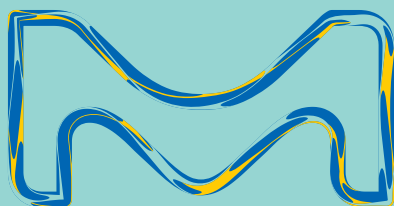


# Scepter™ 3.0 Cell Counter

Smarter, handheld cell counting



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**Millipore®**

Preparation, Separation,  
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# Scepter™ 3.0 Cell Counter

## Smarter, handheld cell counting

The Scepter™ 3.0 cell counter is your portable device option for fast, accurate cell counting. While other automated counters consume bench space and rely on object recognition software, manual focusing, and clumsy loading chambers, the Scepter™ cell counter provides true automation without the error that accompanies vision-based systems. With its microfabricated, precision-engineered sensor, the Scepter™ cell counter does all the work and delivers accurate and reliable cell counts in seconds.

## The Scepter™ 3.0 cell counter demonstrates the latest enhancements in handheld cell counting technology, highlighted by:

### Compatibility with More Cell Types

The Scepter™ cell counter is the only one on the market to accurately count particles as small as 4 µm in diameter.

### Smart, Automated Data Transfer

Transfer results wirelessly, or via USB for reliable recording and archiving.

### Powerful Instrument Software

- Gate and capture up to 999 cell size or volume histograms
- Create and save gating settings
- Easily export data for in-depth analysis

Are you an existing Scepter™ device user interested in upgrading to the Scepter™ 3.0 counter? It's easy.

Visit [SigmaAldrich.com/scepterupgrade](https://SigmaAldrich.com/scepterupgrade) to upgrade your device today.

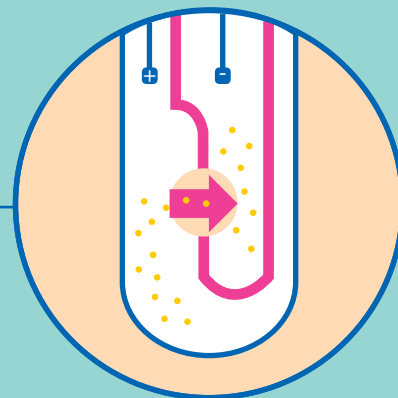
# The power of precision

Trust Scepter™ devices with your most valuable samples to get reproducible and reliable counts. The reliability of Scepter™ cell counters is particularly apparent with smaller cell types. Because the Scepter™ cell counter measures volume using the Coulter principle, it can quantify cells based on size and will discriminate larger cells from smaller debris—unlike vision-based techniques, which rely on object recognition software and cannot reliably detect small cells.

## Scepter™ sensor technology

Compatible with 60 µm and 40 µm sensors, the Scepter™ 3.0 cell counter can meet even more of your cell- and particle-counting needs. Use the 60 µm sensor for particles between 6 and 36 µm in diameter. Use the 40 µm sensor for particles between 4 and 18 µm.

- Precise volumes are drawn into the Scepter™ sensor.
- As cells flow through the aperture in the sensor, resistance increases. This increase in resistance causes a subsequent increase in voltage.
- Voltage changes are recorded as spikes with each passing cell.
- Spikes of the same size are bucketed into a histogram and counted. This histogram gives you quantitative data on cell size or volume that can be used to evaluate the quality and health of your cell culture.



