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Renee Brady and **Heiko Enderling*** (heiko.enderling@moffitt.org), 12902 Magnolia Dr, Tampa, FL 33612. *Learning from prostate-specific antigen dynamics early during androgen deprivation to predict subsequent individual responses.*

Intermittent androgen deprivation therapy (IADT) is an attractive treatment for biochemically recurrent prostate cancer (PCa), whereby cycling treatment on and off can reduce cumulative dose and limit toxicities. It has also been shown to delay the development of treatment resistance in mice. We follow a recent modeling pipeline [Brady & Enderling, Bull. Math. Biol., 2019] to calibrate, validate and evaluate a mathematical model that simulate enrichment of prostate cancer stem cell (PCaSC) dynamics during treatment as a plausible mechanism of resistance evolution. Simulated PCa stem and non-stem cells dynamics demonstrate that PCaSC proliferation patterns correlate with longitudinal serum prostate-specific antigen (PSA) measurements in 70 PCa patients undergoing IADT. By learning dynamics from each treatment cycle, individual model simulations predict evolution of resistance with an overall accuracy of 90%. Model simulations based on response dynamics from the first IADT cycle identify patients who would benefit from concurrent docetaxel in subsequent cycles. Our results demonstrate the feasibility and potential value of adaptive clinical trials guided by patient-specific mathematical models of intratumoral evolutionary dynamics. (Received September 03, 2019)