BLOG

Automated Cell Counting

Cell Counting with Logos Biosystems: Made Diverse, Simple, and Accurate

logos biosystems
by ALIGNED GENETICS

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Cell Counting with Logos Biosystems

With the rising demand for performing multiple and consecutive cell counts in most of today's biomedical research studies, obtaining fast, accurate, and reliable cell counting is of chief importance to many researchers. This urgency is the driving force for leading companies in biotechnology research to develop novel and efficient automated cell counters.

Logos Biosystems has developed a series of automated cell counting and imaging instruments to emphasize the role of precise cell enumeration in the recent advances in cellular and molecular research. For example, the LUNA-II™ by Logos Biosystems is an innovative automated brightfield cell counter with unique features offering a powerful autofocus and light adjustment for reliable cell counting done in 15 seconds.

Accurate cell counting plays a fundamental role in quantitative cellular research. The LUNA-FX7™ automated cell counter has a precise and fast autofocus algorithm with dual fluorescence and brightfield illumination to ensure cell counting accuracy. Interestingly, the LUNA-FX7™ makes cell culture procedures faster and easier as it can count up to 8 samples at once with 8 multichannel pipette-equipped slides. Acquiring precise cell enumeration is key in splitting and maintaining different cultured cell lines in research laboratories. The LUNA-FX7™ has a built-in QC software designed for daily monitoring and analyzing obtained data to guarantee quality control and reliability of obtained results. In addition, this automated cell counter has a unique bioprocessing feature that permits monitoring, recording, and analyzing different bioprocessing activities such as growth rates and trend charts for cells individually.

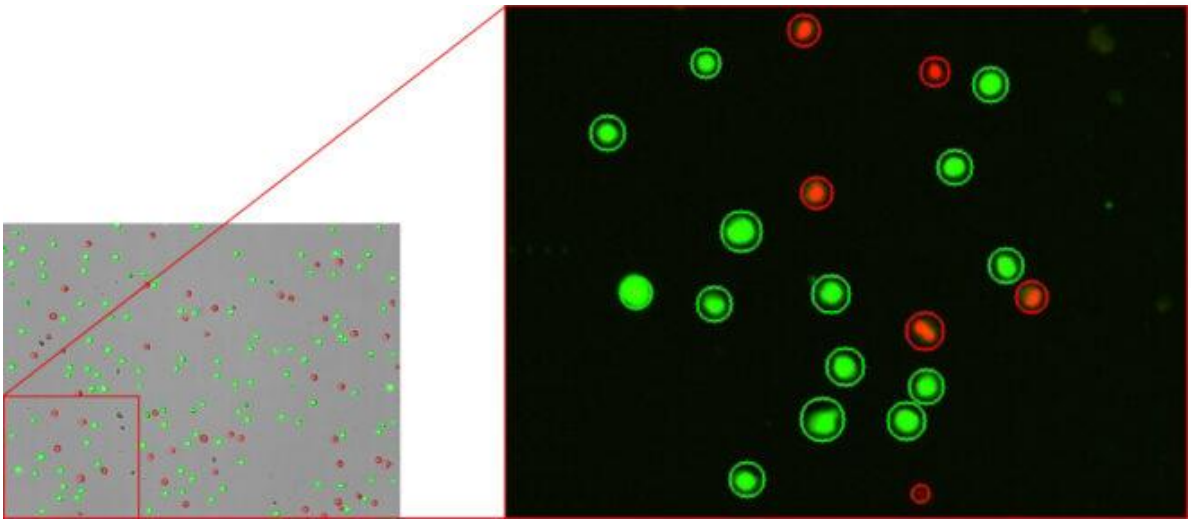


Image shows autofocus, dual fluorescent counting of the LUNA-FX7™ using AO/PI staining; living cells (green) and dead cells (red).

Nevertheless, determining the density of yeast cells is critical in the food and beverage industries as the quantification of fermented yeast has a direct effect on the quality and flavor of the end product. Yeast cells tend to clump easily which makes their enumeration process challenging. Logos Biosystems' LUNA-II YF™ automated yeast cell counter offers an autofocus optimal de-clustering algorithm that counts individual yeast cells of multiple strains efficiently in 15 seconds.

