

22S:138, Bayesian Statistics
Fall 2008, Homework 9

Due: Mon. Nov. 17 in class

The data for this problem, in WinBUGS format, is on the course web page under “Datasets” and is called “cd4116b.dat.” It consists of transformed CD4 counts on 26 patients that were taken at weeks 0, 2, 8, 12, and 24 after they began treatment in an AIDS clinical trial called ACTG 116B. The 4th-root transformation has been applied to stabilize variance. This is often done with CD4-count data.

1. If you are a 2nd-year or later grad student in statistics, biostatistics, or educational statistics, use the “Birats” example from WinBUGS volume 2 examples as a template for your analysis of this dataset.
2. All other students may use the “Rats” example from WinBUGS volume 1 examples as their template.
3. You will need to choose different initial values and possibly different priors for your analysis from those that worked for the baby rats data.
4. Fit a hierarchical normal linear model to the data.
5. Assess convergence in the ways that you have learned. You do not have to print any plots; just write a few sentences telling what you did.
6. Produce estimated posterior means and 95% credible sets for the following quantities:
 - (a) The estimated population intercept of 4th root CD4 for all patients at the beginning of the study (i.e. at week 0). (If you center the covariate, think about how to do this.)
 - (b) The estimated population slope of 4th root CD4 vs. week for all patients on this type of treatment.
 - (c) The standard deviation of 4th root CD4 values around the regression line.
 - (d) The standard deviation that captures between-patient variability in slopes.
 - (e) The individual intercept and slope for patient 12.