

## S4 Listing 4

Listing 4: Test characteristics and CanL prevalence using full Bayesian model

```
1 model
2 {
3   for(i in 1:2)
4     {
5       for (j in 1:6)
6         {
7           pr[i,j] ~ dunif(0, 1)
8           se1[i,j] ~ dunif(0.804, 0.997)
9           se2[i,j] ~ dunif(0.344, 0.961)
10          sp1[i,j] ~ dunif(0.602, 0.990)
11          sp2[i,j] ~ dunif(0.785, 0.990)
12          covse[i,j] ~ dunif(-1, 1)
13          covsp[i,j] ~ dunif(-1, 1)
14          r[i,j,1:4] ~ dmulti(p[i,j,1:4], N[i,j])
15          pos[i,j,1] <- se1[i,j] * se2[i,j] + covse[i,j]
16          neg[i,j,1] <- (1-sp1[i,j]) * (1-sp2[i,j]) + covsp[i,j]
17          pos[i,j,2] <- se1[i,j] * (1-se2[i,j]) - covse[i,j]
18          neg[i,j,2] <- (1-sp1[i,j]) * sp2[i,j] - covsp[i,j]
19          pos[i,j,3] <- (1-se1[i,j]) * se2[i,j] - covse[i,j]
20          neg[i,j,3] <- sp1[i,j] * (1-sp2[i,j]) - covsp[i,j]
21          pos[i,j,4] <- (1-se1[i,j]) * (1-se2[i,j]) + covse[i,j]
22          neg[i,j,4] <- sp1[i,j] * sp2[i,j] + covsp[i,j]
23          p[i,j,1] <- pr[i,j] * pos[i,j,1] + (1-pr[i,j]) * neg[i,j,1]
24          p[i,j,2] <- pr[i,j] * pos[i,j,2] + (1-pr[i,j]) * neg[i,j,2]
25          p[i,j,3] <- pr[i,j] * pos[i,j,3] + (1-pr[i,j]) * neg[i,j,3]
26          p[i,j,4] <- pr[i,j] * pos[i,j,4] + (1-pr[i,j]) * neg[i,j,4]
27          r2[i,j,1:4] ~ dmulti(p[i,j, 1:4], N[i,j])
28          for (k in 1:4)
29            {
30              d[i,j,k] <- r[i,j,k]*log(max(r[i,j,k],1)/(p[i,j,k]*N[i,j]))
31              d2[i,j,k] <- r2[i,j,k]*log(max(r2[i,j,k],1)/(p[i,j,k]*N[i,j]))
32              )
33              ## p > 0
34              constraint1[i,j,k] <- step(p[i,j,k])
35              O1[i,j,k] ~ dbern(constraint1[i,j,k])
36              O1[i,j,k] <- 1
37              ## p < 1
38              constraint2[i,j,k] <- step(p[i,j,k] - 1)
39              O2[i,j,k] ~ dbern(constraint2[i,j,k])
40              O2[i,j,k] <- 0
41              ## pos > 0
42              constraint3[i,j,k] <- step(pos[i,j,k])
43              O3[i,j,k] ~ dbern(constraint3[i,j,k])
44              O3[i,j,k] <- 1
45              ## pos < 1
46              constraint4[i,j,k] <- step(pos[i,j,k] - 1)
47              O4[i,j,k] ~ dbern(constraint4[i,j,k])
48              O4[i,j,k] <- 0
49            }
50        }
51    }
52 }
```

Listing 4 (Cont.): Test characteristics and CanL prevalence using full Bayesian model

```

51
52     ## neg > 0
53     constraint5[i,j,k] <- step(neg[i,j,k])
54     O5[i,j,k] ~ dbern(constraint5[i,j,k])
55     O5[i,j,k] <- 1
56
57     ## prob_sp < 1
58     constraint6[i,j,k] <- step(neg[i,j,k] - 1)
59     O6[i,j,k] ~ dbern(constraint6[i,j,k])
60     O6[i,j,k] <- 0
61
62   }
63   bayesp[i,j] <- step(sum(d[i,j,1:4]) - sum(d2[i,j,1:4]))
64 }
65 }
66 # differences
67 for (j11 in 1:5)
68 {
69   for (j12 in (j11+1):6)
70   {
71     diff[j11,j12] <- pr[1,j11] - pr[1,j12]
72   }
73 }
74 for (j23 in 1:6)
75 {
76   for (j33 in 1:6)
77   {
78     diff[j23,(j33+6)] <- pr[1,j23] - pr[2,j33]
79   }
80 }
81   for (j21 in 1:5)
82   {
83     for (j22 in (j21+1):6)
84     {
85       diff[(j21+6),(j22+6)] <- pr[2,j21] - pr[2,j22]
86     }
87   }
88 }
89
90 ## DATA
91 list(r=structure(.Data=c(16,47,12,107,
92 12,50,0,81,
93 26,56,49,111,
94 17,54,21,114,
95 30,64,28,76,
96 30,32,30,117,
97 16,29,13,94,
98 19,27,3,120,
99 50,17,19,123,
100 24,17,7,59,
101 63,32,11,97,
102 40,21,7,96),
103 .Dim=c(2,6,4)),
104 N=structure(.Data=c(182,143,242,206,198,209,
105 152,169,209,107,203,164),
106 .Dim=c(2,6)))