Discerning viable from dead cells in multi-well plates is crucial in evaluating the efficacy and potency of plausible cell therapies and suggesting new treatments for different malignancies in cellular and molecular research. In addition, precise counting of live nucleated cells is vital in stem cell-derived research as it sets the base for the quality and precision of downstream experiments. The LUNA-STEM™ and The LUNA-FX7™ automated fluorescence cell counter is compatible with tissue-derived cells like stem cells and other cells from the adipose stromal vascular fraction (SVF). It is equipped with dual fluorescence and brightfield optics to differentiate between live and dead nucleated cells in red blood cells and debris-contaminated samples. This automated cell counter transformed the error-prone and time-consuming stem cell counting procedure into reliable and fast as counts are made in 30 seconds, accompanied by a report about cell concentration, cell viability, and average cell size.

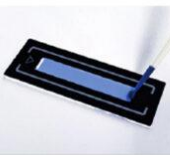
Manual cell counting is an early method that relies on counting chambers named hemocytometers. First, the hemocytometer is cleansed with 70% ethanol. Then, a cover slip is positioned over the counting chamber. Following that, a small titer of suspended cells is aspirated using a pipette and released close to the chamber's edge which will then enter the counting chamber by capillary action. Cell counting is performed manually using the microscope adjusted to 4x or 10x objective by the examiner, focusing on one of the four squares on the hemocytometer at a time. Finally, the sum of the obtained cell counts is averaged.

Manual cell counting could be viewed as an inexpensive alternative for counting cells. In some laboratories such as those with an infrequent need of cell enumeration or where high precision cell counts are not required by the research protocol, the hemocytometer could be used.

However, manual cell counting is subject to human error making it less reliable in advanced research. In addition, manual counting is not feasible when performing a large number of cell counts in quantitative cellular studies as it is time-consuming. Consecutive rounds of counting can cause eyestrain and potentially increases the margin of human error. Considering that manual counting poorly differentiates between multiple cell types in one suspension is a setback for many scientists as it can alter their results.

Hence, a shift to automated cell counting was made by many laboratories in recent years due to its accuracy, time efficiency, and productivity.

Automated cell counters offer a faster and easier alternative with more precision when a higher number and more frequent cell counts are required in a laboratory. As opposed to hemocytometers, automated cell counters are built to differentiate between different types of cells in one suspension regardless of their similarities in size and shape. For instance, LUNA-FL™ by Logos Biosystems is a dual fluorescence automated cell counter that can distinguish between viable and dead cells. Additionally, it offers precise counts for cells in cultures contaminated with non-cell debris.

	NEW LUNA™ 1-Channel Slides	LUNA™ Cell Counting Slides / PhotonSlides™	NEW LUNA™ 3-Channel Slides	NEW LUNA™ 8-Channel Slides	LUNA™ Reusable Slide
Compatible slides					
Sample throughput	1 sample	Up to 2 samples	Up to 3 samples	Up to 8 samples	1 samples
Sample loading volume	50 µL	10 µL / chamber	10 µL / chamber	10 µL / chamber	10 µL / chamber
Maximum analysis volme	5.1 µL	1.3 µL / chamber	1.3 µL / chamber	0.5 µL / chamber	1.3 µL / chamber

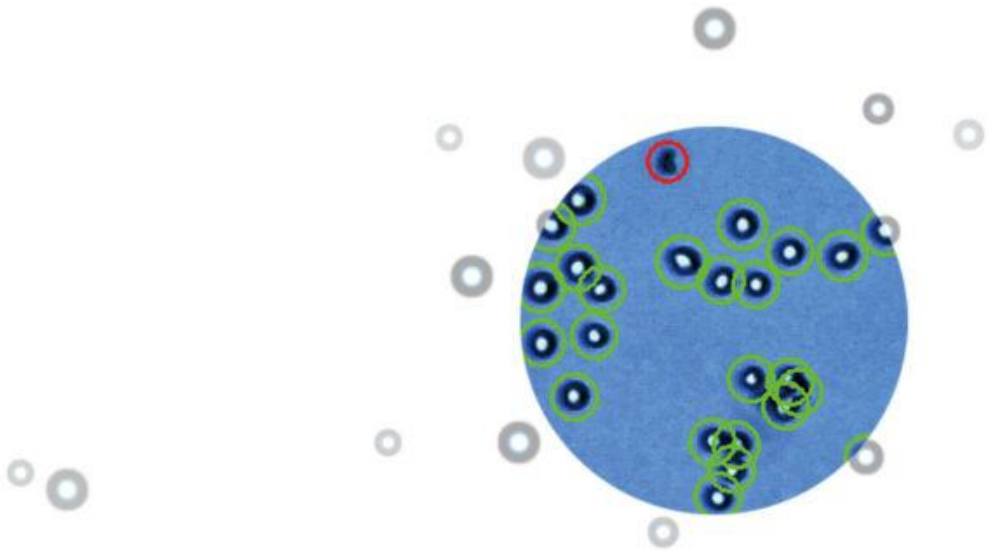
Higher throughput. Offering a variety of slide options, the LUNA-FX7™ utilizes a counting volume of up to 5.1 µl, lowering error and CV for each count.

