

PLENARY SESSION 1: Innovation In Clinical Trail Design

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Bayesian Adaptive Designs for Precision Medicine: Promise, Progress and Challenge

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Clinical trial is a prescribed learning process for identifying safe and effective treatments. In recent years, rapid advancements in cancer biology, immunology, and genomics demand innovative methods to identify better therapies for the most appropriate population in a timely, efficient, accurate, and cost-effective way. In my talk, I will first illustrate the concept of Bayesian update and Bayesian inference, a superior alternative to the traditional frequentist approach. Bayesian methods take the “learn as we go” approach and are innately suitable for clinical trials. Then, I will give an overview of Bayesian adaptive designs in the areas of adaptive dose finding, posterior and predictive probability calculations, outcome adaptive randomization, multi-arm platform design, and hierarchical modeling, etc. Finally, real world applications will be discussed. Bayesian adaptive clinical trial designs increase the study efficiency, allow more flexible trial conduct, treat more patients with more effective treatments in the trial, and provide early stopping for futility or efficacy when sufficient evidence accumulates. Perspectives will be given on translating theory to practice to enhance the clinical trial success and speed up drug approval. We have developed Shiny applications and other software tools to assist the learning and implementation of Bayesian adaptive designs such that we can turn promise into progress. Many useful software can be found at the followings two sites:

<https://biostatistics.mdanderson.org/softwareOnline/>

<https://biostatistics.mdanderson.org/softwareDownload/>

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