

Biostatistics 537: Longitudinal Data Analysis - Fall 2009

Problem Set 3 - Due: Thursday October 8, 2009

The data for this problem are from the Riesby *et al.*, article that we have discussed in class. This study examined the relationship in depressed inpatients between the drug plasma levels - the antidepressant imipramine (IMI) and its metabolite desimipramine (DMI) - and clinical response as measured by the Hamilton Depression Rating Scale (HDRS). In class, we noted that there was a significant relationship across time between the drug plasma levels (specifically, desimipramine) and depression. The dataset (RIESBYT4.DAT) which is available on the class website (<http://www.uic.edu/classes/bstt/bstt513> - towards the bottom of the page) contains the following variables:

field 1: Patient ID

field 2: HDRS change from baseline score

field 3: a field of ones (is “one” the loneliest variable?) - *ignore this variable*

field 4: Week - from 0 (week 2) to 3 (week 5)

field 5: sex (0 = male, 1 = female) - *ignore this variable*

field 6: diagnostic group (0 = non-endogenous, 1 = endogenous) - *ignore this variable*

field 7: Imipramine (IMI) plasma levels (in ln units)

field 8: Desimipramine (DMI) plasma levels (in ln units)

For this problem, I would like you to combine the drug plasma levels into one variable - the natural log (ln) of the ratio of DMI to IMI (*i.e.*, $\ln \text{DMI} - \ln \text{IMI}$, **note that these variables are already on the LN scale in the dataset**). Let's denote this variable as LDIM. From a substantive point of view, the ratio of the metabolite to the administered drug might be thought of as a measure of the degree of drug metabolism. For this problem set do the following:

1. Plot the HDRS (change from baseline) means across time, and then fit a reasonable random-effects model to account for any apparent trends across time. Write down the level-1 and level-2 models. Interpret the parameter estimates from your model.
2. Add the drug plasma variable LDIM to your model and comment on its relationship with the HDRS change scores across time. Support your interpretation with descriptive statistics, as needed. Write down the level-1 and level-2 models.
3. Partition the effect of the time-varying variable LDIM into its within-subjects and between-subjects effects. Write down the level-1 and level-2 models and interpret your results. Test whether the within-subjects and between-subjects effects of LDIM can be considered equal.
4. Summarize your findings. What do you conclude about the relationship between HDRS change and LDIM?