Automated machines provide sharp focus with adjustable light levels. The LUNA-II™ automated cell counter adopted a new autofocusing technology based on a liquid lens mechanism for optimal cell count. This novel technique does not use mechanical moving parts to change the Z position of a sample upon cell counting, instead, the Z position is automatically obtained by the application of a small voltage to the liquid lens.

Several automated cell counting and imaging machines are designed to be cost-effective such as the reusable counting slide compatible with all LUNA cell counter series to minimize waste and expense. On another note, LUNA cell counter series can be provided with a built-in thermal printer and computer that captures and automatically analyzes high-resolution cell images that can be printed directly. Additionally, it encompasses a default cell counting protocol used for multiple cell lines like the human, monkey, Chinese hamster, fish, rat, and mouse. Interestingly, it offers the feature of installing customized and cell-specific protocols picked by the researcher. These features were enlisted by Logos Biosystems to ensure the production of accurate and viable data and to make automated cell counting simple and diverse.

Furthermore, correct cell count is significant in quantifying cell proliferation and testing for the cytotoxicity of different reagents and compounds that may cause cell death in bioassays standardized by cellular activity, this in turn will aid in multiplexing to determine viable cell numbers during the performance of multiple cell-based assays. LUNA FX7™ automated cell counter can scan up to 47 fields of view simultaneously which provides accurate cell counting results for any cell types besides bacteria. Bacteria counting can be conducted with QUANTOM Tx™ microbial cell counter by scannig 20 fields of view simultaneously. This gives correct bacterial cell counts hence abolishing the variability and unreliability of manual colony counting. It is equipped with built-in innovative bacteria-specific cell detection software to count and differentiate the diverse groups, shapes, sizes, and arrangements of bacterial cells in cultures.

Since cell enumeration can be daunting for varying cell lines, diversity and accessibility are a bonus for automated cell counters. A user-friendly machine that is maneuvered easily as LUNA-II™ makes the cell counting process run smoothly due to its automated de-clustering of clumped cells and color-coded differentiation between viable and dead cells. Remarkably, automated cell counts can be done using dyes with lower toxicity like erythrosine B (EB) instead of more toxic ones like trypan blue (TB). Also, it can operate using unstained cell counting techniques.



LUNA-II™'s BF capabilities.

Currently, the usage of automated cell counters is established in the protocols and procedures of many research studies in different fields. In the environmental field, a review demonstrated the principle of automated cell counting and highlighted its functional dimensions for microalgal management by applying the fluorescence method to estimate the chlorophyll integrity in cultured microalgae. Interestingly, this procedure was a forward step toward reaching Sustainable Development Goals (SDGs). In the same field, LUNA-II™ was used in a study to estimate the abundance and viability of marine microalgae cells and their sizes in cultured plates.

Many studies in experimental and clinical medicine involve working with and comparing different types of cells and varying cell lines to uncover the mechanism of diseases and evaluate possible therapies. The LUNA-II™ automated cell counter was used to determine cell viability in a study aiming to evaluate the morphology and viability of spheroid derived from insulin-GLase cell line to better understand the underlying cellular mechanism of type 2 diabetes mellitus.

The application of LUNA-II™ automated cell counter in an agricultural study was ideal for evaluating the viability of grapevine pollen grains, their average size, and total number upon testing treatment with different environmentally friendly phytosanitary reagents. The hallmark of today's research, the stem cell field, is thriving constantly and heavily relies on automated cell counters for precise, fast, and accurate data. A study was conducted to evaluate fibroblast cell regeneration in culture using three varying concentrations of a medium called Wharton's jelly and to test its potency in improving serum-starved fibroblasts. The proliferative ability of the fibroblasts was assessed with the help of LUNA-II™ to avoid subjectivity in results and prevent time expenditure associated with manual cell counting.

Automated cell counters transformed the tedious process of cell enumeration into a fast and well-detailed one offering higher precision and reliability in results. Logos Biosystems' automated cell counters are essential for cell counts and culture maintenance procedures in different fields of research. They are recommended by many researchers because they are easily used, time saving, have great performance, and offer high-quality data.

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