = 1

$PKMODEL cmt = "GUT CENT", depot = TRUE

$MAIN

F_CENT = BIOAV;
ALAG_CENT = LAGT;

if(MODE==1) R_CENT = RAT2;
if(MODE==2) D_CENT = DUR2;

$TABLE
capture DV = (CENT/(V/1000));
capture CP = DV;

$CAPTURE LAGT MODE DUR2 RAT2 BIOAV
'

mod <- mcode_cache("tests1", code)

## Compiling tests1 ...
## done.

```

## BOLUS

```

e <- ev(amt = 100)
out <- sim(mod, e)
data <- to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)

## Run 101 complete.
## NONR complete.
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )

```

## SUMMARY

```
summary(out$CP-outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION

```
e <- ev(amt = 100, rate = 10)
out <- sim(mod, e)
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, LAG

```
e <- ev(amt = 100, rate = 10, cmt = 2, LAGT = 5)
out <- sim(mod, e)
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
```

```
## EVID = col_double(),
## CP = col_double(),
## IPRED = col_double(),
## PRED = col_double(),
## DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, MULTIPLE

```
e <- ev(amt = 100, rate = 10, cmt = 2, ii = 8, addl = 2)
out <- sim(mod, e)
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
## NONR complete.
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, MULTIPLE, LAG, II < DUR

```
e <- ev(amt = 100, rate = 100/10, cmt = 2, ii = 6, addl = 2, LAGT = 2)
out <- as.data.frame(sim(mod, e, end = 48))
data = to_data_set(out)
```

```
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##           0         0         0         0         0
```

## INFUSION, MULTIPLE, LAG, II > DUR

```
e <- ev(amt = 100, rate = 10, cmt = 2, ii = 12, addl = 2, LAGT = 2)
out <- as.data.frame(sim(mod, e, end = 48))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##           0         0         0         0         0
```

## INFUSION, MULTIPLE, II > DUR

```
e <- ev(amt = 100, rate = 100/10, cmt = 2, ii = 24, addl = 2)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
## NONR complete.
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, MULTIPLE, II < DUR

```
e <- ev(amt = 100, rate = 100/10, cmt = 2, ii = 6, addl = 4)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
## NONR complete.
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, BIOAV

```
e <- ev(amt = 100, rate = 100/5, cmt = 2, ii = 12, addl = 4, BIOAV = 0.7)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, BIOAV, DUR

```
e <- ev(amt = 100, rate = -2, cmt = 2, ii = 12, addl = 4, BIOAV = 0.7, DUR2 = 7, MODE = 2)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
```

```
## EVID = col_double(),
## CP = col_double(),
## IPRED = col_double(),
## PRED = col_double(),
## DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

```
# start <- seq(0,4*12,12)
# end <- start + 7
# summary(out$CP - outt$CP)
# ggplot(out, aes(time,CP)) + geom_line() +
#   geom_vline(xintercept = c(start,end), col="firebrick")
```

## INFUSION, BIOAV, RATE

```
e <- ev(amt = 100, rate = -1, cmt = 2, ii = 12, addl = 4, BIOAV = 0.7, R2 = 100/9, MODE = 1)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```



## INFUSION, BIOAV, RATE, LAGTIME

```
e <- ev(amt = 100, rate = -1, cmt = 2, ii = 12, addl = 4, RAT2 = 100/9, MODE = 1, LAGT = 3)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.    Max.
## -0.100000  0.000000  0.000000  0.004324  0.000000  0.100000
```

