

Pulsed Photoacoustic Spectroscopy for Detecting Oral Cancer Early: a Pilot Study

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Photoacoustic spectra of serum samples obtained from normal volunteers as well as pre-malignant oral cancer subjects are recorded at 325 nm pulsed laser excitation. As a preliminary attempt, in the present study, 21 normal and 13 pre-malignant serum samples are used and using nearly 1 ml of the samples in a 1cm path length quartz cuvette of the photoacoustic cell, spectra are recorded in time domain with PZT- transient digitizer combination. The time domain PAS patterns are then converted into frequency domain patterns using MATLAB@R7 based Fast Fourier transform (FFT) tools. Subsequently, using 229 features of the frequency patterns of 10 normal and 10 pre-malignants selected through Recursive Feature Elimination (RFE), support vector machine (SVM) based discrimination analysis has been carried out. SVM training is performed using three different functions namely, linear, radial bias function (RBF) and polynomial kernels and the one with the least misclassification error is chosen and the model is validated using leave-one-out cross validation. The discrimination results obtained with RBF-SVM is very encouraging and have shown maximum sensitivity of 80 % and specificity of 100 % for an optimal subset of 115 features. The receiver operating characteristic (ROC) curve of the results is also plotted, showing encouraging performance of the analysis. The results will be presented and discussed during the conference.