



Jurkat Cell Analyses Using the Beckman Coulter® Vi-CELL™

Vi-CELL XR™

Part of the Cell Lab family



Jurkat Cells

Jurkat cells are human leukemic T lymphocytes. These cells are particularly responsive to the induction of cell death via apoptosis, rather than the necrosis pathway; also, they are easily maintained in cell culture. The cells are employed in research for further understanding of the apoptosis, programmed cell death, process.

Equipment Used

Beckman Coulter,
Vi-CELL XR
Validated Vi-CELL XR reagent pack

Instrument Settings

When using the Vi-CELL most cells can be analyzed using the default instrument settings. In some instances, certain cell lines may require modification of these analyses parameters. The Vi-CELL intuitive software allows easy user selection of optimum instrument settings thus ensuring accurate results. The instrument settings for the analyses of Jurkat cells are listed below:

| | |
|------------------------------|---|
| Min. Size (µm) = 6 | Cell Brightness = 85 |
| Max. Size (µm) = 50 | Cell Sharpness = 100 |
| Number of Images = 50 | Viable Cell Spot Brightness = 75 |
| Aspirate Cycle = 1 | Viable Cell Spot Area = 5 |
| Mixing Cycle = 3 | Min. Circularity = 0 |
| | Decluster Degree = Low |

Results

The results reported by the Vi-CELL are shown in the Results Section of Figure 1. Percentage viability and total Jurkat cell concentration are 95.6% and 1.05×10^6 cells/ml. The Vi-CELL also reports viable cell concentration, mean cell diameter, size distribution, and average cellular circularity. The cell images may be archived for future re-analyses.

Conclusion

The Beckman Coulter Vi-CELL automates the standard manual method, providing accurate results and removing the subjective nature inherent in the manual method. The significantly greater number of cells tested provides greater statistical confidence in the results than the manual technique.

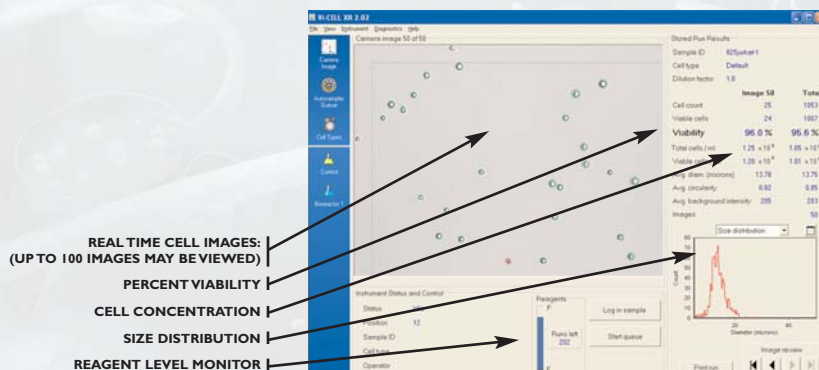


Figure 1. Viable cells are circled in green and non-viable in red.

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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