

TECHNICAL NOTE | New LeviCell S2.3 Cartridge: Best Visualization and Same Superior Cell Enrichment

Overview

LevitasBio has built a solution for cellular enrichment and characterization around proprietary magnetic levitation technology where highly viable cells are separated and enriched from dead or dying cells in a label-free manner. At its core, this technology is driven not only by the LeviCell™ instrument itself, but through its single-use consumable, the LeviCell cartridge. The cartridge design has been recently updated, and the new LeviCell S2.3 cartridge is now available. The S2.3 design offers better visualization of levitating cells which enables powerful sample characterization through advanced software analytics while providing equivalent performance in sample enrichment.

Design

In the new LeviCell S2.3 cartridge, design modifications were made to improve optical imaging characteristics. The clarity of imaging in the separation channel has been enhanced, and prismatic effects are reduced. Samples can be now analyzed more simply, independent of actual levitation height, to determine their levitation profile.

Experiment

To demonstrate comparability between the two cartridges, we evaluated their performance through enrichment of three different cell types, two cell lines (H358 and Jurkat cells), and a primary cell type, PBMCs. These samples were selected to represent a range of characteristics across common cell types, including cell size and cell adhesion. In each case, an initial cell population with ~35% viability was created by taking an aliquot of highly viable cells, artificially killed with 70% ethanol, and subsequently mixed with a separate aliquot of highly viable cells to bring that starting viability up to 35%. Each sample was then processed with the LeviCell instrument under standard run conditions for viable cell enrichment (150 mM levitation agent and 20 minutes levitation time). Upon run completion, the enriched cells in the output well was collected, stained with Acridine Orange/Propidium Iodide (AO/PI), and assessed via cell counting with a Nexcelom cell counter.

In Figure 1, the starting (input) and final (output) viabilities from all 3 different cell types and the two cartridges are plotted. Post-enrichment, viabilities increased from 35% to greater than 90% across all 3 cell types. More

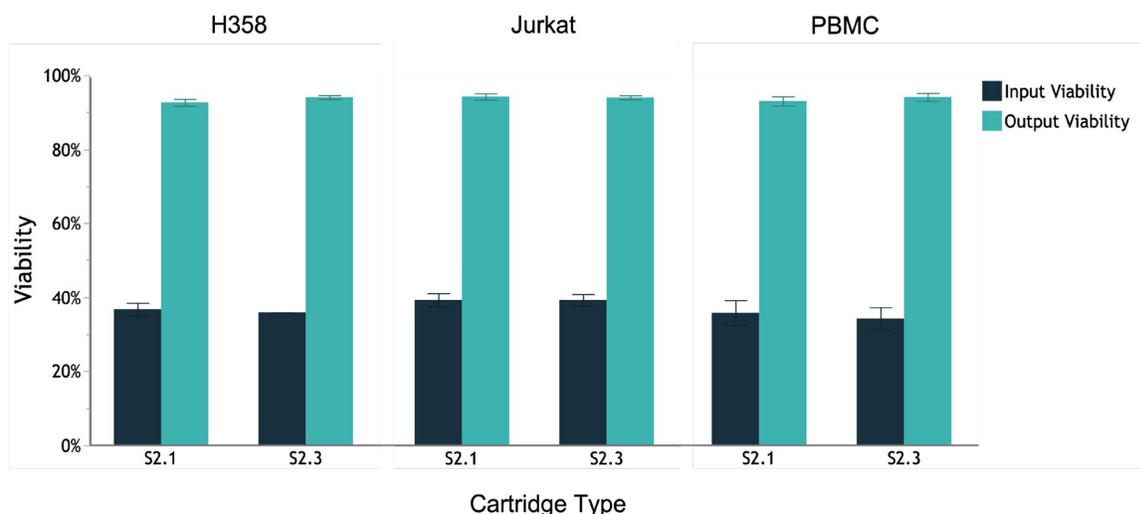


Figure 1. LeviCell S2.1 and S2.3 cartridges demonstrate comparable viability performance. Replicates of three different cell types (H358, Jurkat and PBMCs) were prepared with initial starting viability of ~35%, split between the two cartridges, and enriched for viable cells using the LeviCell system. Input and output viabilities between the two LeviCell cartridges are similar, demonstrating performance comparability between the two designs.

