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Big data analysis for revealing the gene-gene interactions in cancer cells

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We have achieved a breakthrough in the cancer genomics by developing a novel big data analysis platform for analyzing the interactions among genes. A threshold was identified to define a strongly co-expressed gene network with the best coherence to neoplasm phenotype. The genome-wide co-expression structure in the normal state was stronger than that in chronic myelogenous leukemia (CML). Conversely, more links between Nucleophosmin 1 (NPM1) and BCR-ABL-related pathway were noted in CML. Normal-specific network showed dissociation of NPM1 with ribosomal proteins (RP) while CML-specific co-expressions rendered a large network connecting NPM1 to RP genes. Deregulated RPs with their associated oncogenes and tumor suppressor genes may be involved in tumor progression. We thus customized a panel of 174 RPs and their associated oncogenes and tumor suppressor genes which their expression in formalin fixed paraffin embedded breast tumor and adjacent normal breast ductal tissue samples were measured using NanoString nCounter technology which has superb sensitivity, technical reproducibility and robustness for analysis of mRNA gene expression in formalin-fixed paraffin embedded tissue samples. Our results showed that targeted RP genes with their associated oncogenes and tumor suppressor genes expression can clearly distinguish breast tumor and their adjacent normal breast ductal samples into different groups using NanoString nCounter technology.

Biography

Benjamin Yat Ming Yung has obtained his PhD in Pharmacology from Baylor College of Medicine. He did his Postdoctoral training in the Lab of the Nobel Laureate Arthur Kornberg at Stanford University. He is currently Chair-Professor of Biomedical Sciences. For the past 30 years, he has systematically explored the biological role of NPM in cancer. He has published over 100 scientific papers that cover broad range of scientific disciplines and techniques. His achievements and recognitions are reflected in many prestigious awards including Outstanding Researcher Award, Outstanding Cancer Research Award and Ministry of Education Outstanding Teacher Award.

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