Imaging and Sequencing Single Cells

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Quantitative cellular imaging probes morphological phenotype and molecular composition at the single-cell level. Meanwhile recent advances in high-throughput sequencing have enabled a number of single-cell genomic measurements including whole-genome sequencing, whole-transcriptome profiling, and even epigenetic characterization of single cells. Both imaging and sequencing can uncover heterogeneity in cellular populations that would otherwise be obscured in ensemble measurement and can be used to quantify cell state during differentiation. However, in order to infer the relationship between genomic state and morphological phenotypes, it is necessary to image and sequence the same single cell. Here we discuss a suite of microfluidic platforms to couple imaging and sequencing of single cells and we present recent developments on how to analyze large, multimodal, single-cell datasets.