Advancements in microwell-based single-cell analysis technology allow high-throughput capture and pr

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Progress in our ability to sensitively characterize cells at the single-cell level has stemmed from the advancements in single-cell RNA-seq technology. This technology has allowed us to profile gene expression of individual cells within heterogeneous cell populations. However, there have been challenges with this technology. For example, cell recovery can readily be compromised, especially with cells that are fragile. Additionally, attempts at capturing high numbers of cells also result in high multiplet rates, such that the transcriptomes of two or more cells are captured together and are unable to be deconvoluted, rendering those cells unusable for analysis. Here, we showcase advancements to the current BD Rhapsody™ Single-Cell Analysis System that enables simultaneous capture of up to 320,000 cells within an 8-lane microwell cartridge for a single experiment for various cell types and cell size ranges (5 µm to 20 µm), while still maintaining low multiplet rates. Specifically, we highlighted the flexibility and accuracy of the technology by loading each of the 8 lanes with cell numbers ranging from 100 to 40,000. For each lane, different cell types were combined after antibody-based sample multiplexing, which enabled us to evaluate multiplet rates and lane-to-lane contamination. Our data show for 40K cells there was a multiplet rate of ~6% and no contamination between lanes. Additionally, there was a high correlation of targeted gene expression across all lanes. In another experiment, we tested the ability to capture fragile cells in the 8-lane cartridge while benchmarking metrics against our on-market single-lane cartridge. For this, neutrophils, NK cells and T cells were isolated and loaded in the 8-lane cartridge. We found a capture rate of >60% from viable cells, similar to rates from our single-lane cartridge. Together, these data demonstrate the feasibility, flexibility and reliability of using this newly developed high-throughput single-cell analysis system from BD.