# 10 Most Common Errors Made in Cell Counting

Manual cell counting is straightforward and fairly inexpensive; however, mistakes are easy to make.

CORNING


Manual cell counting with hemocytometers is still preferred by some researchers; however, manual cell counting is laborious and often an inefficient use of time. Experiments should be carried out with accuracy and precision, and this applies to the collection, quantification, and analysis of cell samples.

Manual cell counting is straightforward and fairly inexpensive; however, mistakes are easy to make. Knowing the basics of cell counting – as well as the top cell counting errors and how to avoid them – can go a long way in ensuring the most efficient use of time spent in the lab.

## Common Cell Counting Errors

### 1. Device Errors

Hemocytometers lack the latest visualization technology common in more advanced devices. Automated cell counters, such as the Corning® Cell Counter (Cat. No. 6749), can process images quickly on a tablet or computer, offering faster analysis in a digital format that is far more accurate than traditional visualization methods.

### 2. Manual Errors

Manual cell counting relies on human visualization, a feature that is susceptible to inaccuracies from time to time. Improper visualization of a sample can occur due to a number of factors, including cell aggregation, debris, or eyesight issues. This can cause significant fluctuations in cell numbers that are inaccurate representations of the true suspension. An automated cell counter is designed to visualize and detect cells accurately and with high precision.

### 3. Cell Density

Using cell densities that are too low or too high is generally associated with counting errors, specifically with a traditional hemocytometer. When the cell density is too low, the cells in the field may not be representative of the stock solution. In the situation where the cell density is too high, cells may aggregate and lead to egregious counting errors.

### 4. Sample Preparation

When the counting chamber of a hemocytometer is filled with liquid, there is a slight increase in space between the chamber and the cover glass. An error in volume estimation can then occur. Pipetting cell suspensions into the counting slide can also impart similar errors. Fibers or air bubbles in the sample can also cause errors in the cell count.

### 5. Not Suspending a Sample Properly

When a cell suspension rests, many of the cells in the suspension will move toward the bottom of the test tube. A sample taken from this tube will not represent the true solution and result in inaccurate cell values. Prior to counting, it is important to resuspend the samples well. Doing so will produce higher accuracy during counting.

### 6. Not Differentiating Between Cells and Debris

Even to the highly-trained eye, sometimes debris can come across as just another cell in the sample. There is a chance that debris will be present, and when this debris is counted as a cell it is known as a false-positive. Sometimes, manual cell counters will also misclassify a cell as debris, resulting in a false-negative. Automated cell counters usually feature specific detection parameters that reduce the chance of obtaining a significant amount of false-positives or false-negatives.

### 7. Non-standardized Protocols

Since manual cell counting is performed by people, each protocol for counting cells in a sample will rely on an individualized approach that is prone to variation. This variation can cause substantial errors if protocols are not standardized throughout the research team. Automated cell counter detection is based on features for which the algorithm works to determine which characteristics the sample "matches" and operates on one protocol, eliminating the need for the extra work that goes into creating and maintaining a strict counting strategy.

### 8. Inefficient Recording and Monitoring

Using manual methods, operators simply write down the number of cells in their lab journal. Technological advancements have facilitated faster approaches to cell counting and recording. The benefit of many automated cell counters, such as the Corning® Cell Counter, is its ability to utilize cloud technology for the recording and sharing of data.

### 9. Mathematical Errors

With any type of data collection, a good deal of math is involved. The use of mathematics is essential in calculating the average number of cells in a suspension. Math performed manually is time consuming and is also error-prone. Some automated cell counting systems, such as the Corning Cell Counter, calculates the cell density and percent viability of a sample almost instantly.

### 10. Believing Manual Counting is the Only Tried-and-True Method

Although manual cell counting can prove versatile and adaptable in different situations, its utility is limited by the operator. More cell counts at a higher throughput can be performed via automated cell counters, which decreases the likelihood of error while improving productivity across the board.

## Are Automated Cell Counters Cost-effective?

A hemocytometer is relatively inexpensive, at least initially. Many facilities rely on manual counting believing it will be cost-efficient; however, the training involved, the time it takes to standardize a protocol, and the counting errors it produces result in far more long-term costs than usually anticipated compared with automated cell counters.

Making a one-time investment in an automated cell counter, such as the Corning Cell Counter (Cat. No. 6749), will ensure little to no time wasted in the laboratory, resulting in improved long-term cost-efficiency.

## Conclusion

Automated cell counters, such as the Corning Cell Counter, enable faster and more reliable cell counting with higher throughput, allowing researchers to channel their focus toward other important areas of their work.



CORNING

**Corning Incorporated**
*Life Sciences*

**www.corning.com/lifesciences**

**NORTH AMERICA**
t 800.492.1110
t 978.442.2200

**ASIA/PACIFIC**
**Australia/New Zealand**
t 61 427286832
**Chinese Mainland**
t 86 21 3338 4338
**India**
t 91 124 4604000
**Japan**
t 81 3-3586 1996
**Korea**
t 82 2-796-9500
**Singapore**
t 65 6572-9740
**Taiwan**
t 886 2-2716-0338

**EUROPE**
CSEurope@corning.com
**France**
t 0800 916 882
**Germany**
t 0800 101 1153
**The Netherlands**
t 020 655 79 28
**United Kingdom**
t 0800 376 8660
**All Other European Countries**
t +31 (0) 206 59 60 51

**LATIN AMERICA**
grupoLA@corning.com
**Brazil**
t 55 (11) 3089-7400
**Mexico**
t (52-81) 8158-8400