

# Covariate Selection in Adaptive Phase III Clinical Trials

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**Abstract:** Patients arrive sequentially in a phase III clinical trial. Suppose there are two competing treatments, say A and B, and the responses of the patients are immediate. A class of sequential allocation design is the response-adaptive designs where the allocation-and-response histories of all the previously allocated patients is used for the allocation of any entering patient. The objective is to achieve some ethical goal by allocating a larger number of patients to the better treatment in course of allocation. All the available works in this direction use the covariates as they are available, there is no work in the adaptive design literature where the covariates are optimally selected by satisfying some optimality criterion. But it is well accepted that balancing among the covariates or optimal choice of covariates is necessary to get optimal design in standard randomized clinical trials (see Mathews, 2000, Atkinson, 2002). So it is important to have some suitable designs in the literature where covariates can be optimally chosen. In fact optimal selection of covariates is possible in many set up. The present paper is towards that direction. We provide some optimal adaptive designs where covariates are also optimally chosen. The properties of the design is studied.