

عنوان مقاله:

Extracting Mutual Interaction Rules Using Fuzzy Structured Agent-based Model of Tumor-Immune System Interactions

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نویسندگان:

A Allahverdy - *PhD Candidate, Department of Medical Physics & Biomedical Engineering, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

S Rahbar - *PhD Candidate, Department of Medical Physics & Biomedical Engineering, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

H R Mirzaei - *PhD Candidate, Department of Immunology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

M Ajami - *PhD, Department of Immunology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran*

A Namdar - *PhD, Department of Immunology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran*

S Habibi - *MSc, Department of Immunology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

J Hadjati - *PhD, Department of Immunology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

A H Jafari - *PhD, Department of Medical Physics & Biomedical Engineering, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

خلاصه مقاله:

Background: There are many studies to investigate the effects of each interacting component of tumor-immune system interactions. In all these studies, the distinct effect of each component was investigated. As the interaction of tumor-immune system has feedback and is complex, the alternation of each component may affect other components indirectly. **Objective:** Because of the complexities of tumor-immune system interactions, it is important to determine the mutual behavior of such components. We need a careful observation to extract these mutual interactions. Achieving these observations using experiments is costly and time-consuming. **Material and Methods:** In this experimental and based on mathematical modeling study, to achieve these observations, we presented a fuzzy structured agent-based model of tumor-immune system interactions. In this study, we consider the confronting of the effector cells of the adaptive immune system in the presence of the cytokines of interleukin- γ (IL- γ) and transforming growth factor-beta (TGF- β) as a fuzzy structured model. Using the experimental data of murine models of B16F10 cell line of melanoma cancer cells, we optimized the parameters of the model. **Results:** Using the output of this model, we determined the rules which could occur. As we optimized the parameters of the model using escape state of the tumor and then the

rules which we obtained, are the rules of tumor escape. Conclusion: The results showed that using fuzzy structured agent-based model, we are able to show different output of the tumor-immune system interactions, which are caused by the stochastic behavior of each cell. But different output of the model just follow the predetermined behavior, and .using this behavior, we can achieve the rules of interactions

کلمات کلیدی:

Tumor Escape, Fuzzy, T-lymphocytes, Interleukin- γ , Transforming growth factor beta

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