

# A-135: Improving cell count turnaround times with the GloCyte® Automated Cell Counter for CSF: A retrospective study at MercyOne Des Moines Medical Center

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## Background

Accurate, STAT cerebrospinal fluid (CSF) cell counts are critical in the diagnosis of meningitis, malignancy, demyelinating disease, and hemorrhage. Due to historical limitations with the linearity of automated analyzers, CSF cell counts have traditionally been performed manually with a hemocytometer and the aid of a brightfield optical microscope. Manual cell counting is time-consuming, subjective due to reliance on human interpretation, and requires a high degree of skill (**Figure 1**). This poses significant challenges for clinical labs of all sizes facing unprecedented staffing shortages. The purpose of this study was to evaluate the impact of implementing the GloCyte Automated Cell Counter for CSF, an FDA-cleared device with linearity down to 0 cells/ $\mu$ L, on result turnaround times (TAT).

### Steps: Manual Method

1. Prepare moist environment
2. Load counting chamber
3. Wait ~10 minutes for cells to settle
4. Determine if dilution is needed
5. Determine how many squares to count
6. Count sides A & B (if applicable)
7. Clean chamber (if applicable)
8. Repeat 1-7 if sides are not within allowable difference
9. Calculate result in cells/ $\mu$ L
10. Record results
11. Input results into laboratory information system

### Risks Impacting Result Accuracy

- Counting chamber may dry out
- Improper loading
- Missed cells due to inadequate wait time
- Dilution errors
- Tech-to-tech variability
- Requires high degree of skill
- Cross-contamination
- Long turnaround times
- Calculation errors
- Inadequate audit trail
- Transcription errors

**Figure 1: Risks associated with manual CSF cell counting**

## Methods

Result turnaround time data for CSF specimens processed in the hematology lab at MercyOne Des Moines Medical Center, a 600-bed hospital in Des Moines, Iowa, was analyzed in a retrospective study of two cell counting methods– (1) manual cell counting using a Neubauer-Improved hemocytometer and (2) GloCyte, a benchtop cell counting device that uses fluorescence technology and highly specific reagents to automate RBC and TNC cell counts in less than 5 minutes. Turnaround times for 227 CSF specimens counted manually during an approximately six-month period prior to the implementation of GloCyte (January 2, 2017 to June 29, 2017) were compared to those for 133 specimens analyzed on GloCyte over a similar duration (January 4, 2021 to June 30, 2021). In this study, turnaround times were defined as the time between specimen arrival in the lab and result verification. Correlation between the methods was previously established in the MercyOne Des Moines Medical Center laboratory.

## Results

The data demonstrated a significant, 17–30-minute improvement in turnaround times with GloCyte compared to the manual hemocytometer method (Table 1). Median turnaround times, analyzed to adjust for add-ons that resulted in longer turnaround times pre- and post-GloCyte implementation, were 1:38 hours for specimens counted manually versus 1:08 hours for specimens analyzed on GloCyte.

The average turnaround time for specimens counted manually was 2:03 hours compared to 1:46 hours for specimens analyzed on GloCyte. The MercyOne Des Moines Medical Center laboratory processed 456 CSF cell counts in 2022, equating to a reduction in turnaround time of 129-228 hours annually with the implementation of GloCyte.

	Manual Method	GloCyte
Number of samples	227	133
Median TAT (h)	1:38	1:08
Mean TAT (h)	2:03	1:46

**Table 1: Turnaround Time Comparison**

## Conclusion

This study demonstrates that GloCyte can be implemented to significantly improve turnaround times for CSF cell counts. The MercyOne Des Moines Medical Center laboratory realized several benefits from the reduction in turnaround times– GloCyte has:

- (1) Freed up significant tech time for other tasks,
- (2) Standardized CSF cell counting to mitigate tech-to-tech variability,
- (3) Increased lab staff satisfaction & decreased stress levels, and
- (4) Increased physician satisfaction.

For MercyOne Des Moines Medical Center's sister site, MercyOne West Des Moines Medical Center, a 146-bed hospital that infrequently performs CSF cell counts, GloCyte has provided peace of mind in performing cell counts accurately with techs of all skill levels.

