Cell-to-cell interaction of a mouse dendritic cell and a mouse melanoma cell studied within a microfluidic chip

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Long-term monitoring of biochemical changes on a single cell has provided new information about unusual cellular response to reagents. A microchip device that was fabricated with a cell retention chamber allows selection, retention and shuttling of a single biological cell for long-time analysis. Excellent optical and fluorescent observation of the single cell have been simultaneously achieved. We previously reported this microfluidic method for the analysis on single multi-drug resistance (MDR) leukemia cells because MDR-mediated drug efflux is known to be a major cause of the failure of chemotherapy. This measurement method is dubbed as the same-single-cell analysis (SASCA), which takes advantages of tracking one and the same cell over a long period of time. This method is now employed to study cell-to-cell interaction in cancer research using the mouse cell model. In Australia, melanoma is the most common cancer in the 15-44 year age group and accounts for 3% of all cancer deaths. Queensland has the highest incidence rate of melanoma in the world. The murine melanoma B16OVA has been used as a model to determine in what form of cell-derived tumour antigen is cross-presented to murine dendritic cells (DCs). In this study, we have trapped one DC2114 cell in the microfluidic biochip and then bring a second type of cell (i.e. B16OVA) in close proximity to the first cell. The cell-to-cell interaction is then fluorescently imaged to show the time-course changes. We envision this study will provide insight into the mechanism of antigen cross presentation.

Short Biography of the presenter:

Dr. Paul Li obtained his Ph.D in the University of Toronto in 1995. Then he developed the microfluidic lab-on-a-chip at the University of Alberta and City University of Hong Kong. Dr. Li joined Simon Fraser University in 1999, and became full professor in 2010. Dr. Li conducted microfluidic single-cell analysis for analyzing the effects of chemical compounds on individual cancer cells. Dr. Li has published a monograph: Fundamentals of lab on a chip for biological analysis and discovery. He is associate editor of the international journal called “Canadian Journal of Pure and Applied Sciences”. Dr. Li is the inventor of 4 granted patents and 5 pending patents, and he is the founder of ZellChip Technologies Inc. specializing in microfluidic-based instrument for cellular and DNA analysis.