THE UNIVERSITY



OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING AND MEDICAL ENGINEERING PROGRAMME

SEMINAR

- Title:A Dual-Spectrum IR Imaging Approach for Quantifying the
Functional Changes of Breast Cancers
- Speaker: Professor Chung-Ming Chen Director of the Institute Institute of Biomedical Engineering National Taiwan University Taipei, Taiwan

Date: April 20, 2015 (Monday)

Time: 9:00 a.m.

Venue: CPD-2.37, Centennial Campus, HKU

Anatomic and functional changes are two intrinsic phenomena which might be observed in a growing breast cancer or in the chemotherapy response of a breast cancer. While both of them may show the same tendency during the growth or the chemotherapy course of a breast cancer, it is not rare that one of them reveals more informative trend than the other. It suggests that the anatomic and functional changes be complimentary indicators in the assessment of tumor growth and chemotherapy response of breast cancers. Nevertheless, functional change has not received sufficient attention tantamount to its crucial role, which is irreplaceable by anatomic change. Most modern clinical practice for breast cancers mainly rely on the anatomic information provided by such medical imaging modalities as mammogram, breast ultrasound, and breast MRI. Although functional change of a breast cancer may be observed by a nuclear medical imaging modality, e.g., PET, the inherent radiation hazard and high check-up cost have prevented them from being widely used in screening and chemotherapy response monitoring of breast cancers.

To provide a hazard-free and cost-effective imaging modality for observing the functional change, in this talk, we present a new parametric infrared imaging approach for longitudinal screening and chemotherapy response monitoring of breast cancers. Infrared imaging has been long-time considered as a promising imaging modality capable of revealing functional change of breast cancers. However, with more than 50 years of efforts, IR imaging remains controversial as a diagnostic tool of breast cancers. One of the main problems is that it is not easy to remove the physiological and environmental influences inherently in IR imaging. Moreover, it is hard to assess the local functional change measured at different time because longitudinal registration of two IR images is a difficult task due to the lack of anatomic landmarks on the breasts.

The proposed parametric infrared imaging approach is composed of three major algorithms, namely, longitudinal IR image registration algorithm, longitudinal temperature normalization algorithm, and heat pattern separation algorithm. The longitudinal IR image registration algorithm makes it possible to carry out the assessment of functional change for each pixel on a breast. The longitudinal temperature normalization algorithm greatly removes the linear influence of the physiological and environment factors on the breast surface temperature. The separation algorithm decomposes the heat emitted from each pixel into the contributions from the high-temperature and normal-temperature tissues. The contribution from the high-temperature then serves as the parameter to quantify the functional change of breast cancers. With more than 70 subjects involved, the results of the clinical trial on chemotherapy response monitoring showed that the proposed parameter and the SUV_{max} of breast PET had the same variation tendency for 90% of subjects. It suggests that proposed approach has the potential to be used as a tool of chemotherapy response monitoring for breast cancers.

ALL INTERESTED ARE WELCOME.

For further information, please contact Prof. Min Wang at 2859 7903.