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Artificial neuronal network application in recognition of cellular resistance to cisplatin using FTIR technology

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Background and Aims: Cisplatin is one of the most useful antineoplastic chemotherapy drugs for a variety of different human cancers. One of the clinical problems in its application which would consequently affect the therapeutic outcome of its use is the appearance of resistance to this agent. In this project by using FTIR, we have investigated on the spectroscopic differences between cisplatin sensitive and resistance cell lines to acquire more information on the possible mechanism involved in the resistance to this drug.
Methods: Three different sensitive and resistance cell lines of human ovarian A2780 and its resistance pair of A2780-CP, human ovarian OV2008 and its resistance pair of C13, and finally human lung carcinoma of HTB56 and its resistance pair of HTB56-CP were grown in the laboratory under standard procedure. Control cells were exposed to saline, but experimental cells to three concentrations of 1, 5 and 10µg/ml of cisplatin for 1h. Cells were then trypsinized and collected for FTIR spectroscopy in the range of 400-4000 cm-1. Spectra were proceed by baseline correction, smooting, deconvolution and first derivatisation, from which the average and standard division of each three repetition of each sample was used for mathematical and statistical conclusion. ANN was summarized with Feed forward, back propagation, multi layer perceptron, Hidden neurons, Epoch, Classification error mean and Classification error STD.
Results: ANN showed that the non-linear method in neural network with suitable regression may distinguish the sensitive cells from resistance cells in all exposed concentrations within the experimental range with a 92-93% of accuracy.
Conclusions: ANN can diagnose the cells resistance to cisplatin with a good accuracy to be applicable for clinical purposes, including chemotherapy program selection.

Keywords: A2780; OV2008; C13; HTB56; FTIR; ANN