ADVANCED INSTRUMENTS

GLOCYTE

SCIENTIFIC RESOURCE

REDUCING ERROR ASSOCIATED WITH MANUAL CHAMBER COUNTS WITH THE GLOCYTE® AUTOMATED CELL COUNTER FOR CSF

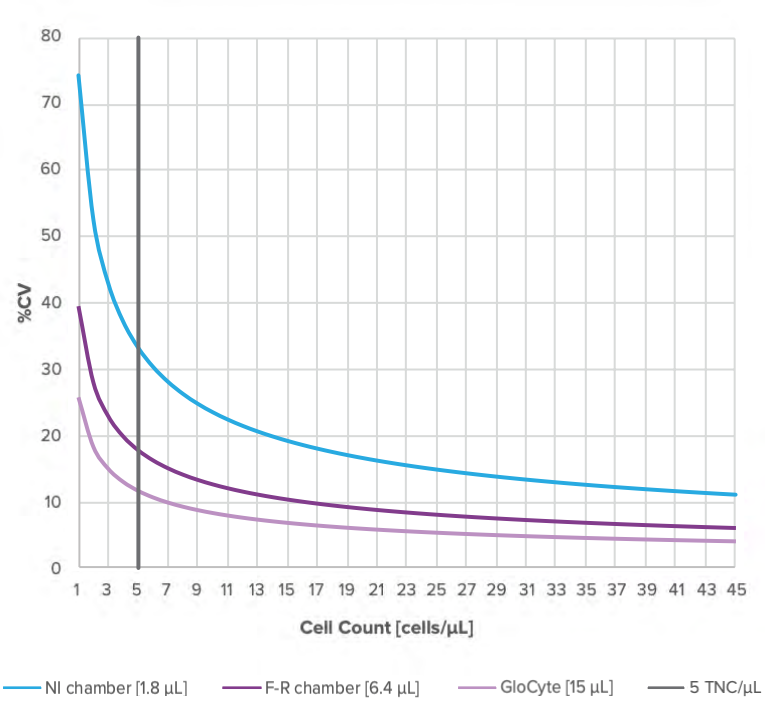
ABSTRACT

The GloCyte Automated Cell Counter for CSF is linear down to 1 cell/µL allowing labs to automate all CSF cell counting. GloCyte mitigates non-random error associated with manual cell counts including human subjectivity and calculation errors. The system also reduces random error. GloCyte requires a similarly small sample size to manual cell counting methods; however, the portion of the sample that the system analyzes is much larger enabling the reduction in random error. The greatest error reduction is realized at clinically relevant low cell counts making GloCyte a powerful solution for clinical laboratories.

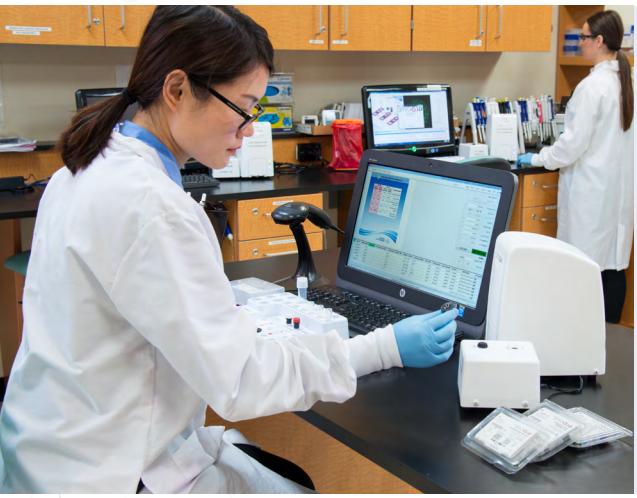
RANDOM ERROR IN CELL COUNTS

The graph to the right shows the percent coefficient of variation (%CV) or expected error based on the Poisson distribution associated with different cell counts for the Neubauer Improved (NI) chamber, the Fuchs-Rosenthal (F-R) chamber, and the GloCyte® Automated Cell Counter for CSF. The graph considers the total number of cells counted to get the final cell count per µL based on the volume for each method, where the total volume counted for both sides of the NI chamber is 1.8 µL, 6.4 µL for both sides of the F-R chamber, and 15 µL for the GloCyte.

Expected Error (%CV) Based on Poisson Distribution of Cell Counts for Different Methods



THE EXPECTED ERROR IS LOWER FOR THE GLOCYTE THAN THE EXPECTED ERRORS ASSOCIATED WITH BOTH THE NI AND F-R CHAMBERS WITH THE MOST PRONOUNCED REDUCTION IN ERROR AT CLINICALLY RELEVANT LOW CELL COUNTS.



BACKGROUND

It was first noted in 1881 by Lyon and Thoma[1] that the standard error of cell counts made on the same sample of blood was roughly proportional to the square root of the number of cells counted. This observation was confirmed and elaborated on by "Student" in 1907[2] when he stated that the scatter of cells in a hemocytometer followed the Poisson distribution, in which the standard error is equal to the square root of the mean for the distribution. The observation that manual chamber counting follows a Poisson distribution has been confirmed by others, and other errors inherent in manual chamber counting have also been noted that can lead to the increase in the observed error in chamber counts.

Table 1. Expected Error (%CV) at 5 cells/µL Based on Poisson Distribution of Cell Counts for Different Methods

Count Method	Sample Volume Counted [µL]	Total Number of Cells Counted	Expected Error (CV) at 5 TNC/µL*
Neubauer Improved Chamber	1.8 (Sides A & B)	9	33.3%
Fuchs-Rosenthal Chamber	6.4 (Sides A & B)	32	17.7%
GloCyte	15	75	11.5%

* The Standard Deviation (SD) of the cell count (n) equals √n. The Coefficient of Variation (%CV) of the cell count (n) equals ((√n)/n)*100.

NON-RANDOM ERROR IN CELL COUNTS

The imprecision of manual methods is even higher when considering the many possible non-random sources of error involved with manual chamber counts. Below is a list of several possible non-random sources of errors in manual chamber counts;

- improper loading of the chamber
- calculation errors
- insufficient time to allow adequate settling of cells
- insufficient cleaning of chamber (if not a disposable style)
- human subjectivity

In summary, the GloCyte reduces both random and non-random error associated with manual cell counts with the greatest reduction at clinically relevant low cell counts.

TO LEARN MORE VISIT AICOMPANIES.COM/GLOCYTE

[1] Lyon, J. F., and Thoma, R. Ueber die Methode der Blutkörperzählung (About the Method of Counting Blood Cells). Archiv f. pathol. Anat. 84, 131-154 (1881).

[2] "Student". On the Error of Counting with a Haemacytometer. Biometrika. 5, 351-360 (1907).