Prediction of cell growth inhibition values evaluated by WST1 assay on human breast cancer cell lines using computational intelligence

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Abstract: Since the experimental research studies are difficult, expensive and time consuming the computational intelligence techniques such as artificial neural network (ANN) and adaptive neuro-fuzzy inference system (ANFIS) can be used for modeling the cell growth inhibition values assessed by colorimetric assays with high accuracy. In this study, the applicability of artificial neural network (ANN) and adaptive neuro-fuzzy inference system (ANFIS) for the prediction of the growth inhibition values evaluated by tetrazolium colorimetric WST1 assay is presented. For developing the ANN and ANFIS models experimental data of the published work were used for training and testing the models. The drug concentrations (the concentrations of fullerol (0.5–7.9 µg/ml) in combination with doxorubicin (1 µmol/l)), the type of the human breast cancer cell lines (T47D, MCF7 and MDA-MB-231) and the time-courses (24, 48 and 72 hour after continuous exposure to doxorubicin and fullerol) are used as the inputs and the values of inhibition cytotoxicity is used as the output of the models. Experimental data of the published work are used for training and testing the models. Comparison of the experimental and predicted values using the proposed ANN and ANFIS models shows that there is a good agreement between them. Also, the proposed ANFIS model is better than the proposed ANN model. Based on the results our models are accurate, fast, cheap and reliable approaches to predict the cell growth inhibition values assessed via WST1 colorimetric assays.

Keyword: Artificial neural network (ANN), Adaptive neuro-fuzzy inference system (ANFIS), WST1 assay, Modeling; Cell growth inhibition values