```

Listing 4 (Cont.): Test characteristics and CanL prevalence using full Bayesian model

```

107
108 ## INITS
109 list(r2=structure(.Data=c(16, 47, 12, 107, 12, 50, 0, 81, 26, 56, 49,
    111, 17, 54, 21, 114, 30, 64, 28, 76, 30, 32, 30, 117, 16, 29,
    13, 94, 19, 27, 3, 120, 50, 17, 19, 123, 24, 17, 7, 59, 63, 32,
    11, 97, 40, 21, 7, 96),.Dim=c(2,6,4)), pr=structure(.Data=c
    (0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5), .Dim=c(2,6)),
    se1=structure(.Data=c( 0.995 , 0.995 , 0.995 , 0.995 , 0.995 ,
    0.995 , 0.995 , 0.995 , 0.995 , 0.995 , 0.995 , 0.995 ), .Dim=c
    (2,6)), se2=structure(.Data=c( 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9
    , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 ), .Dim=c(2,6)), sp1=
    structure(.Data=c( 0.89 , 0.89 , 0.89 , 0.89 , 0.89 , 0.89 , 0.89
    , 0.89 , 0.89 , 0.89 , 0.89 , 0.89 ), .Dim=c(2,6)), sp2=
    structure(.Data=c( 0.97 , 0.97 , 0.97 , 0.97 , 0.97 , 0.97 , 0.97
    , 0.97 , 0.97 , 0.97 , 0.97 , 0.97 ), .Dim=c(2,6)), covse=
    structure(.Data=c( 0.002 , 0.002 , 0.002 , 0.002 , 0.002 , 0.002
    , 0.002 , 0.002 , 0.002 , 0.002 , 0.002 , 0.002 ), .Dim=c(2,6)),
    covsp=structure(.Data=c( 0.0057 , 0.0057 , 0.0057 , 0.0057 ,
    0.0057 , 0.0057 , 0.0057 , 0.0057 , 0.0057 , 0.0057 , 0.0057 ,
    0.0057 ), .Dim=c(2,6)))
110 list(r2=structure(.Data=c(16, 47, 12, 107, 12, 50, 0, 81, 26, 56, 49,
    111, 17, 54, 21, 114, 30, 64, 28, 76, 30, 32, 30, 117, 16, 29,
    13, 94, 19, 27, 3, 120, 50, 17, 19, 123, 24, 17, 7, 59, 63, 32,
    11, 97, 40, 21, 7, 96), .Dim=c(2,6,4)), pr=structure(.Data=c
    (0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5), .Dim=c(2,6)),
    se1=structure(.Data=c( 0.95 , 0.95 , 0.95 , 0.95 , 0.95 , 0.95 ,
    0.95 , 0.95 , 0.95 , 0.95 , 0.95 , 0.95 ), .Dim=c(2,6)), se2=
    structure(.Data=c( 0.8 , 0.8 , 0.8 , 0.8 , 0.8 , 0.8 , 0.8 , 0.8
    , 0.8 , 0.8 , 0.8 , 0.8 ), .Dim=c(2,6)), sp1=structure(.Data=c(
    0.75 , 0.75 , 0.75 , 0.75 , 0.75 , 0.75 , 0.75 , 0.75 , 0.75 ,
    0.75 , 0.75 , 0.75 ), .Dim=c(2,6)), sp2=structure(.Data=c( 0.895
    , 0.895 , 0.895 , 0.895 , 0.895 , 0.895 , 0.895 , 0.895 , 0.895 ,
    0.895 , 0.895 , 0.895 ), .Dim=c(2,6)), covse=structure(.Data=c(
    0.015 , 0.015 , 0.015 , 0.015 , 0.015 , 0.015 , 0.015 , 0.015 ,
    0.015 , 0.015 , 0.015 , 0.015 ), .Dim=c(2,6)), covsp=structure(.
    Data=c( 0.01 , 0.01 , 0.01 , 0.01 , 0.01 , 0.01 , 0.01 , 0.01 ,
    0.01 , 0.01 , 0.01 , 0.01 ), .Dim=c(2,6)))
111 list(r2=structure(.Data=c(16, 47, 12, 107, 12, 50, 0, 81, 26, 56, 49,
    111, 17, 54, 21, 114, 30, 64, 28, 76, 30, 32, 30, 117, 16, 29,
    13, 94, 19, 27, 3, 120, 50, 17, 19, 123, 24, 17, 7, 59, 63, 32,
    11, 97, 40, 21, 7, 96), .Dim=c(2,6,4)), pr=structure(.Data=c
    (0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5), .Dim=c(2,6)),
    se1=structure(.Data=c( 0.91 , 0.91 , 0.91 , 0.91 , 0.91 , 0.91 ,
    0.91 , 0.91 , 0.91 , 0.91 , 0.91 , 0.91 ), .Dim=c(2,6)), se2=
    structure(.Data=c( 0.8 , 0.8 , 0.8 , 0.8 , 0.8 , 0.8 , 0.8 , 0.8
    , 0.8 , 0.8 , 0.8 , 0.8 ), .Dim=c(2,6)), sp1=structure(.Data=c(
    0.85 , 0.85 , 0.85 , 0.85 , 0.85 , 0.85 , 0.85 , 0.85 , 0.85 ,
    0.85 , 0.85 , 0.85 ), .Dim=c(2,6)), sp2=structure(.Data=c( 0.9 ,
    0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 , 0.9 )
    , .Dim=c(2,6)), covse=structure(.Data=c( 0.027 , 0.027 , 0.027 ,
    0.027 , 0.027 , 0.027 , 0.027 , 0.027 , 0.027 , 0.027 , 0.027 ,
    0.027 ), .Dim=c(2,6)), covsp=structure(.Data=c( 0.015 , 0.015 ,
    0.015 , 0.015 , 0.015 , 0.015 , 0.015 , 0.015 , 0.015 , 0.015 ,
    0.015 , 0.015 ), .Dim=c(2,6)))

```