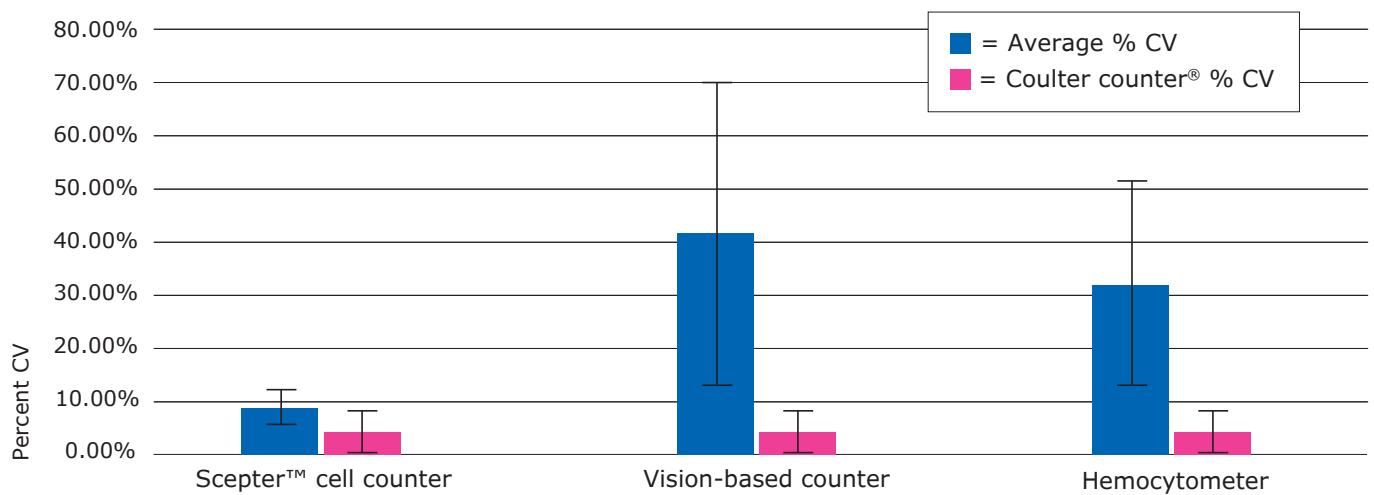
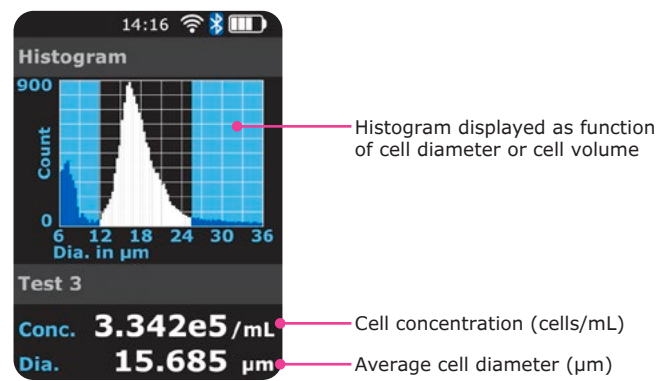
**Figure 1.**

As cells flow through the aperture in the Scepter™ sensor, resistance increases. By Ohm's Law ( $V=IR$ , where  $V$ =voltage,  $I$ =current, and  $R$ =resistance), voltage also increases, and is recorded by the instrument.



# Scepter™ cell counters deliver precision

There is no need to rely on subjectively-determined cell counts, as required by vision-based counting methods. The Scepter™ cell counter uses the Coulter impedance principle to detect every cell and displays the population as a histogram of cell size or volume distributions. From the histogram, count every cell, or use the gating function to count a chosen subpopulation. By monitoring changes in the histogram, you can gain insight into the health and status of your cell culture from one experiment to the next.



	Format	Counting methods	Sample volume needed	Sample volume counted	Cells counted in a 100,000 cell/mL sample	Average % CV
Hemocytometer	Slide and microscope	Manual, vision-based	10 $\mu\text{L}$	0.1 $\mu\text{L}$ /square	10/square	41.8
Brand L	Benchtop	Automated vision-based system	10 $\mu\text{L}$	0.4 $\mu\text{L}$	40	32.1
Scepter™ Cell Counter	Handheld	Impedance-based cell detection	100 $\mu\text{L}$	50 $\mu\text{L}$	5000	9.1

**Figure 2.** The average percent coefficient of variation (CV) for each counting method shown was calculated from cell concentration measurements at 50,000 cells/mL samples of 19 different cell lines. The Scepter™ cell counter is more precise than vision-based counting and hemocytometry, and approaches the precision of the Coulter Counter® standard (magenta bars). Error bars represent standard deviation.

## Precise counts, faster and easier.

### Prepare the sample:

Start with a single-cell suspension, diluted to a total volume of 100  $\mu\text{L}$  (the minimum volume required for an accurate count) in phosphate buffered saline (such as EmbryoMax® 1x DPBS) to 10,000-500,000 cells/mL (operating range for 60  $\mu\text{m}$  sensor) in a 1.5 mL microcentrifuge tube.

