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Analytica-2015 : Hyper-multicolor high-content cellular assay based on quantum dot nanoprobe - Joon Myong Son - Seoul National University

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High-Content Cell-Based Assay (HCA) has attracted great attention due to its ability to be used in the drug discovery-driven research and development required to understand the functions of genes and gene products at the level of the cell. HCA simultaneously measures multiple biomarkers in a single cell with multiplexing fluorescent probes. The complex intracellular responses involved in drug-induced efficacy or cytotoxicity can be observed in organ-specific cells by HCA. Application of HCA to organ-specific cell models provides deeper biological information suitable for better decisions on progressing compounds. Early safety evaluation by HCA reveals the complex cellular responses triggered by potentially harmful molecules in the cells of target organs. Gaining a deep understanding of the mechanisms underlying these cellular toxicological responses is valuable before a series of lead compounds are progressed to time-consuming and expensive animal tests. Despite HCA's capability, it is not common to simultaneously observe many biomarkers in an intact cell. This is because HCA measurement is dependent on the use of probing materials. Concurrent monitoring of multiple biomarkers is practically limited due to the spectral overlap among probing materials having broad absorption and emission spectrums. Quantum dot-based HCA is capable of supplying cellular imaging at particular wavelengths and each wavelength can be scanned rapidly. This cellular imaging is very advantageous in that it can select particular wavelengths that do not overlap among the probing materials and concurrently monitor a large number of drug targets or biomarkers.

Semiconductor Quantum Dots (QD) are little nanoscale particles that have remarkable optical properties like size-tunable light emanation, high brilliance, photostability and concurrent excitation and checking of various hues because of tight outflow extend. High-content cell-based test (HCA) has pulled in incredible consideration because of its capacity to be utilized in the medication revelation driven innovative work required to comprehend the elements of qualities and quality items at the degree of the cell. HCA at the same time gauges numerous biomarkers in a solitary cell with multiplexing fluorescent tests. The complex intracellular reactions engaged with tranquilize initiated adequacy or cytotoxicity can be seen in organ-explicit cells by HCA. In spite of HCA's ability rarely to at the same time watch numerous biomarkers in an unblemished cell. Simultaneous observing of various biomarkers is for all intents and purposes restricted because of the ghastly cover among examining materials having expansive retention and emanation ranges. QD-based HCA is exceptionally invaluable in light of the fact that it can give specific frequencies that don't cover among the testing materials and simultaneously screen a bigger number of medication targets or biomarkers. In this work, QD-based HCA has been examined to recognize malignancy immature microorganisms actuated by Benzo[a]pyrene (BP).

It was discovered that bosom CSCs were producedfrom MCF-7 cells by BP-actuated change. Bosom CSCs wereobtained utilizing attractive globule based arranging from MCF-7 cells and identified throughhigh-content observing of three distinct markers CD44, CD24 and aldehyde dehydrogenase1(ALDH1) utilizing the QD-based HCA. The BP-actuated change was quantitatively watched by means of assimilation spectra of BPDE-DNA adducts. MCF-7 cells were treated with BP at various focus 0.2µM, 2µM, 5µM and 10µM for 24hr. The resultant CSCs in the whole MCF-7 cellswere resolved to be 0.35±0.032%, 0.45±0.038%, 0.55±0.075%, 1.02±0.28% and 1.19±0.27% in charge, 0.2µM, 2µM, 5µM and 10µM individually.

Ends: QD-based HCA was worthwhile for the identification of CSCs instigated via cancer-causing agents, for example, benzo[a]pyrene. Otherworldly cover among tests of CSC biomarkers could be dispensed with and analytic exactness could be incredibly improved, contrasted and the ordinary FACS.

Biography

Joon Myong Song received his PhD in 1997 at Kyushu University, in Japan. He worked as a Postdoctoral Research Fellow from 1998 to 2004 at Iowa State University, Brookhaven National Laboratory, and Oak Ridge National Laboratory in United States. At present, he is a Professor and Head of Department of Pharmacy at

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College of Pharmacy School, Seoul National University in South Korea. His research area includes multifunctional nanoparticle for diagnosis and therapy and high-content cell-based drug screening and diagnosis using hyper-multicolor cellular imaging. He has published 84 peer reviewed papers in the top journals, 7 book chapters, and 10 patents.

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