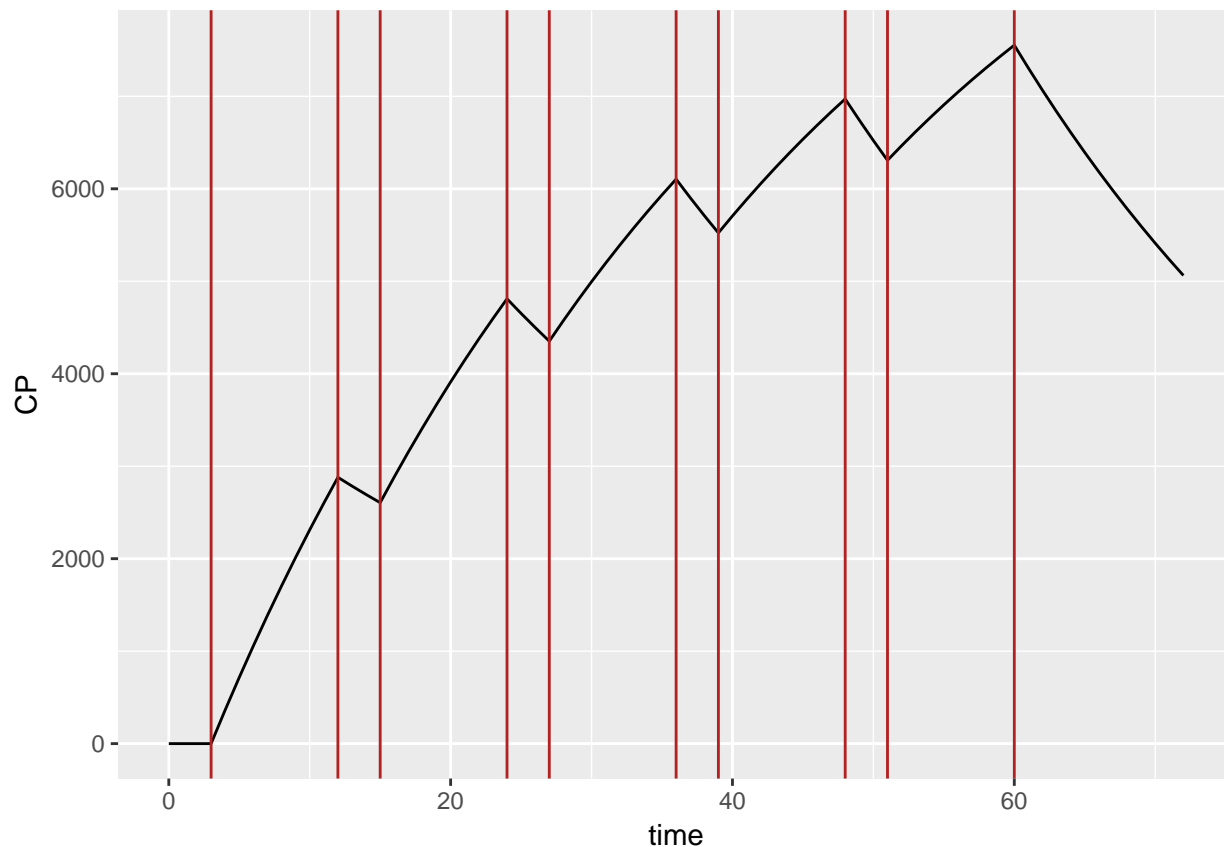
```
start <- 3+seq(0,4*12,12)
```

```
end <- (start + 9)
```

```
summary(out$CP - outt$CP)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.    Max.
## -0.100000  0.000000  0.000000  0.004324  0.000000  0.100000
```

```
ggplot(out, aes(time,CP)) + geom_line() +
  geom_vline(xintercept = c(start,end), col="firebrick")
```



## INFUSION, SS

```
e <- ev(amt = 100, rate = -1, cmt = 2, ii = 12, addl = 4, RAT2 = signif(100/9,5), MODE = 1, ss = 1)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
```

```
##   TIME = col_double(),
```

```
##   EVID = col_double(),
```

```
##   CP = col_double(),
```

```
##   IPRED = col_double(),
```

```
##   PRED = col_double(),
```

```
##   DV = col_double()
```

```
## )
```

```
out$NM <- outt$CP
```

```
head(out)
```

```
##   ID time evid amt cmt ss ii addl rate LAGT MODE DUR2  RAT2 BIOAV  DV
## 1  1    0    0    0  0  0  0    0    0    0    1    2 11.111    1  0.0
```

```
## 2 1 0 1 100 2 1 12 4 -1 0 1 2 11.111 1 7903.9
## 3 1 1 0 0 0 0 0 0 0 0 1 2 11.111 1 8009.0
## 4 1 2 0 0 0 0 0 0 0 0 1 2 11.111 1 8110.7
## 5 1 3 0 0 0 0 0 0 0 0 1 2 11.111 1 8209.1
## 6 1 4 0 0 0 0 0 0 0 0 1 2 11.111 1 8304.2
##      CP      NM
## 1      0.0      0.0
## 2 7903.9 7903.9
## 3 8009.0 8009.0
## 4 8110.7 8110.7
## 5 8209.1 8209.1
## 6 8304.2 8304.2
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, SS, BIOAV