### Perform cell count:

- Turn on the Scepter™ 3.0 cytometer by pressing the menu button on the face of the instrument, and wait for on-screen instructions to appear.
- When prompted, attach a sensor to the end of the Scepter™ unit with the electrode sensing panel facing toward the front of the instrument, and you'll see detailed instructions for each step of the counting process.
- When the display prompts you, press OK to begin drawing up sample. 50  $\mu\text{L}$  of your cell suspension is drawn into the microfabricated, precision-engineered channel embedded in the sensor. The cell sensing zone detects each cell drawn through the sensor, and cell concentration is subsequently calculated.
- The sensing zone also measures cell sizes and cell volumes with sub-micron and sub-picoliter resolution, enabling the Scepter™ cytometer to display a histogram distribution of cell size or cell volume.





# What makes the Scepter™ cell counter different?

The unparalleled accuracy of Coulter impedance counting in a handheld device

Thousands of cells per sample are counted in seconds, returning histogram data binned by cell size or volume

Technical support direct from Millipore® scientists, who developed the instrument

Mounts anywhere for storage and charging

A USB port that lets you easily access your data

Easy-to-read cell count histogram display

Ergonomic placement of power and function buttons for sustained, fatigue-free use

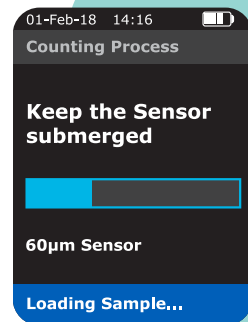
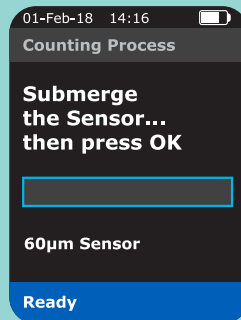
Wireless transmission of results from instrument to printer or to a lab workstation

