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# MODELING THE DYNAMICS OF SPATIOTEMPORAL PATTERN FORMATION OF MALIGANT GLIOMAS AND IMMUNE SYSTEM INTERACTION

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We report a mathematical model which depicts the spatiotemporal dynamics of malignant gliomas, macrophages, cytotoxic T-lymphocytes, immuno-suppressive factor TGF- and immuno-stimulatory cytokine IFN- through a system of five coupled reaction-diffusion equations [1]. We perform local stability analysis of the biologically based mathematical model for the growth of glioma populations and their environment. A sensitivity analysis is conducted by using Partial rank correlation coecient (PRCC) [2] technique to determine how the gliomas-immune model output is aected by changes in a specic parameter disregarding the uncertainty over the rest of the parameters. The presented stability analysis of the model system demonstrates that the temporally stable positive interior steady state remains stable under the small inhomogeneous spatiotemporal perturbations. We conduct some numerical simulations in one and twodimensions. The irregular spatiotemporal dynamics of gliomas, macrophages and cytotoxic T-lymphocytes are discussed extensively. The numerical simulations indicate that the cell distributions are quasi-stationary with time and inhomogeneous in space. The heterogeneous dynamics of the model system have both biological and mathematical connotation and the concepts of gliomas dormant phenomenon.

## References

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