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Casey Mills*. *Modeling Intermittent Hormone Therapy for Prostate Cancer Using Various Time Scales*

Prostate cancer is a common cancer among males in the United States and is most frequently treated by intermittent androgen deprivation therapy. This therapy requires a patient to alternate between periods of androgen suppression treatment and no treatment. Prostate-specific antigen levels are used to track relative changes in tumor volume of prostate cancer patients undergoing intermittent androgen deprivation therapy. During this therapy, there is a pause between treatment cycles. Traditionally, continuous ordinary differential equations are used to estimate prostate-specific antigen levels. In this paper, we use dynamic equations to estimate prostate-specific antigen levels and construct a novel time scale model to account for both continuous and discrete time simultaneously. This allows us to account for breaks between treatment cycles. Using empirical data sets of prostate-specific antigen levels, a known bio-marker of prostate cancer, across multiple patients, we fit our model and use least squares to estimate two parameter values. We then compare our model to the data and find a resemblance on treatment intervals similar to our time scale.

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