Processing on recognition of FTIR-MSP alteration of Heart tissue during mice fetal life

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Abstract

Introduction:

Understanding of fetus development is one of the most complicated with a great impact on Teratology. FTIR-MSP is among the most useful spectroscopy technique for biological and cellular application. In this project, various statistical calculations were used for recognition and discrimination of heart tissue spectra during 9.5-17.5 days of mice fetal life.

Method and Results:

The mice fetuses were dissected on day 9.5-17.5 of gestation and then fixed by fixative solution. Tissue sections (10 μm) were used for FTIR-MSP measurement in the wavenumber region of 4000-400 cm^{-1}. Spectra were preceded by baseline correction, smoothing, deconvolution and 2nd derivatisation. PCA, ANN and SVM have been used to find the most relevant modifications in during fetus development. PCA with adjusting data mass and seven selected major PCs have been used to find the most relevant modifications in different steps of mice fetus heart tissue development and also BP-FF ANN and SVM classifications could diagnose different steps of development up to 96.3% and 92.59% respectively.

Conclusions:

PCA, ANN and SVM methods could classify and discriminate the FTIR spectroscopic data and can be as a new potential tool for the teratogenic investigations.

Keywords: Mice fetus heart tissue, FTIR-MSP, ANN, PCA, SVM.