MODELLING THE EFFECT OF IMMUNOTHERAPIES ON HUMAN CASTRATION-RESISTANT PROSTATE CANCER

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We analyse the potential effect of immunotherapies on castration-resistant form of prostate cancer (PCa). In particular, we examine the potential effect of the dendritic vaccine *sipuleucel-T*, the only currently available immunotherapy option for advanced PCa [3], and of *ipilimumab*, a drug targeting the Cytotoxic T-Lymphocyte Antigen 4 (CTLA4), exposed on the CTLs membrane, currently under Phase II clinical trial. The model, builiding on the one by Rutter and Kuang [1], includes different types of immune cells and interactions and is parameterised on available data.

Our results show that the vaccine has only a very limited effect on PCa, while repeated treatments with *ipilimumab* appear potentially capable of controlling and even eradicating an androgen-independent prostate cancer. From a mathematical analysis of a simplified model, it seems likely that, under continuous administration of *ipilimumab*, the system lies in a bistable situation where both the tumor-eradication equilibrium and a high-tumor equilibrium are attractive. The schedule of periodic treatments could then determine the outcome, and mathematical models could help determine an optimal schedule.

While the results appear promising, a caveat is that the anti-CTLA4 effect of the drug has been estimated from the patients that most benefited from the therapy [2], and thus may be over-optimistic.

References

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