

## Computational Forecasting of Treatment Response in Metastatic Prostate Cancer

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*Abstract:* Metastatic prostate cancer remains largely incurable and is responsible for tens of thousands of deaths each year. Although modern imaging techniques can now detect metastatic tumors with remarkable precision, physicians still lack reliable tools to predict how an individual patient's cancer will grow or respond to treatment. As a result, therapy adjustments are often made only after significant disease progression has already occurred.



This project aims to develop a personalized computational “digital twin” of metastatic prostate cancer for individual patients. By combining advanced mathematical modeling with clinical data—including PSMA-PET/CT imaging, blood-based PSA measurements, and molecular data—we seek to forecast tumor progression and detect treatment resistance earlier than current standard-of-care approaches allow. In collaboration with researchers and clinicians at MD Anderson Cancer Center, this work will lay the foundation for predictive tools that could enable timelier, precision-guided treatment decisions and ultimately improve outcomes for patients with advanced prostate cancer.