setwd("C:/R files BHMRA")

library(rjags); library(jagstools); options(scipen=999)

attach("DS\_10\_8.Rdata")

library(R2OpenBUGS)

require(rube)

Sys.setenv(BUGSDIR="c:\\users\\p congdon\\documents\\WINBUGS14")

**model1= "**model {for (i in 1:N) { y[i] ~ dnorm(eta[i], taus[i]) I(0,)

LL[i] <- 0.5\*log(taus[i]/6.28)-0.5\*taus[i]\*pow(y[i]-eta[i],2)

taus[i] <- tau/pow(eta[i],omega)

eta[i] <- dose[i] \*exp(-beta[subj[i]] \* time[i]/alpha[subj[i]])/alpha[subj[i]]}

# subject loop (n=12)

for (i in 1:n) { # volumes

alpha[i] <- exp(b[i,1])

# clearances

beta[i] <- exp(b[i,2])

# half-lives

HL[i] <- alpha[i]\*log(2)/beta[i]

b[i,1:2] ~ dmnorm(B[1:2], Inv.D[1:2, 1:2])

# predictive distributions at 32 hours

eta.new[i] <- 30 \*exp(- beta[i] \* 32/alpha[i])/alpha[i]

taus.new[i] <- tau/pow(eta.new[i],omega)

ynew[i] ~ dnorm(eta.new[i], taus.new[i]) I(0,)

sortHL[i] <- ranked( HL[ 1:n ], i)

sortbeta[i] <- ranked( beta[ 1:n ], i)}

# median half-life and clearance

median[1] <- 0.5\*(sortHL[5]+sortHL[6])

median[2] <- 0.5\*(sortbeta[5]+sortbeta[6])

# priors

omega ~ dunif(0,5); tau ~ dgamma(1,0.001)

B[1:2] ~ dmnorm(B0[1:2], Inv.C[1:2, 1:2])

Inv.D[1:2, 1:2] ~ dwish(R[1:2, 1:2], 2)

D[1:2,1:2] <- inverse(Inv.D[1:2, 1:2])}

**"**

# initial values and estimation

b0 <- matrix(0,10,2)

init1 <- list(B=c(0,0), tau=10, Inv.D = diag(0.1,2),b=b0)

init2 <- list(B=c(0,0), tau=100, Inv.D = diag(1,2),b=b0)

inits <- list(init1,init2)

**c1 = rube(model1, DS\_10\_8, inits)**

**summary(c1)**

**pars <- c("median","tau","B","omega")**

**r1 = rube(model1, DS\_10\_8, inits, pars, n.burn=1000, n.thin=2, n.chains=2,n.iter=10000)**

**summary(r1)**

**# MODEL 2 (Scale mixture, Heteroscedastic power model)**

**model2="** model { # observation loop

for (i in 1:N) { y[i] ~ dnorm(eta[i], taus[i]) I(0,)

LL[i] <- 0.5\*(log(taus[i]/6.28)-taus[i]\*pow(y[i]-eta[i],2))

taus[i] <- tau\*lambda[subj[i]]/pow(eta[i],omega)

eta[i] <- dose[i] \*exp(-beta[subj[i]] \* time[i]/alpha[subj[i]])/alpha[subj[i]]}

# subject loop

for (i in 1:n) { # volumes

alpha[i] <- exp(b[i,1])

# clearances

beta[i] <- exp(b[i,2])

# half-lives

HL[i] <- alpha[i]\*log(2)/beta[i]

b[i,1:2] ~ dmnorm(B[1:2], Inv.D[1:2, 1:2])

lambda[i] ~ dgamma(nu.2,nu.2)

# predictive distributions at 32 hours

eta.new[i] <- 30 \*exp(- beta[i] \* 32/alpha[i])/alpha[i]

taus.new[i] <- tau/pow(eta.new[i],omega)

ynew[i] ~ dnorm(eta.new[i], taus.new[i]) I(0,)

sortHL[i] <- ranked( HL[ 1:n ], i)

sortbeta[i] <- ranked( beta[ 1:n ], i)}

# median half-life and clearance

median[1] <- 0.5\*(sortHL[5]+sortHL[6])

median[2]<- 0.5\*(sortbeta[5]+sortbeta[6])

# priors

omega ~ dunif(0,5)

tau ~ dgamma(1,0.001)

nu ~ dgamma(2,0.1)

nu.2 <- nu/2

B[1:2] ~ dmnorm(B0[1:2], Inv.C[1:2, 1:2])

Inv.D[1:2, 1:2] ~ dwish(R[1:2, 1:2], 2)

D[1:2,1:2] <- inverse(Inv.D[1:2, 1:2])

ynew2 <- ynew[2]}

**"**

# initial values and estimation

b0 = matrix(0,10,2)

init1 = list(B=c(3,1), tau=200, Inv.D = diag(0.1,2),b=b0)

init2 = list(B=c(2.5,1), tau=100, Inv.D = diag(1,2),b=b0)

inits = list(init1,init2)

**c2 = rube(model2, DS\_10\_8, inits)**

**summary(c2)**

**pars = c("median","tau","B","omega","lambda","nu","ynew2")**

**r2 = rube(model2, DS\_10\_8, inits, pars, n.burn=1000, n.thin=2, n.chains=2,n.iter=10000)**

**summary(r2)**

**sims=r2$sims.array**

**sims=matrix(sims,2\*4500,19)**

**hist(sims[,18],main=expression(paste("Figure 10.1 Predictive Distribution of y"[2])),**

**xlab=expression(paste("y"[2])),col="gray")**