Skew Normal Distribution and Treatment Selection in Clinical Trials

Kuang-Kuo Gordon Lan (藍光國)
Johnson & Johnson Pharmaceutical Research & Development LLC
(Collaborators Zhenming Shun and Yehwen Soo)

Abstract

We consider a clinical trial starting with two treatment groups and a control group with a planned interim analysis. The inferior treatment group will be dropped after the interim analysis, only the winning treatment and the control will continue to the end of the study. The unconditional distribution of the final test statistic from the 'winner' treatment is skew normal, and numerical integration is needed for the design of such a trial. To avoid complex computations, we propose a normal approximation approach to calculate the type I error, the power, the point estimate, and the confidence intervals. Due to the well understood and attractive properties of the normal distribution, the 'Winner Design' can be easily planned and adequately executed, which is demonstrated by an example. We also provide detailed discussion on how the proposed design should be practically implemented by optimizing the timing of the interim look and the probability of winner selection.