

H.W. 5

- 1) The cluster in this study is the person. The \sum_i for each cluster is 8 by 8. We have 2 cholesterol type and four visits for each person.
- 2) These data could actually be considered triply-repeated measures because there are 22 clinical centers and two cholesterol types and four visits. Therefore, there is repeatedness within clinics, within cholesterol type and within visits.
- 3) Correlation among HDL different visits is 0.1249
Correlation among LDL different visits is 0.8048
Correlation between HDL and LDL at same visits is 0
Correlation between HDL and LDL different visits is 0
- 4) The first four lines and first four columns correspond to HDL and the last four lines and last four columns correspond to LDL. The R correlation matrix can be divided into four quadrants. The upper left corresponds to the correlation among HDL at different visits and lower right corresponds to correlation among LDL at different visits. Both lower left and upper right quadrants correspond to correlation between HDL and LDL at same and different visits.

5) Correlation among HDL at different visits

$$\begin{aligned}\text{Corr (H-V1, H-V2)} &= 0.5807 \\ \text{Corr (H-V1, H-V3)} &= 0.5439 \\ \text{Corr (H-V1, H-V4)} &= 0.5608 \\ \text{Corr (H-V2, H-V3)} &= 0.6632 \\ \text{Corr (H-V2, H-V4)} &= 0.6603 \\ \text{Corr (H-V3, H-V4)} &= 0.7440\end{aligned}$$

Correlation among LDL at different visits

$$\begin{aligned}\text{Corr (L-V1, L-V2)} &= 0.6644 \\ \text{Corr (L-V1, L-V3)} &= 0.6614 \\ \text{Corr (L-V1, L-V4)} &= 0.6454 \\ \text{Corr (L-V2, L-V3)} &= 0.7015 \\ \text{Corr (L-V2, L-V4)} &= 0.6814 \\ \text{Corr (L-V3, L-V4)} &= 0.7604\end{aligned}$$

Correlation between HDL and LDL at same visits

- Corr (H-V1, L-V1) = -0.01172
- Corr (H-V2, L-V2) = 0.04357
- Corr (H-V3, L-V3) = 0.03691
- Corr (H-V4, L-V4) = 0.06534

Correlation between HDL and LDL at different visits

- Corr (H-V1, L-V2) = 0.02370
- Corr (H-V1, L-V3) = 0.01306
- Corr (H-V1, L-V4) = 0.04673
- Corr (H-V2, L-V3) = 0.02144
- Corr (H-V2, L-V4) = 0.06106
- Corr (H-V3, L-V4) = 0.09499

- Corr(L-V1, H-V2) = 0.04765
- Corr (L-V1, H-V3) = 0.08411
- Corr (L-V1, H-V4) = 0.04206
- Corr (L-V2, H-V3) = 0.04988
- Corr (L-V2, H-V4) = 0.01851
- Corr (L-V3, H-V4) = -0.01364

6) Model 2 (completely UN GLM with repeated type*cvisit) provides the better covariance structure by AIC and BIC (smaller compared to the other model)

As per LRT also model 2 is a better model (LRT=2802.9, df =33, p<0.0001)

7) As per the output from model 2: the average initial values for LDL cholesterol is 170.18 units and for HDL cholesterol is 51.83 units and this difference ($\beta = -118.35$, SE=1.58) was statistically significant (F= 5617.31, p <.0001). The average slope or rate of change over visits for LDL was -1.55 units per unit of time and for HDL it was -0.07 units per unit of time. This difference ($\beta = 1.48$) was statistically significant (F=37.99, p< 0.001). The slope, or rate of change was steeper for LDL cholesterol i.e. the level of LDL cholesterol lowered at higher rate than did the HDL cholesterol over time. Overall the lipid profile improved over time.

The 3 way interaction between condition, visit and cholesterol type is insignificant (F=0.08, P=0.78). Which means that the trajectories across time in LDL-cholesterol and in HDL-cholesterol for the two randomization treatment groups were not different or were same.