

Reliable Cell Counting with Superior Reproducibility Using the LUNA-III™ Automated Cell Counter

INTRODUCTION

In biotechnology research, accurate cell counting is essential for maintaining experimental integrity, as discrepancies in cell counts can lead to significant variations in results. Consistency and reproducibility are particularly important in processes such as cell therapy production, quality control, and biomanufacturing, where precise cell quantification is crucial for ensuring product quality and meeting regulatory standards. The LUNA-III™ automated cell counter offers an affordable solution for researchers, providing precise and reliable cell counts. This study evaluates the LUNA-III™'s performance, focusing on its ability to deliver consistent results both within a single device and across multiple devices, addressing the importance of minimizing variability in experimental workflows.

MATERIALS AND METHODS

The DEFAULT protocol of the LUNA-III™ was used for all cell counts. To assess intra-deviation, three different LUNA-III™ devices counted the beads seven times following standard quality control procedures. Inter-deviation was evaluated by testing five different LUNA-III™ devices. All assessments were conducted using LUNA™ Standard Beads (Cat No. B13101) loaded onto LUNA™ Cell Counting Slides.

Intra- and Inter- deviation of the LUNA-III™

As shown in Table 1, the results were consistent across all measurements, with similar total cell concentrations, average cell sizes, and total cell numbers. The slight variations, with CV values around 1 %, may result from re-inserting the LUNA cell counting slide during repeated cell counting measurements using the devices.

Repeat	Device 1			Device 2			Device 3		
	Cell concentration	Cell size	Cell count	Total Cell Concentration (cells/mL)	Avg. Cell size (µm)	# Total cells	Total Cell Concentration (cells/mL)	Avg. Cell size (µm)	# Total cells
1	1.69.E+06	10.4	745	1.71.E+06	10.2	747	1.69.E+06	10.4	748
2	1.69.E+06	10.4	742	1.70.E+06	10.3	752	1.67.E+06	10.5	740
3	1.70.E+06	10.4	748	1.70.E+06	10.3	753	1.69.E+06	10.5	748
4	1.73.E+06	10.4	760	1.67.E+06	10.3	736	1.67.E+06	10.4	740
5	1.68.E+06	10.4	738	1.67.E+06	10.3	737	1.70.E+06	10.5	752
6	1.69.E+06	10.5	744	1.69.E+06	10.2	749	1.70.E+06	10.5	751
7	1.69.E+06	10.5	742	1.70.E+06	10.3	751	1.70.E+06	10.5	752
Mean	1.70.E+06	10.4	746	1.69.E+06	10.3	748	1.69.E+06	10.5	747
SD	1.62.E+04	0.0	7.1	1.57.E+04	0.0	8.1	1.35.E+04	0.0	5.3
CV	0.95 %	0.49 %	0.95 %	0.93 %	0.48 %	1.09 %	0.80 %	0.47 %	0.70 %

Table 1. Intra-deviation of the LUNA-III™. Three separate preparations of LUNA™ Standard Beads were counted using three different LUNA-III™ devices. Each preparation was counted five times on each device.

Inter-device reproducibility was examined by counting the same LUNA™ Standard Beads across five different LUNA-III™ devices. As described in Table 2, the variability between devices was remarkably low, with coefficient of variance (CV) values remaining below 2% for all measurements. This demonstrates the high consistency of the LUNA-III™ across different units, ensuring reliable results regardless of the specific device used.

Repeat	Sample 1			Sample 2			Sample 3		
	Total Cell Concentration (cells/mL)	Avg. Cell size (µm)	# Total cells	Total Cell Concentration (cells/mL)	Avg. Cell size (µm)	# Total cells	Total Cell Concentration (cells/mL)	Avg. Cell size (µm)	# Total cells
1	1.69.E+06	10.4	746	1.64.E+06	10.4	726	1.65.E+06	10.3	728
2	1.71.E+06	10.2	757	1.70.E+06	10.3	752	1.70.E+06	10.3	753
3	1.69.E+06	10.4	748	1.67.E+06	10.5	740	1.69.E+06	10.5	748
4	1.69.E+06	10.5	740	1.69.E+06	10.4	739	1.74.E+06	10.5	764
5	1.69.E+06	10.4	745	1.69.E+06	10.4	742	1.70.E+06	10.4	748
Mean	1.68.E+06	10.4	743	1.68.E+06	10.4	740	1.70.E+06	10.4	748
SD	2.61.E+04	0.0	11.4	2.39.E+04	0.1	9.3	3.21.E+04	0.1	13.0
CV	1.55 %	0.49 %	1.54 %	1.42 %	0.68 %	1.25 %	1.89 %	0.96 %	1.74 %

Table 2. Inter-deviation of the LUNA-III™. A single preparation of LUNA™ Standard Beads was counted using five different LUNA-III™ devices. This process was repeated twice more with additional bead preparations.

CONCLUSION

The results of this study demonstrate the LUNA-III™ automated cell counter's consistency in delivering accurate and reproducible cell counts across both intra- and inter-device measurements. The minimal variability, with coefficient of variance (CV) values consistently below 2 %, shows the LUNA-III™'s reliability in providing consistent cell concentrations, and sizes. These findings confirm the LUNA-III™ as a reliable cell counter for researchers, ensuring precise cell quantification crucial for a wide range of experimental applications.