BECKMAN COULTER Presents

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MASTERING CELL COUNTING

ACCURATE CELL COUNTING IS CRITICAL TO ENSURE EXPERIMENTAL SUCCESS AND REPRODUCIBILITY FOR CELL-BASED ASSAYS AND CELL CULTURE APPLICATIONS.

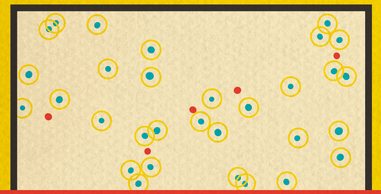
CALCULATING THE NUMBER OF CELLS IS REQUIRED FOR MONITORING CELL PROLIFERATION & VIABILITY, OPTIMIZING CELL CULTURE CONDITIONS, AND PREPARING CELL-BASED ASSAYS.

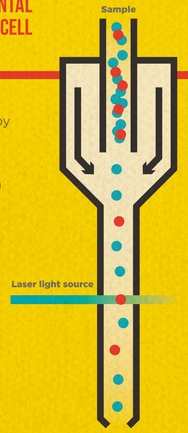
CELL COUNTING PROCEDURES NEED TO BE:

- Accurate
- Reproducible
- Cell type independent, i.e., take into consideration cell property variables such as cell clumping, cell shape, and cell populations of varying size

IMAGE-BASED COUNTERS

Image-based systems use bright field or fluorescent microscopy to capture an image of the cells. Some systems operate on a flow-based imaging methodology where cells are drawn into a capillary and the cells are imaged and counted as they pass a detector. Cell viability can be calculated using dye exclusion methods, such as Trypan Blue. Software analyzes the images based on system specific parameters such as cell diameter, brightness, and circularity to determine the number of cells and cell viability.





COULTER COUNTERS

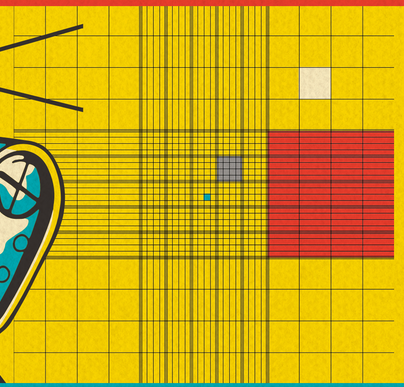
Coulter counters measure changes in electrical resistance to determine the number, volume and size of the cells in the sample. Some Coulter counters offer the ability to distinguish live cells from dead cells and cell debris.

FLOW CYTOMETERS

Flow cytometers are not dedicated cell counters and report on relative values, such as the percent of cells in a given sample that have specific properties. The volume of sample counted needs to be determined to calculate the absolute cell count. To accomplish this, samples need to be spiked with fluorescent counting beads as a control.

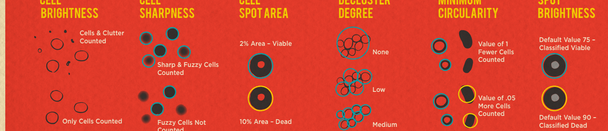
HEMOCYTOMETER

DIMENSIONS	AREA	VOLUME AT 0.1 MM DEPTH
1 x 1 mm	1 mm^2	0.0001 mL
0.25 x 0.25 mm	0.0625 mm^2	0.00000625 mL
0.20 x 0.20 mm	0.04 mm^2	0.000004 mL
0.05 x 0.05 mm	0.0025 mm^2	0.00000025 mL



1. Apply the cell suspension so that the sample fills the chamber.
   Tip: Dilute the cell suspension if necessary. Cells should be uniformly distributed without clumping or overlap on the grid.
2. Using a microscope, count the number of cells in 4 squares.
   Tip: The lower the concentration of cells, the more squares should be counted to reduce statistical errors.
   Tip: Only count cells that are within the square or on the bottom or left lines; do not count cells that touch the top or right lines of the square.
3. Calculate the density of cells in the suspension.

CELL ANALYSIS



AUTOMATED CELL COUNTING

★★★★★★★★✕

AUTOMATED CELL COUNTERS OFFER AN EFFICIENT AND RELIABLE WAY TO QUICKLY COUNT AND ANALYZE A CELL POPULATION.

★ **PROs:** FAST • ACCURATE • REPRODUCIBLE • ELIMINATES SUBJECTIVITY • ANALYSIS & GRAPHICAL DISPLAY • DATA STORAGE & EXPORT CAPABILITIES • SUPPORTS 21 CFR PART 11

✕ **CONs:** INITIAL COST FOR EQUIPMENT

VS.

MANUAL CELL COUNTING

★★✕✕✕✕✕✕✕

MANUAL CELL COUNTING OFFERS AN ACCESSIBLE WAY TO DETERMINE THE CONCENTRATION OF CELLS IN A LIQUID SAMPLE, REQUIRING JUST A LIGHT MICROSCOPE AND HEMOCYTOMETER.

★ **PROs:** INEXPENSIVE • VERSATILE

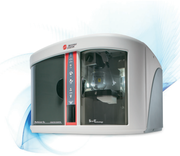
✕ **CONs:** TIME-CONSUMING • LABOR-INTENSIVE • VARIABLE RESULTS • LIMITED FEATURES • POOR REPRODUCIBILITY • SUBJECTIVE

$$\text{Cell density (cells/mL)} = \frac{\text{(Average number of cells counted per square) X (Dilution factor)}}{\text{Volume of square (mL)}}$$

Cell viability can be calculated by treating the cell suspension with cellular dyes, such as Trypan Blue. Live cells do not take up Trypan Blue, dead cells will stain blue.

$$\text{Cell viability (\%)} = \frac{\text{Total viable cells (unstained)}}{\text{Total cells (stained + unstained cells)}} \text{ X } 100$$

COUNT AND SIZE PARTICLES WITH HIGH RESOLUTION



Multisizer 4e
COULTER COUNTER

Accurate counts for all types of particles — independent of shape, color, or transparency

- Precise and discrete size distributions in number, volume and surface area in one measurement (range: 0.2 µm to 1600 µm)
- Ultra-high resolution, multiple channel analysis and accuracy with the Digital Pulse Processor (DPP)
- Ability to detect small changes in particle/cell size
- Measurement is not affected by particle color, shape, composition or refractive index

www.cellcountsolutions.com

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MASTERING CELL COUNTING

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Beckman Coulter Life Sciences is dedicated to empowering discovery and scientific breakthroughs. The company's global leadership and world-class service and support deliver sophisticated instrument systems, reagents and services to life science researchers in academic and commercial laboratories, enabling new discoveries in biology-based research and development. A leader in centrifugation and flow cytometry, Beckman Coulter has long been an innovator in particle characterization and laboratory automation, and its products are used at the forefront of important areas of investigation, including genomics and proteomics. For more information, visit beckmancoulter.com. Follow Beckman Coulter Life Sciences on Twitter @BCILifeSciences; Facebook: BCILifeSciences; and LinkedIn.

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AUTOMATED CELL COUNTING ★★★★★★★★★★

VS.

MANUAL CELL COUNTING ★★✕✕✕✕✕✕✕✕

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CELL COUNTING MADE EASY

Vi-CELL XR
Cell Viability Analyzer

Fast, Efficient, Accurate

- 12-position auto sampler, for walk-away sample analysis.
- No dilution required if your samples are within the 50×10^3 to 1×10^7 cells/mL range.
- Customizable cell types allow analysis of many cell species.

www.cellcountsolutions.com

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BECKMAN COULTER *Life Sciences*

Vi-CELL is For Laboratory Use Only. Not for use in diagnostic procedures.