Precise Coulter technology in a smaller, sturdier, more economical sensor

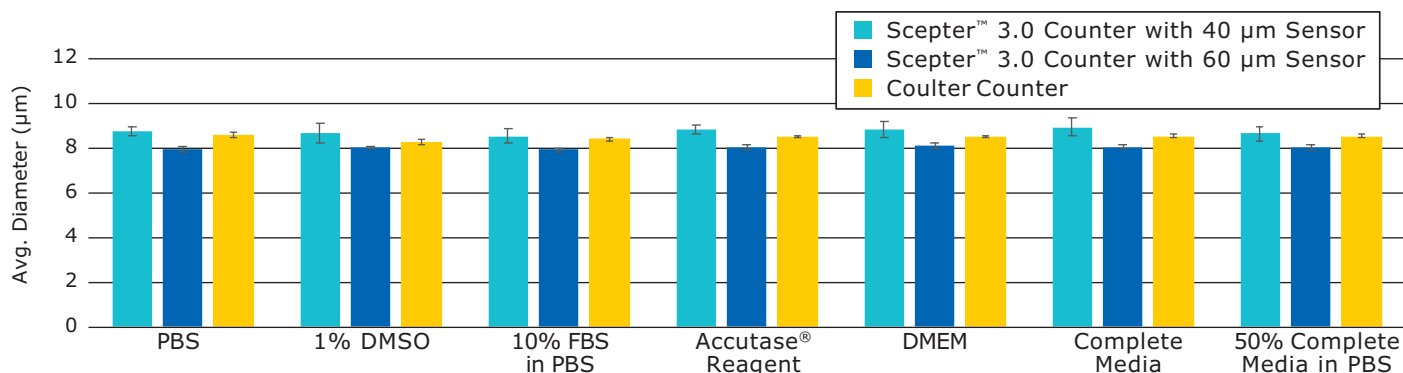


**Scepter™ 3.0 counts are more efficient and reliable than ever before**

# With the Scepter™ 3.0 instrument, Count on this:



## Consistent data from diverse samples

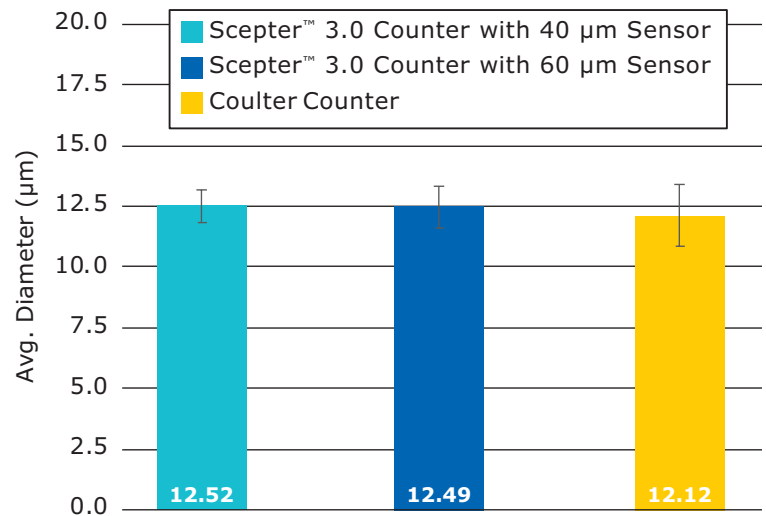


Polystyrene beads of known diameter (8 µm) suspended in various cell culture buffers and reagents were measured using the Scepter™ 3.0 Cell Counter with both 40 µm and 60 µm sensors. Results are compared to the same counts obtained with a Coulter Counter Z2™ Instrument equipped with 100 µm aperture. Data are from three measurements per sample.

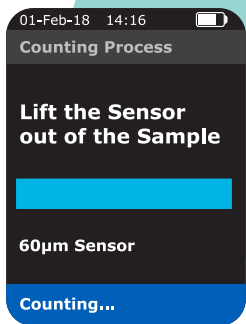




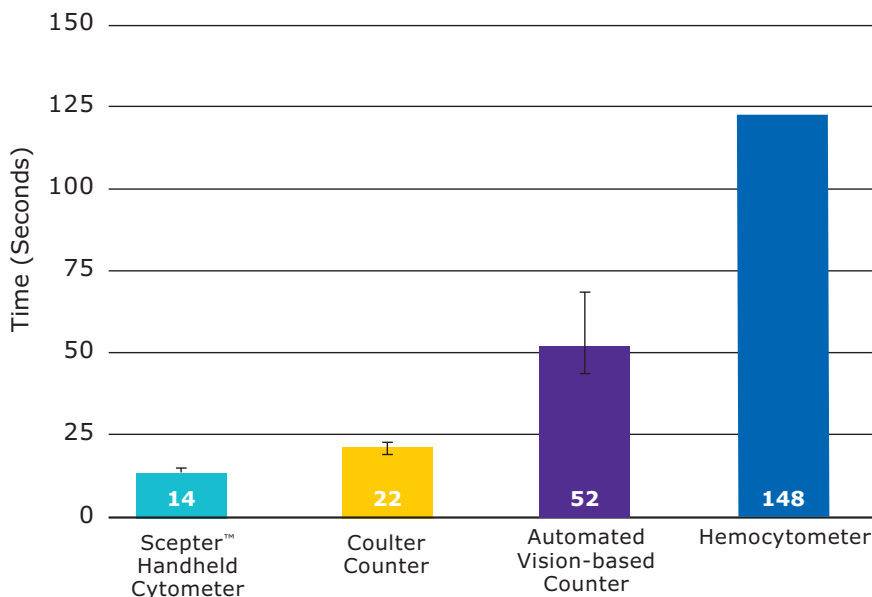
# Precision cell measurements



Jurkat cells were measured to test accuracy and reproducibility of cell size measurements using the Scepter™ 3.0 Cell Counter with both 40 µm and 60 µm sensors. Results are compared to the same measurement obtained with a Coulter Counter Z2™ Instrument equipped with 100 µm aperture. Data are from five measurements per sample.

