RESEARCH PAPER

ARTIFICIAL NEURAL NETWORK AS TOOL FOR QUALITY BY DESIGN IN FORMULATION DEVELOPMENT OF SOLID DISPERSION OF FENOFIBRATE

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Optimization techniques are abundant in pharmaceutical industry. In general, all the required information should be obtained from as few experiments as possible. Conventional techniques such as response surface models or simplex optimization are often used. With the advent of the computer in the laboratory, a new class of optimization problems arose which could not be tackled with the standard methodologies. For these search type problems, new strategies such as simulated annealing (SA), genetic algorithms (GA) and artificial neural network are applied. Artificial neural network (ANN) is now become more efficient technique for the optimization of pharmaceutical formulation compared with the Multiple Linear Regression Analysis (MLRA). In the present investigation Self Organizing Featured Maps (SOFM) tool of ANN was implicated for the optimization of formulation of solid dispersion for fenofibrate. Solid dispersion was prepared using 3^2 full factorial design and the results obtained were evaluated using ANN for the optimization purpose. Solid dispersion was prepared using Poloxamer 407 as carrier and Lyophilization methods as method of preparation. Amount of Poloxamer 407 (X_1) and Lyophilization temperature (X_2) was selected as independent variable, angle of repose and $T_{90\%}$ was selected as dependent variables. Results of angle of repose and $T_{90\%}$ obtained by factorial analysis was choose as set of ANN training data and results of check point analysis for angle of repose and $T_{90\%}$ was choose as a set of test data for ANN. Both sets of data were trained using SOFM tool for ANN training using Software NEUROSOLUTION 6.31. Data was trained for satisfactory results.

Key words: ANN, Factorial Design, Poloxamer 407, Fenofibrate, Quality by Design.

INTRODUCTION

Artificial intelligence (AI) is the science and engineering of making intelligent machines, especially intelligent computer programs (Ahmadi Lakalayeh *et al* 2012). It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable (Agatonovic-Kustrin and Beresford, 2000). Researchers in AI follow the

algorithmic approach of creating computer program and try to capture the knowledge of an expert in some specific domain as a set of rules to create so-called expert systems (Aksu *et al* 2012). This is based on the hypothesis that the expert's thought process can be modeled by using a set of symbols and a set of logical rules. Using the algorithmic and symbolic approach, the digital computers solve problems that are difficult for humans. Artificial neural network