Experimental design for analysis of trapped single-cell on microfluidics

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Single cell unit analysis is essential to understand mechanisms such as disease, drug experiments, basic cell biology, and toxicology. However, most existing single-cell assays have some limitations of their specificity, accuracy and selectivity by the external environment. Microfluidics overcomes these limitations, implementing cell analysis, real-time screening, and large number of single cell searches within a highly controlled and customized environment.

Here, we report an experimental design of analysis for trapped single-cell on microfluidics. The microfluidic device consists of an array of micromechanical traps which trap the cells in a low shear stress region. We investigated the frequency of trapping of single cells with different intervals, widths in the trap array, and several types of cells.

Furthermore, we integrated a microfluidic device with a gradient generator to form chemical fluid gradients. Thus, this microfluidic device can be used to monitor two different types of drugs in a single cell at various concentrations. We anticipate that this device facilitates single cell analysis with high throughput drug screening.