```
e <- ev(amt = 100, rate = -1, cmt = 2, ii = 12, addl = 4, RAT2 = 100/10, MODE = 1, ss = 1, BIOAV = 0.3)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

```
out$NM <- outt$CP
```

```
head(out)
```

```
##   ID time evid amt cmt ss ii addl rate LAGT MODE DUR2 RAT2 BIOAV    DV
## 1  1  0  0  0  0  0  0  0  0  0  0  1  2  10  0.3  0.0
## 2  1  0  1 100  2  1 12  4  -1  0  1  2  10  0.3 2138.4
## 3  1  1  0  0  0  0  0  0  0  0  0  1  2  10  0.3 2396.1
## 4  1  2  0  0  0  0  0  0  0  0  0  1  2  10  0.3 2645.4
## 5  1  3  0  0  0  0  0  0  0  0  0  1  2  10  0.3 2886.5
## 6  1  4  0  0  0  0  0  0  0  0  0  1  2  10  0.3 2791.9
##      CP      NM
```

```
## 1    0.0    0.0
## 2 2138.4 2138.4
## 3 2396.1 2396.1
## 4 2645.4 2645.4
## 5 2886.5 2886.5
## 6 2791.9 2791.9
```

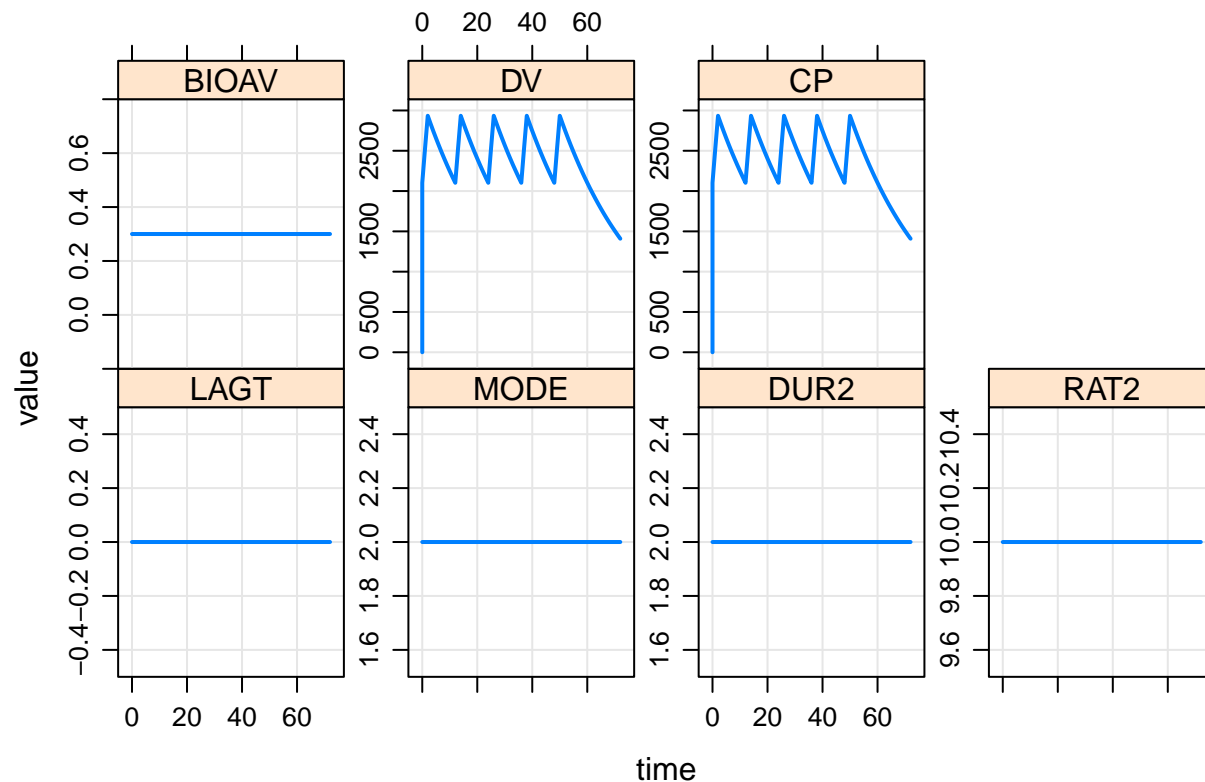
## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, SS, BIOAV, DUR

```
e <- ev(amt = 100, rate = -2, cmt = 2, ii = 12, addl = 4, DUR2 = 2, MODE = 2, ss = 1, BIOAV = 0.3)
out <- sim(mod, e, end = 72)
plot(out)
```



```
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

