

LABEL-FREE EVALUATION OF HUMAN MYOCARDIAL INFARCTION USING RAMAN SPECTROSCOPY

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KEY WORDS: Raman spectroscopy, Myocardial infarction, Label-free evaluation

Myocardial infarction (MI) following ischemia is a major cause of mortality worldwide. In this study, we propose a label-free evaluation method of myocardial infarction (MI) in patients undergoing cardiac surgery by Raman spectroscopy[1]. We identify key signatures of Raman spectra for the evaluation of myocardial viability by evaluating the infarct border zone myocardium (Fig. 1a). We also obtain a prediction model to discriminate the non-infarcted myocardium and the infarcted myocardium by applying a multivariate spectral analysis, partial least squares regression analysis (Fig. 1b). The prediction model enables to visualize non-infarcted and infarcted region of MI as shown in Fig. 1c. These results suggest the potential of the Raman spectroscopic observation for noninvasive and label-free estimation of myocardial viability, and we expect that this method could become a key technique for cardiac surgery.

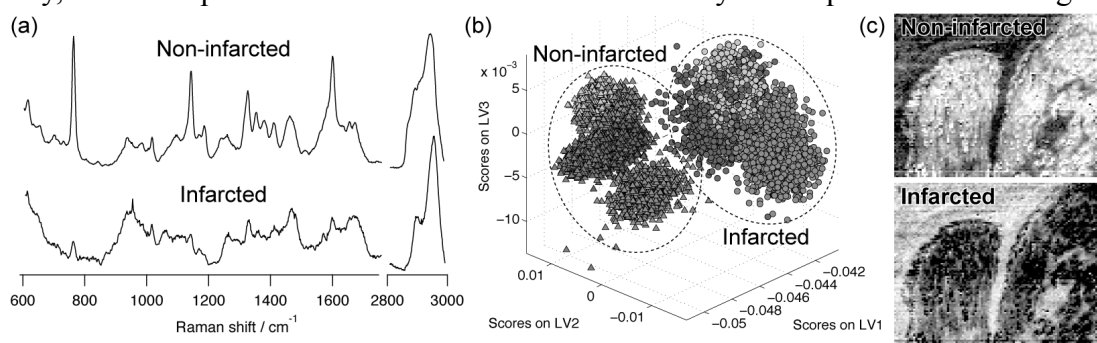


Fig. 1 Label-free Raman spectroscopic evaluation of human myocardial infarction. (a) Representative Raman spectra of non-infarcted and infarcted cardiac tissues. (b) Score plot of PLS-DA analysis. (c) A representative 2D Raman image of a marginal region of non-infarcted and infarcted myocardium.

[1] T. Yamamoto, T. Minamikawa, Y. Harada, Y. Yamaoka, H. Tanaka, H. Yaku, and T. Takamatsu, "Label-free evaluation of myocardial infarct in surgically excised ventricular myocardium by Raman spectroscopy", *Scientific Reports*, **8** (1), 14671 (2018)