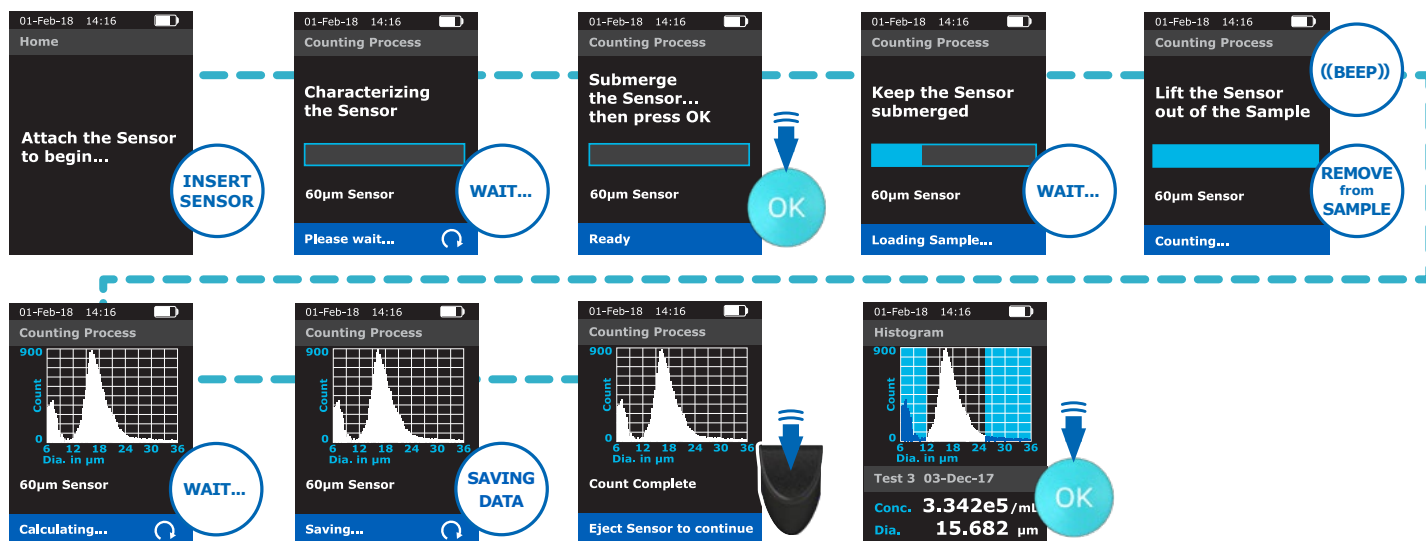


# Rapid counts



The time required to perform cell counts using various methods was compared using a sample concentration of 500,000 cells/mL. Scepter™ counting (14 seconds on average, using the 60 µm sensor) is significantly faster than other counting methods. Using the 40 µm sensor, Scepter™ counts are complete within 25 seconds, on average (data not shown).

# Sample and Count



## Ordering Information

Description	Quantity	Cat. No.
<b>Scepter™ 3.0 Handheld Automated Cell Counter</b>		
Kit with 40 µm Scepter™ 3.0 Sensors (50 Pack)	1	PHCC340KIT
Kit with 60 µm Scepter™ 3.0 Sensors (50 Pack)	1	PHCC360KIT
<b>Each Kit Includes:</b>		
Scepter™ 3.0 Handheld Automated Cell Counter		
Scepter™ 3.0 Cell Counter Sensors (50 Pack)		
Scepter™ 3.0 Charger Station		
Scepter™ 3.0 Test Bead Vial		
<b>Cell Counter Sensors &amp; Accessories</b>		
Scepter™ 3.0 Cell Counter Sensors, 60 µm	50/pk	PHCC360050
Scepter™ 3.0 Cell Counter Sensors, 60 µm	250 (5 x 50/pk)	PHCC360250
Scepter™ 3.0 Cell Counter Sensors, 40 µm	50/pk	PHCC340050
Scepter™ 3.0 Cell Counter Sensors, 40 µm	250 (5 x 50/pk)	PHCC340250
Scepter™ 3.0 Charger Station	1 ea	PHCC3CHARG
Scepter™ 3.0 Charger Mounting Kit	1 ea	PHCC3WKIT
Scepter™ 3.0 Test Bead Vial	1 ea	PHCC3BEADS

## Export your Scepter™ count data wirelessly or by USB transfer, and you can:

- Compare several samples and data sets side by side using virtually any spreadsheet program
- Create graphical representations and meaningful reports with your data

## With a portable instant printer, you can:

- Create a printout of the count display to be added to lab notebook or other archival record