```
head(out)
```

```
## Model:  tests1
```

```
##   ID time evid amt cmt ss ii addl rate LAGT MODE DUR2 RAT2 BIOAV    DV
## 1  1    0    0  0  0  0  0  0    0    0    0    2    2   10   0.3    0.0
## 2  1    0    1 100  2  1 12    4   -2    0    2    2   10   0.3 2102.6
## 3  1    1    0  0  0  0  0  0    0    0    0    2    2   10   0.3 2525.4
## 4  1    2    0  0  0  0  0  0    0    0    0    2    2   10   0.3 2934.3
## 5  1    3    0  0  0  0  0  0    0    0    0    2    2   10   0.3 2838.1
## 6  1    4    0  0  0  0  0  0    0    0    0    2    2   10   0.3 2745.1
##           CP
## 1         0.0
## 2 2102.6
## 3 2525.4
## 4 2934.3
## 5 2838.1
## 6 2745.1
```

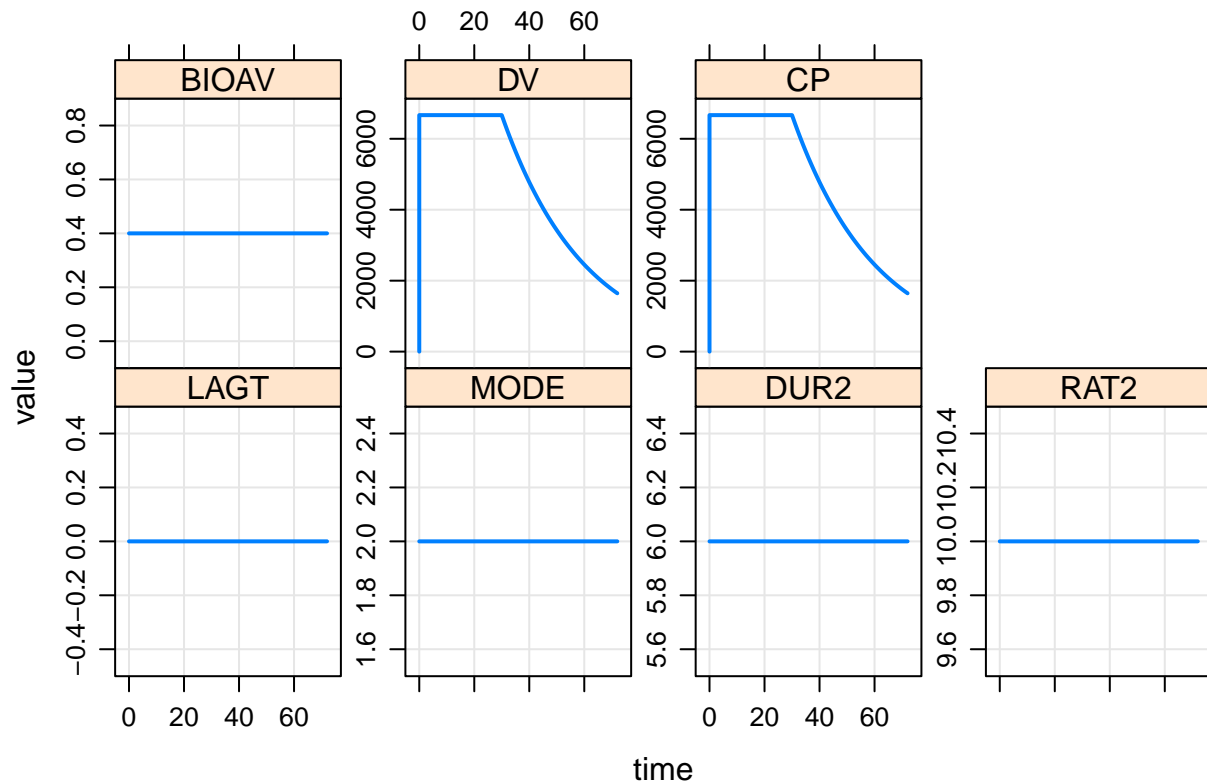
## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, SS, BIOAV, DUR, DUR == II

