BRENDAN JARRELL, ZHIJUN WANG, QING WANG, Department of Computer Sciences, Mathematics, and Engineering, Shepherd University, Shepherdstown, WV, 25443, and DAVID J. KLINKE, Department of Chemical Engineering, and Dept. of Microbiology, Immunology & Cell Biology, West Virginia University, Morgantown, WV, 26506. Treatment strategy for non-responders and partial-responders based on a calibrated cancer model in response to an immune-chemotherapy.

It has been demonstrated through recent findings that chemotherapy treatments which utilize the combined Interleukin-12 (IL-12) and chemotherapy agent Oxaliplatin (OXP) effectively combat metastasized colorectal cancer in lab mice. To explore the effects of various treatment strategies on tumor control, we conducted simulation experiments based on a calibrated mathematical model using ordinary differential equations (ODEs). The experiments presented in this work focused on treatment effects of a group of non-responders and partial-responders who survived two treatment cycles of combined OXP and IL12 therapy and did not responded or partially responded to the third treatment cycle using the same treatment protocol, respectively. Impulses reflecting dose and frequency change of IL12 and/or OXP were specifically manipulated and results were analyzed for differences in effects of IL-12 strength, OXP dose size, OXP treatment cycles, and overall number of treatment cycles on tumor growth. The results of the 30 different parameter sets evaluated show that increases in the size of the dose of administered OXP and an increase in the frequency of OXP treatment cycles significantly lowered tumor volume in partial responders over the span of 720 days. For non-responders, on the other hand, the results tended to be miniscule. While increases in the frequency of OXP treatment cycles and the number of treatment cycles overall did step down the tumor volume on a median scale of the 30 parameter sets, these effects were small and sometimes insignificant. The project was supported by NIH Grant P20GM103434 to the West Virginia IDeA Network for Biomedical Research Excellence and the Research Challenge Fund through a Summer Undergraduate Research Experience Grant from the West Virginia Higher Education Policy Commission Division of Science and Research.