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Using Raman Spectroscopy to Investigate the Molecular Level Characteristics of Endometriosis*

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Endometriosis is a benign gynecologic disorder. It is particularly common among young women and may make pregnancy difficult. In this study molecular level characterization of endometriosis tissues were performed using Raman spectroscopy in combination with multivariate statistical analysis. Three hundred sixty-six Raman spectra recorded from different points of seventy two tissue samples, taken from the cyst walls of twelve patients were examined. Principle Component Analysis (PCA) followed by Linear Discriminant Analysis (LDA) were performed on the Raman data, and the samples were then classified into three groups; severe, moderate, and weak endometriosis. In the severe endometriosis group, the relative band intensities of DNA were increased. Moreover, increase in pyrrole moieties and kynurenine were seen. The results show that endometriosis severity correlates to increase in DNA concentration, and degradation of tryptophan due to increased indoleamine-pyrrole 2, 3-dioxygenase (IDO) activity, and an increase in kynurenine concentration and pyrrole intermediate. It is concluded that Raman spectroscopy is capable of providing a quick diagnosis, ahead of the pathology result being reported.

Keywords: Endometriosis; Raman spectra, PCA-LDA analysis.