```
e <- ev(amt = 100, rate = -2, cmt = 2, ii = 6, addl = 4, DUR2 = 6, MODE = 2, ss = 1, BIOAV = 0.4)
out <- sim(mod, e, end = 72)
plot(out)
```



```
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
## NONR complete.
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

```
head(out)
```

```
## Model: tests1
##   ID time evid amt cmt ss ii addl rate LAGT MODE DUR2 RAT2 BIOAV   DV
## 1  1   0   0   0   0   0   0   0   0   0   0   2   6   10   0.4   0.0
## 2  1   0   1 100   2   1   6   4  -2   0   2   6   6   10   0.4 6666.7
## 3  1   1   0   0   0   0   0   0   0   0   2   6   6   10   0.4 6666.7
## 4  1   2   0   0   0   0   0   0   0   0   2   6   6   10   0.4 6666.7
## 5  1   3   0   0   0   0   0   0   0   0   2   6   6   10   0.4 6666.7
## 6  1   4   0   0   0   0   0   0   0   0   2   6   6   10   0.4 6666.7
##      CP
## 1    0.0
## 2 6666.7
```

```
## 3 6666.7
## 4 6666.7
## 5 6666.7
## 6 6666.7
```

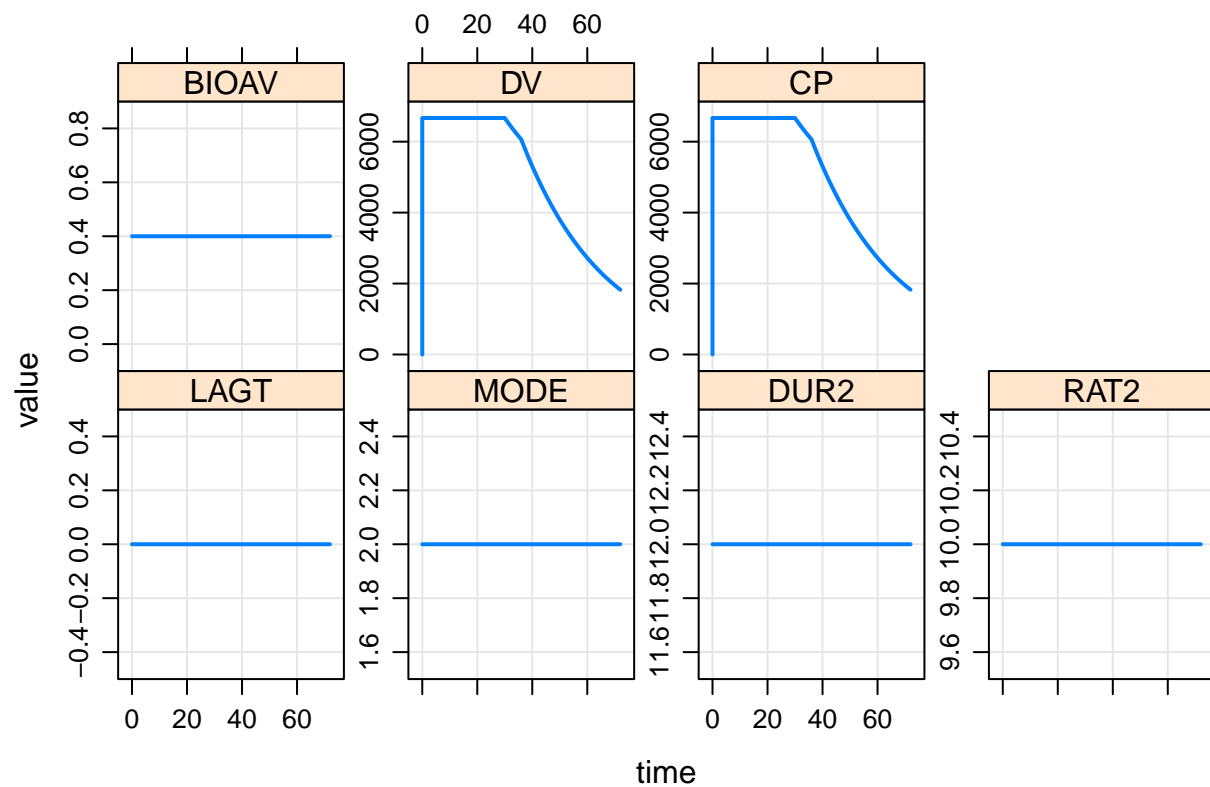
## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, SS, BIOAV, DUR, II multiple of DUR

```
e <- ev(amt = 100, rate = -2, cmt = 2, ii = 6, addl = 4, DUR2 = 12, MODE = 2, ss = 1, BIOAV = 0.4)
out <- sim(mod, e, end = 72)
plot(out)
```



```
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
## NONR complete.
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

