

## **Robustness Analysis of the Carbon and Nitrogen Co-Metabolism Model of *Mucor mucedo***

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**Abstract :** An emerging important area of the life sciences is systems biology, which involves understanding the integrated behavior of large numbers of components interacting via non-linear reaction terms. A centrally important problem in this area is an understanding of the co-metabolism of protein and carbohydrate, as it has been clearly demonstrated that the ratio of these metabolites in diet is a major determinant of obesity and related chronic disease. In this regard, we have considered a systems biology model for the co-metabolism of carbon and nitrogen in colonies of the fungus *Mucor mucedo*. Oscillations are an important diagnostic of underlying dynamical processes of this model. The maintenance of specific patterns of oscillation and its relation to the robustness of this system are the important issues which have been targeted in this paper. In this regard, parametric sensitivity approach as a theoretical approach has been considered for the analysis of the robustness of this model. As a result, the parameters of the model which produce the largest sensitivities have been identified. Furthermore, the largest changes that can be made in each parameter of the model without losing the oscillations in biomass production have been computed. The results are obtained from the implementation of parametric sensitivity analysis in Matlab.

**Keywords :** system biology, parametric sensitivity analysis, robustness, carbon and nitrogen co-metabolism, *Mucor mucedo*

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