Implications from two prostate cancer models for intermittent therapy

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In this project, we formulate a three cell population model of intermittent androgen suppression therapy for cancer patients to study the treatment resistance development. We compare it with other models that have different underlying cell population structure using patient prostate specific antigen (PSA) and androgen data sets. Our results show that in the absence of extensive data, a two cell population structure performs slightly better in replicating and forecasting the dynamics observed in clinical PSA data. We also observe that at least one absorbing state should be present in the cell population structure of a plausible model for it to produce treatment resistance under continuous hormonal therapy. This suggests that the heterogeneity of prostate cancer cell population can be represented by two types of cells differentiated by their level of dependence on androgen, where the two types are linked via an irreversible transformation.