```
head(out)
```

```
## Model:  tests1
```

```
##   ID time evid amt cmt ss ii addl rate LAGT MODE DUR2 RAT2 BIOAV    DV
## 1  1    0    0  0  0  0  0  0    0    0    0    2   12   10   0.4    0.0
## 2  1    0    1 100  2  1  6    4   -2    0    2   12   10   0.4 6666.7
## 3  1    1    0  0  0  0  0  0    0    0    0    2   12   10   0.4 6666.7
## 4  1    2    0  0  0  0  0  0    0    0    0    2   12   10   0.4 6666.7
## 5  1    3    0  0  0  0  0  0    0    0    0    2   12   10   0.4 6666.7
## 6  1    4    0  0  0  0  0  0    0    0    0    2   12   10   0.4 6666.7
##           CP
## 1         0.0
## 2 6666.7
## 3 6666.7
## 4 6666.7
## 5 6666.7
## 6 6666.7
```

## SUMMARY

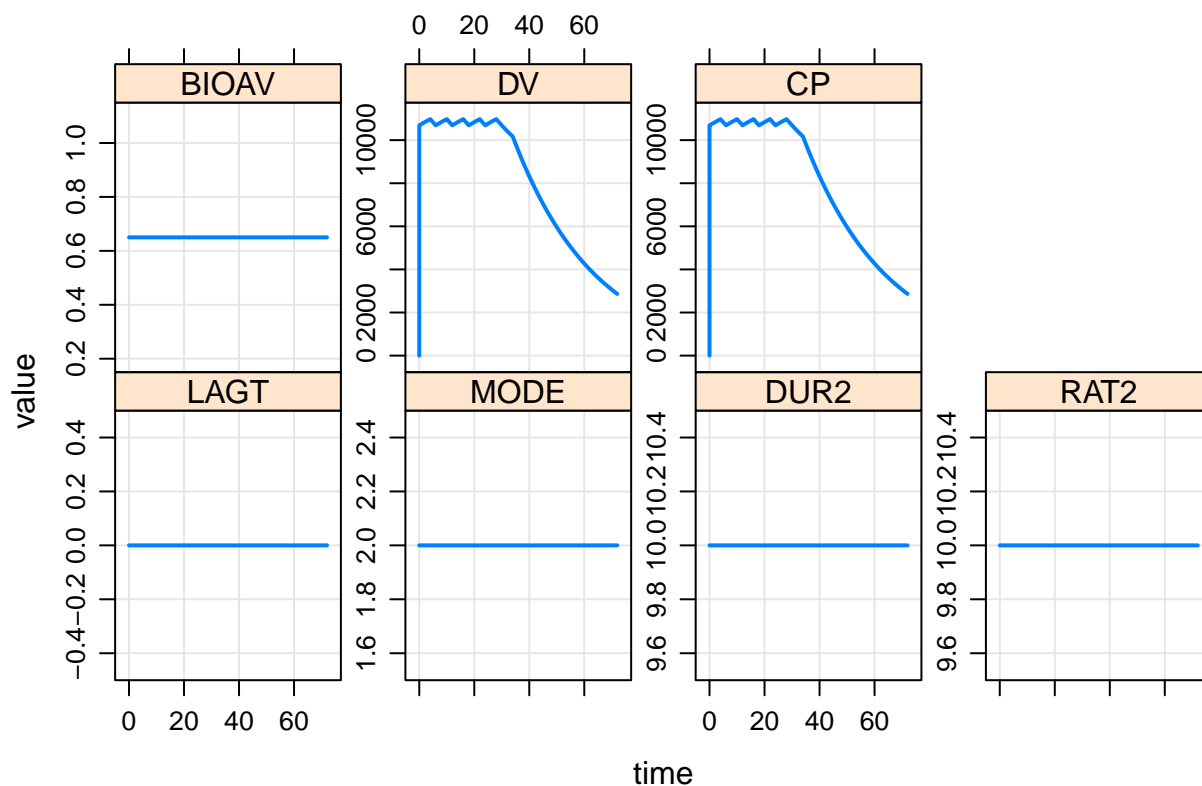
```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## INFUSION, SS, BIOAV, DUR, II < DUR

```
e <- ev(amt = 100, rate = -2, cmt = 2, ii = 6, addl = 4, DUR2 = 10, MODE = 2, ss = 1, BIOAV = 0.65)
out <- sim(mod, e, end = 72)
plot(out)
```





```
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
## NONR complete.
## Parsed with column specification:
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