**Table 1. Cell types validated with the Scepter™ cell counter and the recommended Scepter™ sensor**

Cell Type	Measured size (µm)	40 µm sensor	60 µm sensor
2102 Ep	15-19		*
454 (Beads)	28		*
A10	22 - 24		*
A172	15		*
A253	14-18		*
A375	16		*
A431	15-17		*
A549	11-15		*
Algae (various)	7-9	*	*
B35	13-16	*	*
B Cells	6-11	*	
C2C12	12	*	*
C305	12-14	*	*
C6	12-13		*
CA46	10-12	*	*
Caco-2	17		**
CHO	13-17		**
COS-1	12	*	
COS-7	15		*
D283	12	*	
Daudi	10-12	*	*
DU-145	15-17		*
EL4 (Blood Murine Lymphoblast)	12-14	*	*
Epithelia	14-15		*
Epithelia MDA-MB-231	16-17	*	*
HCC827 (Human lung adenocarcinoma)	18		*
HCT-116	10	*	*
HEK293	11-16		**
HeLa	12-15	*	**
HepG2	12-17	* <sup>1</sup>	**
HFF	18-20		*
Hs27	14	*	*
HT-1080 (fibrosarcoma)	14-16		**
HT-29	11		*
HUH7 (Hepatoma)	not available		*
Human ES Cells	9-12	*	*
HUVEC	14-15		*
Hybridoma	13-14		*
T cells: CD3+	11-12	*	*
THP 1 (Human blood monocyte)	12-13	*	*
TF-1	13-14	*	*
U251	16-20		*
HepG2	12-17	* <sup>1</sup>	**
HFF	18-20		*
Hs27	14	*	*
HT-1080 (fibrosarcoma)	14-16		**
HT-29	11		*
HUH7 (Hepatoma)	not available		*
Human ES Cells	9-12	*	*
HUVEC	14-15		*
Hybridoma	13-14		*
T cells: CD3+	11-12	*	*
THP 1 (Human blood monocyte)	12-13	*	*
TF-1	13-14	*	*
U251	16-20		*
U2OS	16-19		*
U266	12		*
U87 (Human Glioblastoma)	12-14		*
U937	11-13	*	*
WI-38	12-15		*
Y79	13-14		*
Yeast- Pichia Pastoris	5	*	
Yeast - S. cerevisiae	6	*	
IMR-32	12-14	*	*
IMR-90	15	*	*
iPSCs	16-17	* <sup>1</sup>	*

Cell Type	Measured size (µm)	40 µm sensor	60 µm sensor
Jurkat	12-13	*	**
K562	14		*
KB	10-13		*
KG-1	10-13	*	*
L6	14-16		*
LNCaP	15-16		*
Luminex® beads	5-6	*	
MCF7	15-21		**
MDCK	13-15	*	**
Meg-01	16-17	*	*
MG-63	15-17		*
Mouse ES Cell	5-13	*	*
MN9D (Mouse Dopaminergic Neuronal)	15		*
MSC (Mesenchymal Stem Cells)	15-16	** <sup>1</sup>	*
MRC-5	18		*
NCI-H146	10-13	*	
NIH 3T3	14-16	*	**
3T3-L1	15-16		*
NTERA2, clone D1	13	*	*
OK	17-18		*
PBMCs Human Blood	6 - 12 [lymphocytes ~ 7 µm and monocytes ~ 10 µm]	**	
PC12	9-15	*	*
Primary Astrocytes	7	*	
Primary Neuronal Cell	Varies	*	
Raji	12-15	*	*
Ramos	11-12	*	*
Rat Dorsal Root Ganglion Cells	20-30	*	
Rat Whole Blood suspension	4-6	**	
Rat Whole Blood suspension	4-6	**	
Red Blood Cells	5-7	*	
Rat Neural Stem Cell (RNSC)	11-13		*
RAW 264.7 Cell Line murine macrophage from blood	11-13	*	*
RBL	11-13	*	*
RIN-mF5	13-14		*
S462 (Human Peripheral Nerve Sheath Tumor)	16		*
SF9 (Insect Ovary)	13		*
SH-SY5Y	12		*
Sk-Br-3	15-20		*
SK-MEL-28	17-19		*
SK-N-MC	14-15		*
SK-N-SH	14-15		*
Splenocytes	7-9	*	
SW-480	15		*
SW-620	13-14	*	*
T84	14-18		*
T98G	17		*
T cells: naïve	5-7	*	*
T cells: CD3+	11-12	*	*
THP 1 (Human blood monocyte)	12-13	*	*
TF-1	13-14	*	*
U251	16-20		*
U2OS	16-19		*
U266	12		*
U87 (Human Glioblastoma)	12-14		*
U937	11-13	*	*
WI-38	12-15		*
Y79	13-14		*
Yeast- Pichia Pastoris	5	*	
Yeast - S. cerevisiae	6	*	

\* Recommended based on size \* Customer Validated \* Scepter™ 2.0 Validated or \* Scepter™ 3.0 Validated

<sup>1</sup> Histograms may be cut-off at high concentrations, dilution may be needed.

**For more information on available cell lines, visit: [SigmaAldrich.com/scepter-validated-cell-types](https://sigmaaldrich.com/scepter-validated-cell-types)**



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