



Bioprocessing Feature of the Beckman Coulter® Vi-CELL™

VI-CELL XR™ Part of the Cell Lab family



The Beckman Coulter® Vi-CELL automates the cumbersome manual trypan blue vital dye viability method. This bulletin will discuss the bioprocessing feature of the instrument.

By using the data from the bioprocess, optimum cell culture conditions may be maintained over time, thus, maximum therapeutic protein yields may be obtained in recombinant DNA therapeutic protein production facilities.

The bioprocessing component of the Vi-CELL software monitors percent viability and other significant cultured cell parameters over time. The convenient presentation of cellular data in graph form enables the Vi-CELL user to quickly detect and correct adverse culture conditions. This feature is particularly suited to the recombinant protein production environment found in the Biopharma industry where cells are routinely cultured, at relatively high concentrations, in a variety of bioreactors. A separate bioprocess may be started, with just a single mouse click, for each bioreactor monitored.

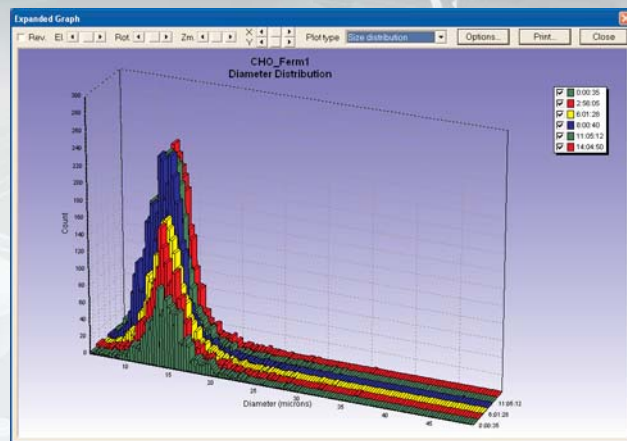


Figure 2. Expanded Bioprocess Size Distribution

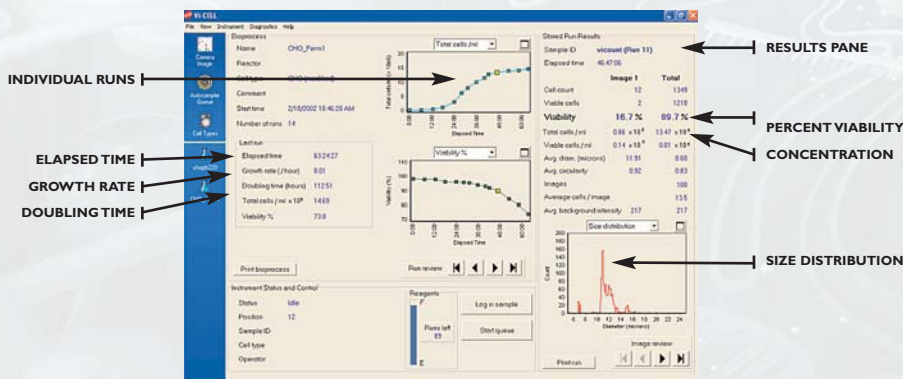


Figure 1. Vi-CELL Bioprocess

Results

Figure 1 illustrates a Chinese Hamster Ovary Cell bioprocess result. CHO cells are a very common cell line used in recombinant DNA protein production. Each data point represents an individual instrument run. User selected run times are on the X axes. The graphs may be expanded via a mouse click. This screen also provides two critical cell culture parameters, cellular growth rate and doubling time. Figure 2 shows an expanded bioprocess size distribution 3D graph.

THE VI-CELL

The Vi-CELL automates the widely accepted Trypan Blue Dye Exclusion method. The Vi-CELL combines the state of the art in imaging technology, proprietary algorithm and fluidics management. At the heart of the Vi-CELL is the customized liquid handling system. This system, which allows sample aspiration, reagent handling and subsequent instrument cleaning, is fully automated. Once the cellular suspension has been aspirated and mixed with the trypan blue dye, it is pumped to the flow cell for imaging. The Vi-CELL can analyze up to 100 images for a given analysis increasing total volume from 15 to 30 times over the manual method with result in a less than 2.5 minutes.

MANUAL TRYPAN BLUE DYE EXCLUSION METHOD

As mentioned, the standard method for measuring cell viability is the Trypan Blue Dye Exclusion method. Trypan blue stain (0.4%) is mixed with an equal volume of cells. Viable cells, given their intact membranes, exclude the trypan blue stain; non-viable cells, membrane permeable, stain dark blue. The manual method, however, requires a technician, using a hemacytometer and microscope, to enumerate both stained and unstained cells and manually calculate the percent viability. In addition to being labor intensive, this technique has substantial accuracy error due to its subjective nature.

- Prepare**
 - Automated liquid handling
 - Automated lysing
 - General purpose centrifugation
 - High performance centrifugation
 - Ultracentrifugation
- Identify**
 - Automated fluorescence microscopy
 - Cell counting
 - Cell markers
 - Cell viability analysis
 - Flow cytometry
 - Monoclonal antibodies
- Probe**
 - Automated liquid handling
 - Flow cytometry
 - Microarray technology
 - Monoclonal antibodies
 - Signal transduction assays
- Sort**
 - Cell sorters
 - Micro-piezo electric tips
 - Reagents (various)
- Evaluate**
 - Monoclonal antibodies
 - Multi-mode plate reading
 - Genomics solutions
 - Proteomics solutions
 - Software informatics
- Diagnose**
 - Automated liquid handling
 - Flow cytometry
 - Immunoassays
 - Monoclonal antibodies
 - Software algorithms

VI-CELL TECHNICAL SPECIFICATIONS

INSTRUMENT FUNCTION:	POWER REQUIREMENTS:
Concentration Range: 5 x 10 ⁴ to 1 x 10 ⁷ cells / mL	Power 50 watts (65 Watts Max.)
*Counting Accuracy: ± 6%	Voltages 100V, 120V, 220V or 240V 50/60 Hz
OPERATING SYSTEM:	TEMPERATURE:
Windows® 98	10° to 40° C (50° to 104° F)
Windows® 2000	
Windows® XP	
INSTRUMENT TYPE:	WEIGHT:
Video imaging through a quartz flow cell	11.3kg (25lb)
	UNIT DIMENSIONS:
	44.5cm (17.5") height
	38cm (15") width
	41cm (16") depth

VI-CELL SERIES

	PN	AUTO SAMPLE	SIZE RANGE (µm)	SAMPLE VOLUME (mL)	ANALYSIS TIME (Min)	VIABILITY RANGE	IMAGING TECHNOLOGY
VI-CELL XR	383556	Yes	2-70	0.5	<2.5	0-100	Auto-focus routine Firewire Camera 1394 X 1040 CCD array
VI-CELL AS	6605769	Yes	5-70	1.0	<3.5	0-100	Manual focus routine Image frame grabber 640 X 480 CCD array
VI-CELL S	383080	No	5-70	1.0	<3.5	0-100	Manual focus routine Image frame grabber 640 X 480 CCD array
VI-CELL XR QUAD PACK	383722						
VI-CELL AS, S QUAD PACK	383198						
VI-CELL CONCENTRATION CONTROL	175478						
VI-CELL FOCUS CONTROL	175474						



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