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Identification of blood-based molecular signatures to detect early human hepatocellular carcinoma

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Tumor recurrence and metastases are the major obstacles to improve the prognosis of patients with hepatocellular carcinoma (HCC). In this presentation, we will describe the identification of blood-based diagnostic and prognostic biomarkers that surpass existing clinicopathologic factors in gauging the risk of early recurrent disease in patients with HCC and the development of HCC in high-risk CHB patients.

To identify novel molecular signatures associated with HCC recurrence and metastases, we have established an expression database of HCC patients using Affymetrix gene chips. Samples from patients with early recurrent disease were compared with non-recurrent human HCC tissue samples (recurrence is defined as recurrent disease occurring within a 2-year time point of the original treatment). Novel biomarkers associated with early HCC recurrence have been characterized and are being employed as diagnostic markers for early recurrent disease.

Metastasis that is responsible for the majority of cancer-related deaths is initiated by cancer cells that are shed and disseminated through the circulation from the primary tumor to distant organs (circulating tumor cells, CTCs). Although the detection of CTCs may have important prognostic and therapeutic implications, their detection poses key technical challenges because their numbers can be very small. Great efforts have therefore been made toward the enhancement of signal amplification to significantly increase the sensitivity for the detection of tumor-specific biomarkers on the surface of CTCs. In this presentation, I will also present a dual signal amplification immunosensing strategy that has the potential to offer high sensitivity and specificity for the detection of low-abundance tumor cells. High sensitivity is achieved by using graphene to modify the immunosensor surface to accelerate electron transfer and quantum dot (QD)-coated silica nanoparticles as tracing tags. On the other hand, high specificity is obtained by the simultaneous measurement of multiple HCC-specific biomarkers, identified through the microarray studies, on the cell surface of CTCs using different QD-coated silica nanoparticle tracers.

In summary, the presentation will cover some of our effort to identify novel biomarkers to diagnose early HCC and the development of novel strategies to couple some of these biomarkers to enable the detection of low abundance circulating tumour cells.

Biography

Kam Man Hui is a Professor at Division of Cellular and Molecular Research, National Cancer Centre, Singapore. He is also a Adjunct Professor, Program in Cancer & Stem Cell Biology, Duke-NUS Graduate Medical School, Singapore; Adjunct Professor, National University of Singapore, Department of Biochemistry, Yong Loo Lin School of Medicine; Adjunct Research Director, Institute of Molecular and Cell Biology, A*STAR, Biopolis, Singapore; Adjunct Senior Investigator, Singapore Bioimaging Consortium (SBIC), A*STAR, Biopolis, Singapore. He has completed his Ph.D., Immunology, Northwestern University School of Medicine, Chicago, USA. He is a fellow of The Royal College of Pathologists, FRCPath UK.

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