Whole blood Raman spectroscopy Analysis for Myocardial Infarction

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Introduction

• The myocardial infarction (MI), is causative factor for higher mortality and morbidity, term depicts myocardial cell death due to prolonged ischemia. MI is caused due to the atherosclerotic plaque rupture in artery.

• Presently the diagnosis of MI is done with the help of electrocardiogram (ECG), Echocardiogram (ECHO), treadmill test (TMT), and coronary angiography (CAG) along with biomarker test (Troponin T test).

• Even in presence of some clinical diagnostic techniques for MI, there is a need for the early detection. A method which is reliable and affordable with minimum time delay in the diagnosis.

Methods and Materials

• Blood samples were collected from the cardiac patients at the time of hospitalization (before medication) and after patient is in medication (after medication) at Kasturba Medical College, Manipal.

• Whole blood Raman spectra were recorded using ~15mW Laser power, with 60 seconds exposure time and two accumulations.

• The plasma samples were recorded using ~45mW Laser power, with 60 seconds exposure time and two accumulations.

• Plasma Raman spectra were collected with different ratios of Laser power.

• Whole blood samples were collected from the patients and after 60 seconds exposure time.

Result and Discussion

• Lower BH4 availability.

• Higher Phenylalanine to Tyrosine ratio with inflammation and immune activation.

Conclusions

• Direct detection of BH4 in blood sample demands complex preanalytical procedures which limits its use in clinical application.

• In view of this, the phenylalanine to tyrosine ratio can be used as an indirect marker of BH4 availability, since it regulates the PAH enzyme activity. This indicates the diagnostic importance of probing phenylalanine to tyrosine ratio to evaluate the inflammation process occurring in cardiac patients.

Acknowledgement

The authors are thankful to Manipal Academy of Higher Education and DST for research facilities and Ms. Reena John is thankful to directorate of minority for the fellowship.

References