

## **Abstract**

### **Mathematical Modeling of Dynamic Breast Cancer Screening Policies**

How worthwhile is it, in terms of individual mortality risk, to implement different mammogram screening intervals in the pre- and post-menopausal phases? Should screening be more frequent pre- or post-menopause? How does the screening start-age/stop-age affect mortality risk? These questions are particularly interesting given the dynamic nature of breast cancer incidence, breast cancer aggression and mammogram-efficacy between the pre- and post-menopausal phases.

We take a mathematical model based approach to understanding these relationships, and formulate a partially observed Markov decision process (MDP) model. We use this model to evaluate different screening policies and construct informative tradeoff curves that plot some measure of "policy effort" versus mortality risk. We restrict our attention to two types of policies: "routine" policies that prescribe the same screening interval over the life of the patient, and "two-phase" policies that prescribe one interval pre-menopause and a different interval post-menopause.

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