4/21/22

$Y_{ij}$ = # of seizures in period $j$ for subject $i$ $\quad j = 1, 2, 3, 4$

$T_{ij}$ = length of observation period $j$ for subject $i$ $= T_j$ (weeks)

Pattern

$T_1 = 8 \quad T_2 = T_3 = T_4 = 2$

$Y_{ij} / T_{ij}$ = seizure rate (per week) ← not time-varying

$X_{1ij} = \begin{cases} 1 & i^{th} \text{ indiv. is on progabide} \\ 0 & \text{if placebo} \end{cases}$ $\quad (\approx X_{1i})$

$X_{2ij} = \begin{cases} 1 & \text{post-baseline} \quad j = 2, 3, 4 \\ 0 & \text{baseline} \quad j = 1 \end{cases}$

GLMM: $Y_{ij} \mid \underline{b}_i \overset{ind}{\sim} \text{Pois}(\mu_{ij})$

$\underline{b}_i = \begin{pmatrix} b_{0i} \\ b_{2i} \end{pmatrix} \sim$ Random effect

$\text{MVN}\left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, G \right)$ ← 3 parameters

$$G = \begin{bmatrix} \text{Var}(b_{0i}) & \text{Cov}(b_{0i}, b_{1i}) \\ \text{Cov}(b_{0i}, b_{1i}) & \text{Var}(b_{1i}) \end{bmatrix}$$

$\mu_{ij} = E(Y_{ij} \mid \underline{b}_i)$

$$\log(E(Y_{ij} \mid \underline{b}_i)) = \beta_0 + b_{0i} + \beta_1 X_{1ij} + (\beta_2 + b_{2i}) X_{2ij} + \beta_3 X_{1ij} X_{2ij} + \log(T_{ij})$$

$$\log\left( \frac{E(Y_{ij} \mid \underline{b}_i)}{T_{ij}} \right) = \beta_0 + b_{0i} + \beta_1 X_{1ij} + (\beta_2 + b_{2i}) X_{2ij} + \beta_3 X_{1ij} X_{2ij}$$

↳ Seizure rate for person $i$ at time $j$