

MORGAN CROW and QING WANG, Dept of Computer Sciences, Mathematics and Engineering, Shepherd University, Shepherdstown, WV, 25443. Stability Analysis of a Tumor-Free Equilibrium of a Tumor Growth Model in Response to a Combinatorial Anti-Nodal Antibody and Chemotherapy.

Nodal is a member of the transforming growth factor-beta superfamily and plays an important role in embryonic stem cell maintenance and body axis establishment. Nodal is not typically observed in most normal adult tissues but is reactivated in various advanced-stage cancers. Recent research showed the advantage of using combinatorial treatment with chemotherapy agent Doxorubicin (DOX) plus anti-Nodal monoclonal antibody to suppress tumor growth and metastasis. In this study, the stability analysis of an impulsive ODE model describing how the combination therapy affected the tumor growth was conducted. By evaluating the signs of eigenvalues of the Jacobian matrix of the linearized system at the tumor-free equilibrium point, we can conclude that the tumor-free equilibrium is not stable when treatment is not employed. Numerical simulations indicate this equilibrium can be stabilized by impulsive control (i.e., manipulating the timing and dosage of the combination therapy). The project was supported by NIH Grant P20GM103434 to the West Virginia IDeA Network for Biomedical Research Excellence and the NASA Space Grant.