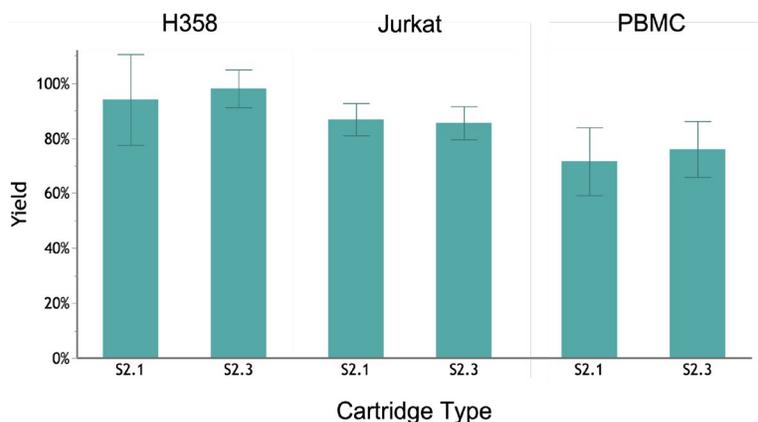


Figure 2. Yield recovery is comparable between the two LeviCell cartridge types. Three different cell types were prepared with initial viabilities of ~35-40%. Each sample was processed in replicates and enriched for viable cells using either the S2.1 or S2.3 cartridges. The yield of live cells, calculated as the number of output live cells divided by the number of input live cells, is shown here.

importantly, there was no observed difference in final viabilities between the original S2.1 cartridge and the new S2.3 cartridge.

In addition to viability, post-enrichment yield was also assessed and plotted in Figure 2. Here, the Jurkat cells had similar yields while the new LeviCell S2.3 cartridge demonstrated a slight increase for both the H358 cell line and PBMCs.

To ensure that the two cartridge types perform similarly across different instruments, a second experiment was conducted in which only one cell type was used. Here,

Jurkat cells were prepared in the same manner as the first experiment - by adding 70% ethanol to artificially kill a portion of cells in order to bring the starting viability down to 35%. The modified samples were then processed using either the S2.1 or S2.3 cartridge on 3 different LeviCell instruments. Viabilities and final yields were assessed across all 6 runs, and plotted accordingly in Figures 3 and 4. In Figure 3, there were no discernible differences in final viabilities across all the runs. In Figure 4, slight variations were observed in final yield, likely attributed to the smaller sample size, but all results were within the accepted range.

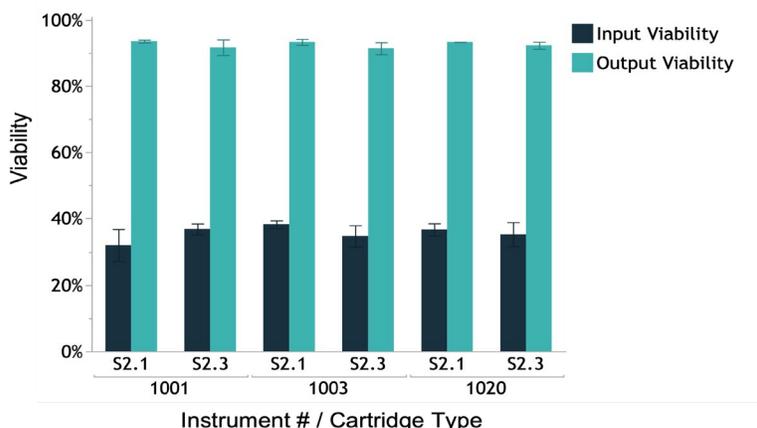


Figure 3. Viability measurements are comparable across different LeviCell cartridges and instruments. Jurkat cells were prepared with an initial starting viability of ~35% and enriched for viable cells. Each sample was processed in replicates and tested on both LeviCell cartridges and three different LeviCell instruments.

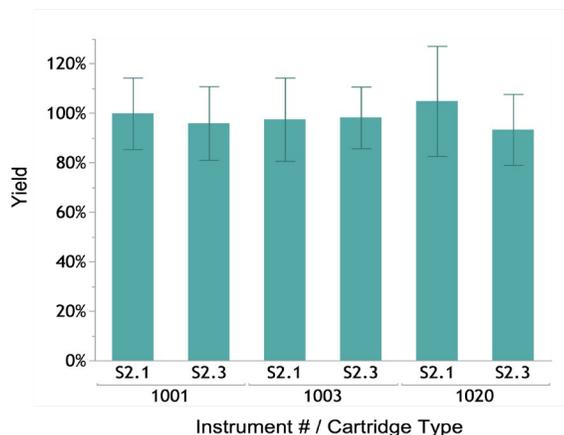


Figure 4. Yield recovery across different cartridges and instruments show consistent results. Jurkat cells were prepared with an initial viability of ~35%, and enriched for viable cells with a LeviCell S2.1 or S2.3 cartridge types. This experiment was replicated across three different LeviCell instruments (serial numbers 1001, 1003, and 1020).

Conclusion

These experiments confirm that the new LeviCell S2.3 cartridge delivers the same superior performance in viable cell enrichment as its predecessor, the LeviCell S2.1 cartridge. Consistent and reliable performance was seen across multiple instruments for both cell viability and yield recovery, further showcasing the robustness of our LeviCell system and Levitation Technology. With this ability to achieve better sample visualization, the new LeviCell S2.3 cartridge delivers more sample insights to help elevate your downstream studies.

For more information, visit levitasbio.com/levicell

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