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Principle component analysis application in recognition of cellular resistance to cisplatin using FTIR technology

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Background and Aims: Cisplatin is one of platinum-based chemotherapy drugs. Resistance to cisplatin is one of the major factors in its application for cancer therapy. The aim of this study is to investigate on the spectroscopic differences between cisplatin sensitive and resistance cell lines by using FTIR to help in better selection of chemotherapy program in clinic.
Methods: Four different cell lines of human ovarian A2780 and human lung carcinoma of HTB56 and their resistance pairs 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 preceded by baseline correction, smoothing, deconvolution and first derivatisation. PCA, with adjusting data mass for 13 dimensional spaces, and eight selected major PCs have been used to find the most relevant modifications in pairs of sensitive and resistant cell lines.
Results: In A2780 sensitive cell lines changes in the wave numbers of 970, 1010, 1240, 1637, 1646, 2850 and 2870 cm-1 are apparent, while in the resistant ones the most relevant changes are seen at the wave numbers of 1220, 1240, 2850 and 2870 cm-1. On the other hand, more relevant changes in HTB cell lines are at 1170, 1220, and 2870 cm-1 wave numbers, but in the resistant cells at 1010,, 1085, 1170, 1220, 2850, and 2870 cm-1.
Conclusions: PCA revealed more uniform pattern of changes in resistant cell lines, which might indicate a similar mechanism of resistant to cisplatin in these cell lines.

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