Speaker: Peter Thall (The University of Texas MD Anderson Cancer Center)

Date: 03/05/2024 at 15:15 (4 West 1.7)

Title: Bayesian Personalized Treatment Selection for Advanced Breast Cancer

Abstract:
A Bayesian method is presented for personalized treatment selection in medical settings where data are available from a randomized clinical trial with multiple outcomes. The motivating application is a trial that compared the targeted agent combination letrozole plus bevacizimab (L+B) to letrozole alone (L) as first-line therapy for hormone receptor positive advanced breast cancer. The trial's data showed that L+B was associated with longer progression-free survival (PFS) time, but also had a much higher severe toxicity rate. To address the problem of selecting a future patient's treatment based on the trial's data and the patient's covariates, collaborating physicians who treat advanced breast cancer patients constructed a utility function of PFS time, total toxicity burden (TTB), and patient prognostic covariates, guided by their clinical experiences. Joint effects of treatment and covariates on PFS time and TTB were estimated by fitting a Bayesian nonparametric regression model to the data. Using the fitted model, a future patient's treatment may be selected by maximizing the posterior predictive mean utility, computed using the patient's covariates. Posterior inferences showed that the optimal treatment choice for a given patient depends on their age.

References:

1. Dickler MN, Barry WT, Cirricione CT, et al. Phase III trial evaluating letrozole as first-line endocrine therapy with or without bevacizumab for the treatment of postmenopausal women with hormone receptor positive advanced-stage breast cancer: CALGB 40503 (alliance). J Clinical Oncology, 34(22):2602, 2016

2. Lee J, Thall PF, Lim B, and Msaouel P. Utility based Bayesian personalized treatment selection for advanced breast cancer. J Royal Statistical Soc, Series C. 71:1605-1622, 2022.

3. Thall PF. Bayesian Precision Medicine. Chapman & Hall/CRC Press, 2024.