

Enhancing Core Lab Capabilities in Single-Cell Multi-Omics with Levitation Technology

The Imperial Genomics Facility (IGF) at Imperial College, London, UK, supports translational research for the scientific community both within and beyond the university. They provide a range of genomics services to their collaborators including next generation sequencing, spatial analysis and single-cell sequencing. While the IGF team is dedicated to their collaborators’ success, they face a significant challenge in the variability of sample quality, particularly regarding viability percentage and the presence of debris for single-cell transcriptomic and DNA assays. Occasionally, they advise aborting projects to prevent generating unusable data from low-quality samples, thus avoiding wasting valuable resources from their collaborators.

In January 2023, the team integrated the LeviCell® 1.0 system into their lab workflow to enhance their collaborators’ ability to produce high-quality data, regardless of initial sample quality. This system has provided the team with a solution for swift sample quality improvement within their own lab, requiring no technical expertise and compatibility with various samples and cell types.

*“The LeviCell 1.0 system enables us to offer our collaborators a **solution for low-quality samples** that need viability improvement before single-cell analysis. This process can be swiftly executed in our core lab, effectively eliminating dead cells and debris that might otherwise compromise downstream data quality.”*

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An example of the IGF team’s capabilities post-LeviCell platform adoption involves rescuing a dissociated liver sample from a mouse, initially with a viability

KEY HIGHLIGHTS

- Levitation Technology is a go-to enrichment method for improving sample and data quality
- Overcome sample quality limitations, empowering researchers with the latest genomics solutions
- Cell multiplexing allows increased throughput in sample processing, lowering cost and saving time

of only 41%, reaching a final viability of 86% with Levitation Technology™. Without viability enrichment, this sample would have been deemed unsuitable for scRNA-seq analysis—an outcome made possible solely through the LeviCell system’s unique methodology.

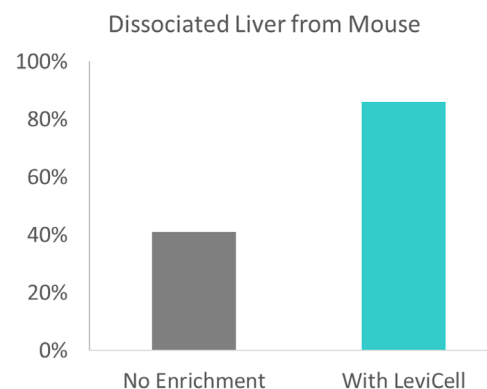


Figure 1: Marked improvement in viability after using the LeviCell 1.0 system. The mouse liver cell suspension was run on the LeviCell and viable cell percentages improved from 41% to 86% to meet scRNA-seq QC targets.

Moreover, the LeviCell system demonstrates remarkable versatility in the lab, seamlessly integrating with multiple single-cell applications. The IGF team employs cell hashing to optimize single-cell experimental costs, using lipid-conjugated oligos for

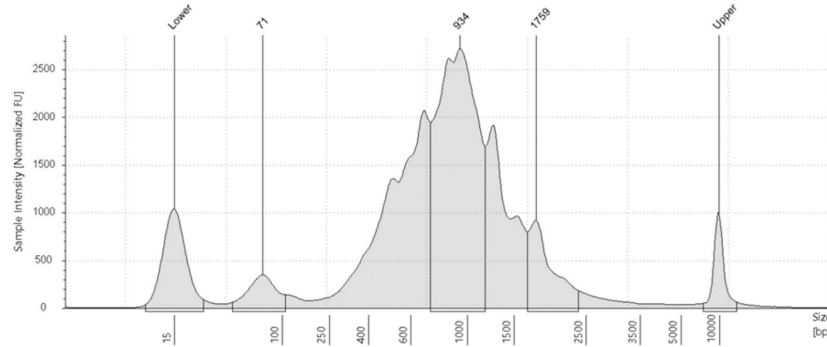


Figure 2. Tapestation trace results of the dissociated liver sample after LeviCell viability enrichment. The results obtained match what is observed with a high-quality sample.

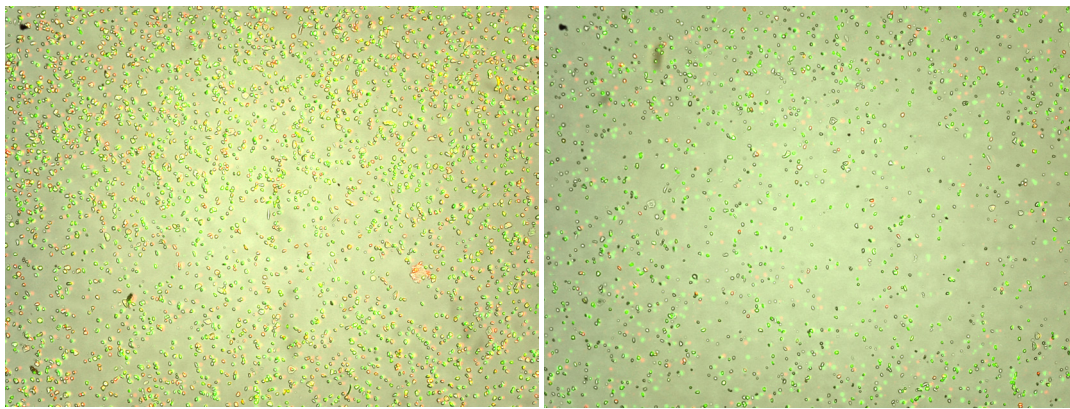


Figure 3. Before (left) and after (right) LeviCell viability enrichment on the hashed keratinocytes. The pooled sample is AO/PI stained to distinguish live (green) and dead (red) cells (Project 1). The increase in viability from 50% to 80% after the LeviCell run observed in Fig. 3 does not consider the removal of debris, which is not quantified in cell viability measurements. Debris visible in the left image may inadvertently affect the quality of data in single-cell analysis.

multiplexing different samples into a single sequencing reaction. Following cell multiplexing with the 10x Genomics Cell Multiplexing Kit*, LeviCell enrichment is applied to the pooled samples to eliminate dead cells and debris. Across two distinct projects, the team consistently obtained high-quality data using this approach.

| | Sample Type | Starting viability | Final viability |
|-----------|--|--------------------|-----------------|
| Project 1 | Hashed single-cell library with 3 frozen human keratinocyte samples | 50% | 80% |
| Project 2 | 13 hashed single-cell libraries with 10 frozen human PBMC samples each (130 total samples) | 60-70% | 90% |

By adopting the LeviCell platform and Levitation Technology, core labs such as the IGF at Imperial College can empower their collaborators to access cutting-edge technology and overcome sample quality limitations. This workflow solution uniquely enables new service capabilities and a broader spectrum of samples to be run in any core facility. Low-quality samples no longer hinder research progress — they no longer have to be sacrificed or turned away. Make use of every precious sample using the LeviCell systems and embark on a path of discovery with single-cell analysis.

* Chromium Next GEM Single Cell 3’ v3.1: Cell Multiplexing