RESEARCH SNAPSHOT

LeviCell vs. FACS: Delivering Pure, Viable, Clean Cells for Transfection Workflows

Overview

Transfection (the process of introducing nucleic acids into eukaryotic cells by either biological, chemical or mechanical means) is a cornerstone tool of research and has helped resolve some of the most fundamental questions in biology[1]. However, like any tool, its use comes with known challenges such as cell death from the transfection process and the need for workflow optimization based on cell type.

In most transfection workflows, the primary limitation is low efficiency of the protocol and the significant negative effects it has on most cells[2]. To circumvent these issues, successful transfection require a starting cell population with high-purity and viability, a robust posttransfection cleanup step that does not damage or bias the surviving cells, and a workflow that can accommodate a wide range of cell types, including the most sensitive and difficult ones.

Elevate Transfection Protocol with the LeviCell System

The **LeviCell system**, a label-free and bias-free solution for sample processing, addresses all of these challenges through fast, simple, and extremely gentle live cell enrichment. In addition to time savings due to a simple 3-step workflow, the LeviCell also offers the following key benefits for any transfection workflow:

1. Increased viability of starting cell population
2. Increased purity and yield of transfected cells
3. Maintenance of original cell representation

Maximize Cell Viability of Starting Cell Population

Conventional enrichment protocols often require the use of labels, beads, high pressure or ultracentrifugation, which can affect cell health, trigger cell death or introduce bias. Further, in some cases, available cells can be low in number or variable from sample to sample. In Figure 1, six sample sets were processed with the LeviCell system to determine impact of enrichment on cell viability. The inputs ranged from 20,000 to 1,000,000 cells, and all six had post-enrichment viabilities > 90%, which meets the minimum requirements of most transfection protocols. The LeviCell system uses intrinsic cellular characteristics to separate and enrich for cells of interest.

KEY HIGHLIGHTS

- Post-enrichment viability in six sample sets increased 4X to >90% with LeviCell enrichment
- Post enrichment yields are 3X greater using Levitation
- Population ratios maintained in cells within CD45+ lymphocyte population

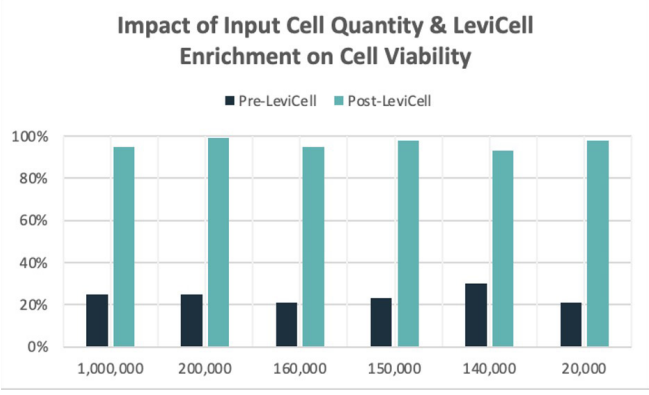

Figure 1. Enrichment with LeviCell system increases viability by 4X, with final viabilities > 90%.

Increase Purity and Yield of Posttransfected Cells

Post-transfection enrichment increases purity and yield while eliminating toxic leftovers (chemicals, dead cells, debris), all of which can retard post-transfection recovery and expansion efforts. In Figure 2, two different enrichment methods were compared and the final yields plotted. The LeviCell system delivered 3X greater yields than conventional methods, while simultaneously removing dead cells and debris.

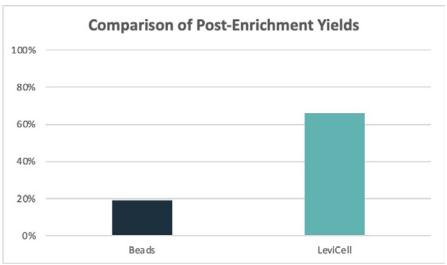

Figure 2. LeviCell system delivers 3X greater yield than conventional magnetic bead enrichment.

Maintain Original Population Ratios

Unbiased enrichment ensures that the original cell population diversity is fully maintained. Following transfection, cell populations require days to weeks for recovery and viability improvements, during which time differential doubling times create significant shift in dominant clonotype. Ideally, viability needs to be improved sooner, without any unintended change in the relative cell populations. In Figure 3, the percentage of three cells within a CD45+ lymphocyte population were measured pre- and post-enrichment, and found to be similar, confirming the original population representation was preserved.

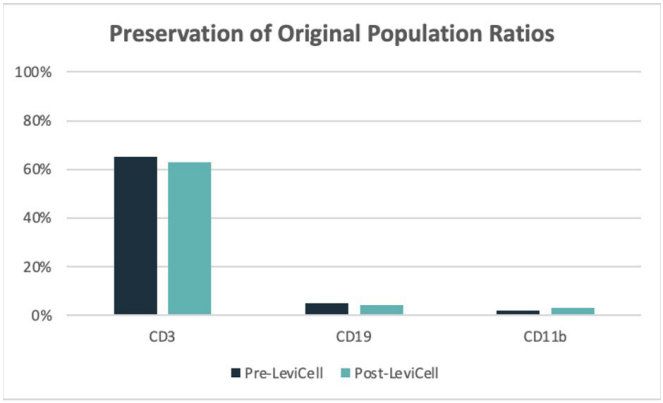

Figure 3. CD3+, CD19+ and CD11b+ cells within a CD45+ lymphocyte population showed similar ratios pre and post-enrichment with the LeviCell system.

With the LeviCell system, the overall efficiency of your transfection workflow can be improved while post-transfection expansion and cell recovery can be accelerated. Enrichment at both ends of the transfection workflow maximizes cell health, viability and purity, enabling you to overcome low transfection efficiency.

References

1. Kim TK, Eberwine JH. Mammalian cell transfection: the present and the future. Anal Bioanal Chem. 2010;397(8):3173-3178. doi:10.1007/s00216-010-3821-6

2. Chong ZX, Yeap SK, Ho WY. Transfection types, methods and strategies: a technical review. PeerJ. 2021;9:e11165. Published 2021 Apr 21.doi:10.7717/peerj.11165

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