

Optimal design of clinical trials, based on linear and nonlinear models

Professor Phillip Hougaard, who is associated with the Biostat unit, will be presenting his work: May 21 at 13-14 in meeting room 4.39.

Abstract:

Optimal design of a clinical trial refers to picking one or more design features of a clinical trial in a way that optimizes some given/chosen objective function. The classical result in this field is that for comparing two given treatments (say active versus placebo), it is optimal to put half the patients into either group. This result will be presented but I will spend most time on less obvious examples.

A main example will be a dose-finding study, where potentially several doses can be studied in a factor-type model or a linear or nonlinear regression model. One discussion will go on objective function, for which standard choices are: Variance of a key parameter estimate; Determinant of variance matrix or sum of several variances.

Studying a dose-response model leads (for the determinant approach) to select a number of doses (same number as number of parameters in the dose-response model), each with the same number of patients. If the statistical model is linear, the optimal doses are independent of the unknown parameters, but this is not the case for a nonlinear statistical model. This will be illustrated and discussed. More advanced objective functions will also be discussed.