Research in Pharmaceutical Sciences, 2012;7(5)
School of Pharmacy and Pharmaceutical Sciences
Isfahan University of Medical Sciences

Optimization of bacterial urate oxidase enzyme activity

M. Baniasad[1,*], A. Ghasemiyan[2], Z. Moradpour[2], Y. Ghasemi[2]

[1]Department of Pharmaceutical Biotechnology, Faculty of Pharmacy and student research committee, Shiraz University of Medical Science, Shiraz, Iran
[2]Department of Pharmaceutical Biotechnology, Faculty of Pharmacy, Shiraz University of Medical Science, Shiraz, Iran

Background and Aims: Enzyme uricase facilitates the opening of purine ring to yield carbon dioxide, hydrogen peroxide, and allantoin which is more soluble and easily excreted than uric acid. Urate oxidase plays a crucial role in vivo by determining the urate concentration of blood. Moreover, it is shown that uricase can be used as protein drug to treat hyperuricemia. There is also some evidence to show that uricase has remarkable role in prophylaxis and treatment of tumor lysis hyperuricemia. These clues, taken together, indicate that up-regulation and optimization of uricase activity could be useful for pharmaceutical applications.
Methods: Optimization of growth conditions is commonplace to increase the in vivo expression or activity of enzymes. Therefore, in this study, we examine the effect of some factors such as temperature, pH, carbon and nitrogen sources, uric acid concentration, metal ions and etc. in optimizing of uricase enzyme. In doing so, firstly, we used one-factor at the time procedure to select some of the most effective factors. To make a more detailed picture, we used Minitab version15 program to evaluate the selected factors.
Results: Our statistical analyses demonstrated that among twelve variables tested; pH, glucose, yeast extract and CuSO4 were selected based on their high significant effect on uricase activity in special species of Pseudomonas.
Conclusions: In screening the factors affecting production of uricase it is very important to test as many factors as possible, but using some statistical experimental designs offer good and fast screening procedures. It is worthwhile to use the results of these designs in industrial and pharmaceutical bioprocess.

Keywords: Uricase; Optimization; Statistical experimental design