The Right Treatment for the Right Patient at the Right Time: Personalized Medicine and Statistics

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Free and Open to the Public

Abstract:

With the advent of genomics era, the goal of "personalizing" treatment to the patient, that is, selecting the "best" treatment for a patient based on his/her own characteristics and past history, has become more tantalizing than ever. Personalized medicine involves identifying patients sharing certain characteristics ("the right patient") who are likely to benefit from one treatment option over the others available ("the right treatment"). In chronic diseases and disorders like cancer or substance abuse, a series of treatment decisions must be made, and the goal is to determine the most beneficial treatment option at each decision for patients with similar characteristics and responses to previous treatments. This sequential decision-making introduces many complications; for example, treatments chosen early on may affect how well treatments given later will work ("at the right time").

Why is a statistician talking about personalized medicine? The goal of personalized treatment requires making sense of vast, complex data. Statistics is an essential tool for tackling these challenges and uncovering optimal strategies for treatment. This lecture will provide an overview of the challenges involved and of the essential role of statistical methods and study designs in the quest for personalized medicine.