```
head(out)
```

```
## Model:  tests1
```

[illegible]

```
## 3 10763
## 4 10837
## 5 10907
## 6 10976
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##         0         0         0         0         0         0
```

## BOLUS, SS

```
e <- ev(amt = 100, cmt = 2, ii = 12, addl = 4, ss = 1)
out <- as.data.frame(sim(mod, e, end = 72))
data = to_data_set(out)
sv(data, "data/101.csv")
outt <- run(101)
```

```
## Run 101 complete.
```

```
## NONR complete.
```

```
## Parsed with column specification:
```

```
## cols(
##   TIME = col_double(),
##   EVID = col_double(),
##   CP = col_double(),
##   IPRED = col_double(),
##   PRED = col_double(),
##   DV = col_double()
## )
```

```
out$NM <- outt$CP
```

```
head(out)
```

```
##      ID time evid amt cmt ss ii addl rate LAGT MODE DUR2 RAT2 BIOAV      DV
## 1  1    0    0  0  0  0  0  0    0    0    0    0    2   10     1    0.0
## 2  1    0    1 100  2  1 12    4    0    0    0    0    2   10     1 10111.0
## 3  1    1    0  0  0  0  0  0    0    0    0    0    2   10     1  9779.3
## 4  1    2    0  0  0  0  0  0    0    0    0    0    2   10     1  9458.7
## 5  1    3    0  0  0  0  0  0    0    0    0    0    2   10     1  9148.6
## 6  1    4    0  0  0  0  0  0    0    0    0    0    2   10     1  8848.7
##           CP      NM
## 1      0.0      0.0
## 2 10111.0 10111.0
## 3  9779.3  9779.3
## 4  9458.7  9458.7
## 5  9148.6  9148.6
## 6  8848.7  8848.7
```

## SUMMARY

```
summary(out$CP - outt$CP)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
##	0	0	0	0	0	0

## Control stream

```
writeLines(readLines("model/101.ctl"))
```

```
$PROB RUN# 101
```

```
$INPUT C ID TIME EVID AMT CMT SS II ADDL RATE LAGT MODE DUR2 RAT2 BIOAV DV
```

```
$DATA ../../data/101.csv IGNORE=C
```

```
$SUBROUTINES ADVAN2 TRANS2
```

```
$PK
```

```
TVCL=THETA(1)
```

```
CL=TVCL*EXP(ETA(1))
```

```
TVV2=THETA(2)
```

```
V=TVV2*EXP(ETA(2))
```

```
TVKA=THETA(3)
```

```
KA=TVKA*EXP(ETA(3))
```

```
ALAG2 = LAGT
```

```
F2 = BIOAV
```

```
IF(MODE.EQ.1) R2 = RAT2
```

```
IF(MODE.EQ.2) D2 = DUR2
```

```
$ERROR
```

```
IPRED=A(2)/(V/1000)
```

```
Y=IPRED*EXP(ERR(1))
```

```
CP = IPRED
```

```
$THETA
```

```
(1, FIX) ;; CL
```

```
(30, FIX) ;; V
```

```
(1.5, FIX) ;; KA
```

```
$OMEGA
```

```
0.0 FIX
```

```
0.0 FIX
```

```
0.0 FIX
```

