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SEX DETERMINATION USING CONFOCAL RAMAN MICROSCOPE WITH CHEMOMETRIC METHOD FROM DENTAL SAMPLE AND CONFIRMATION BY AMELOGENIN GENE

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Abstract

Lack of evidence in DNA analysis for sex determination of dental samples, with burned teeth. Resulting in the field of forensic dentistry looking for alternatives in sex determination for personal identification efforts. One alternative is to use spectral analysis from the Raman Microscope Confocal with the chemometric method. This alternative method uses samples of 20 teeth from 10 male and female dental samples, which are then analyzed on the enamel, dentin, and pulp surfaces with Raman spectra and also gold standards in the form of amelogenin DNA analysis, accompanied by chemometric tests using machine learning in the form of principal component analysis, restricted Boltzmann machines, support vector machine and artificial neural network, and comparative analysis based on the dental surface and signal fragments in the form of full width at half maximum.

The results obtained the accuracy value of the artificial neural network and support vector machine comparison, namely 75% on the Dentin surface using artificial neural network principal component analysis and Enamel using support vector machine, radial basis function, restricted Boltzmann machines. This means that the enamel and dentin surfaces are potential areas that can be used to predict gender using the chemometric method. Analysis of signal fragments at wave numbers 920-1080 cm-1 with the main molecule (PO_4) symmetric stretching (960 cm-1) analyzed in the form of full width at half maximum has a p value of 0.001, this means that there is a significant difference between men and women based on signal fragments. The examination of the gold standard DNA amelogenin has the same results between men and women in each layer of teeth. It can be concluded that the analysis of the confocal raman microscope in sex determination with the chemometric method of dental samples confirmed by DNA amelogenin gene can be used as an alternative method of gender identification.

Keywords: *Raman, artificial neural network, support vector machine, restricted Boltzmann machines Amelogenin, dental sample.*

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