Issues in Bayesian Analysis of Clinical Trial Data Using Semiparametric Models

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Frequentist and Bayesian approaches to the design and analysis of clinical trials provide complementary information regarding the strength of statistical evidence regarding particular conclusions. Because they address different perspectives, there is much to be gained by considering both analytic approaches. However, it seems only natural that the assumptions underlying both the frequentist and Bayesian approaches be similar, and that raises some issues. There are in general many plausible biological mechanisms which result in an intervention affecting many different aspects of the probability distribution for the primary outcome of a clinical trial. In such a setting, assumptions of fullyparametric statistical model is problematic, and hence when using frequentist inference I typically restrict attention to semiparametric statistical models (and especially those semiparametric models that are most robust to a variety of probability models). Unfortunately, Bayesian methods have not been as well established in a semiparametric setting. In this talk I will discuss some approaches I am taking to defining Bayesian analogues of such models as semiparametric tests of means, medians, and the Wilcoxon rank sum.