\$SIGMA  
0.00 FIX

\$TABLE FILE=TAB TIME EVID CP IPRED PRED DV NOPRINT ONEHEADER NOAPPEND

\$SIMULATION (2674474) ONLYSIMULATION

```
devtools::session_info()
```

## Session info -----

```
## setting value
## version R version 3.3.3 (2017-03-06)
## system x86_64, linux-gnu
## ui X11
## language (EN)
## collate en_US.UTF-8
## tz Etc/UTC
## date 2017-09-15
```

## Packages -----

## package	* version	date
## assertthat	0.2.0	2017-04-11
## backports	1.1.0	2017-05-22
## base	* 3.3.3	2017-03-06
## bindr	0.1	2016-11-13
## bindrcpp	* 0.2	2017-06-17
## colorspace	1.3-2	2016-12-14
## datasets	* 3.3.3	2017-03-06
## devtools	1.13.2	2017-06-02
## digest	0.6.12	2017-01-27
## dplyr	* 0.7.3	2017-09-09
## evaluate	0.10.1	2017-06-24
## fork	1.2.5	2017-07-26
## ggplot2	* 2.2.1	2016-12-30
## glue	1.1.1	2017-06-21
## graphics	* 3.3.3	2017-03-06
## grDevices	* 3.3.3	2017-03-06
## grid	3.3.3	2017-03-06
## gtable	0.2.0	2016-02-26
## hms	0.3	2016-11-22
## htmltools	0.3.6	2017-04-28
## knitr	1.16	2017-05-18
## labeling	0.3	2014-08-23
## lattice	0.20-35	2017-03-25
## lazyeval	0.2.0	2016-06-12
## magrittr	1.5	2014-11-22
## MASS	7.3-45	2016-04-21
## memoise	1.0.0	2016-01-29
## methods	* 3.3.3	2017-03-06
## metrumrg	5.57	2015-10-08
## mrgsolve	* 0.8.9.9001	2017-09-15
## munsell	0.4.3	2016-02-13
## pkgconfig	2.0.1	2017-03-21
## plyr	1.8.4	2016-06-08

```

## R6                2.2.2      2017-06-17
## Rcpp              0.12.12    2017-07-15
## RcppArmadillo     0.7.960.1.2 2017-08-29
## readr             * 1.1.1     2017-05-16
## reshape           0.8.6      2016-10-21
## rlang              0.1.2      2017-08-09
## rmarkdown         1.6         2017-06-15
## rprojroot         1.2         2017-01-16
## scales            0.5.0       2017-08-24
## stats             * 3.3.3     2017-03-06
## stringi           1.1.5       2017-04-07
## stringr           1.2.0       2017-02-18
## tibble            1.3.4       2017-08-22
## tools             3.3.3       2017-03-06
## utils             * 3.3.3     2017-03-06
## withr             1.0.2       2016-06-20
## XML               3.98-1.9    2017-06-19
## yaml              2.1.14      2016-11-12
## source
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## local
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.2)
## local
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## cran (@0.7.3)
## CRAN (R 3.3.3)
## local
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## local
## local
## local
## CRAN (R 3.3.2)
## CRAN (R 3.2.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.2)
## CRAN (R 3.3.3)
## CRAN (R 3.2.3)
## CRAN (R 3.3.2)
## CRAN (R 3.3.2)
## CRAN (R 3.3.2)
## CRAN (R 3.3.2)
## local
## R-Forge (R 3.2.3)
## Github (metrumresearchgroup/mrgsolve@7387407)
## CRAN (R 3.3.2)
## CRAN (R 3.3.3)
## CRAN (R 3.3.2)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)

```

```
## cran (@0.7.960)
## CRAN (R 3.3.3)
## CRAN (R 3.2.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## local
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## CRAN (R 3.3.3)
## local
## local
## CRAN (R 3.3.2)
## CRAN (R 3.3.3)
## CRAN (R 3.3.2)
```