Raju Botta, J Genet Mol Biol 2018, Volume 2

# TUBERCULOSIS DETERMINATION USING SURFACE ENHANCED RAMAN SPECTROSCOPY AND CHEMOMETRIC METHODS

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Recently applications of Raman spectroscopy have been increased to various fields, especially clinical diagnosis. Tuberculosis (TB) is one of the leading causes of mortality in the world. WHO estimated that 10.4 M people were detected as active TB and about 1.4 M people died in 2015. However, propagation of TB can be prevented by early diagnosis and treatments. Various methods have been used for diagnosis TB such as sputum smear microscopy (SSM), culture method, chest radiography, tuberculin skin testing, etc. The existing methods are poorly sensitive and time-consuming. So, there is a need to develop a rapid and sensitive method to detect TB. Surface enhanced Raman spectroscopy (SERS) is an alternative nondestructive method in terms of its rapid and sensitivity. Herein, two groups of serum protein samples, active TB (AT) and healthy control (HC) were selected for SERS analysis and spectra were measured with 785 nm laser. The measured spectra associated with vibrational modes of serum proteins. To analyze the data various multivariate statistical methods such as principal component analysis (PCA), support vector machine (SVM), decision tree (DT) and random forest (RF) were developed and tested their ability to discriminate the HC and AT samples. First two principal components (PC1, PC2) PCA scores showed clusters of AT and HC separately. A blind test has been done to validate the calibration model and test data currently falls under the same category. Results demonstrate the distinction between HC and AT samples.

## BIOGRAPHY

Raju Botta has received his PhD in Physics from the University of Hyderabad, India in 2016. He is working as Postdoctoral Researcher in Carbon-based Devices and Nanoelectronics Laboratory (CNL), National Electronics and Computer Technology Center (NECTEC), National Science and Technology Development Agency (NSTDA), Thailand. His main research interests are surface-enhanced Raman scattering (SERS), nanostructures fabrication, PVD techniques, sensing application in biomedical, environmental, agriculture and aquaculture.

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