

Modelling enzymatic allosteric inhibition by product

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Abstract

Enzymes are biological catalysts naturally present in living organisms, and they are capable of accelerating biochemical reactions in the metabolism process. Cells use many regulatory mechanisms to regulate the concentrations of cellular metabolites at physiological levels. Enzymatic allosteric inhibition by product is one of the key regulatory mechanisms naturally occurring in cellular metabolism. This inhibition process helps the cells regulate enzymatic activities. In this paper, we propose a novel mathematical model describing the enzymatic allosteric inhibition by product. The model consists of a coupled system of nonlinear ordinary differential equations for the species of interest. A formula for product formation rate for this mechanism is obtained in a transparent manner using nondimensionalization analysis. Further analysis for this formula yields qualitative insights into the maximal reaction velocity and apparent Michaelis-Menten constant. Finally, a potential application of the model to realistic enzymes is briefly discussed.

This is joint work with Nhan Anh Thái.

References

- [1] Vinh Quang Mai, Thái Anh Nhan, *Modelling enzymatic allosteric inhibition by product* (in submission).
- [2] Vinh Q. Mai, Martin Meere, *Modelling the phosphorylation of glucose by human hexokinase I* (in submission).