**Supplementary Material TextS1**

model{

#Likelihood

x[1:4] ~ dmulti(p[1:4], n)

p[1] <- pi\*((1-Se1)\*(1-Se2)+covDp) + (1-pi)\*(Sp1\*Sp2+covDn)

p[2] <- pi\*((1-Se1)\*Se2-covDp) + (1-pi)\*(Sp1\*(1-Sp2)-covDn)

p[3] <- pi\*(Se1\*(1-Se2)-covDp) + (1-pi)\*((1-Sp1)\*Sp2-covDn)

p[4] <- pi\*(Se1\*Se2+covDp) + (1-pi)\*((1-Sp1)\*(1-Sp2)+covDn)

ls <- 0

us <- min(Se1,Se2) - Se1\*Se2

lc <- 0

uc <- min(Sp1,Sp2) - Sp1\*Sp2

covDn ~ dunif(lc, uc)

covDp ~ dunif(ls, us)

rhoD <- covDp / sqrt(Se1\*(1-Se1)\*Se2\*(1-Se2))

rhoDc <- covDn / sqrt(Sp1\*(1-Sp1)\*Sp2\*(1-Sp2))

#Prior

pi ~ dbeta(1,1)

Se1 ~ dbeta(1,1)

Sp1 ~ dbeta(1,1)

Se2 ~ dbeta(1,1)

Sp2 ~ dbeta(1,1)

}

#end BUGS model specification

#Data

list(x= c(560, 41, 22, 61), n = 684)

#Initial value

list(pi=0.51,Se1=0.50, Sp1=0.50, Se2=0.49, Sp2=0.51)