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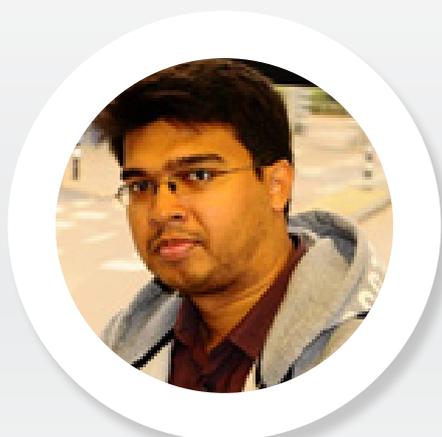
FT-IR and LA-ICP-MS imaging technology – a new collective tool for bio-molecular and elemental study of breast tissues

H&E images show the clear tissue morphology of healthy/control and tumor tissues. HER2 and ER test confirms the presence of tumor and differentiate from control. During FT-IR analysis, spectra and images of healthy/control, benign and malignant tissues of human breasts were obtained and have been determined and analyzed statistically. Several spectral differences were detected: (1) the A_{1650}/A_{1635} absorbance ratio was the highest for fibro adenoma and carcinoma tissues; (2) the A_{1680}/A_{1650} absorbance ratio decreased significantly in the order of control>benign>malignant; (3) the frequency of the α -helix amide I band decreased for the malignant tissue, while the corresponding β sheet amide I band frequency increased; (4) there was significant shift in amide I and amide II bands in malignant breast tissue comparing to control and benign tissue; the A_{1083} absorbance was significantly higher for the malignant than for the other types of tissues; (5) the bands in the region 3100-2975 cm^{-1} shifted to lower frequencies for the malignant tissues. In comparison with the benign samples, the characteristic changes of malignant ones mainly involve: the prominent bands 1650 and 1550 cm^{-1} due to the proteins in the α -helical and the unordered-random-coils substructures become stronger compared to those in the β -sheet and the turns substructures, suggesting that the former type of proteins increase in content in contrast to the later. The phosphodiester band 1083 cm^{-1} of the nucleic acids becomes strongest on cancer tissues spectra and its area ratio to the amide II band 1548 cm^{-1} rises greatly, indicating that the DNA content rises remarkably. Additionally, LA-ICP-MS was used in order to observe the role of different elemental composition in breast malignancy. Significant accumulation of Fe and Zn was observed in the affected area of the malignant tissue which indicates lower risk of cancer because iron and zinc are crucial contributors for cell proliferation and hormone deficiency. The absence of sufficient reliable methods for early detection of cancers requires a search for new and more effective techniques for screening and prevention. The discovery and introduction of appropriate techniques to test risk groups would increase the chances of successful treatment and subsequently reduce mortality, therefore we propose to take FT-IR and LA-ICP-MS imaging into consideration for the development of new vista as cancer diagnostic tools

Biography

Fazle Rakib was graduated from Qatar University majoring in Environmental Sciences. He has received Best Poster Award for his under graduate level. He is currently specialized in Bio-spectroscopy and has three publications.

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