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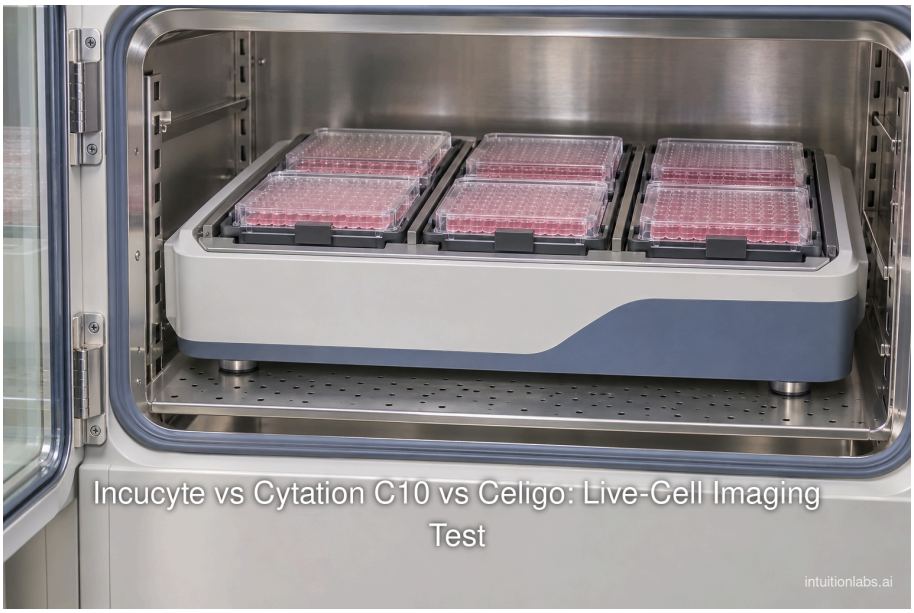
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Incucyte vs Cytation C10 vs Celigo: Live-Cell Imaging Test

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Executive Summary

Incucyte, Cytation C10 and Celigo overlap for some live-cell assays, but they are three different acquisition architectures, and no public, independent benchmark ranks them against each other. As of November 2026, the documented differences are structural. The **Incucyte SX5** sits inside a tissue-culture incubator (Sartorius states an incubator larger than 200 L is required) and holds up to six microplates (www.sartorius.com). The **Cytation C10** pairs spinning-disk confocal and widefield imaging with an optional **BioSpa 8** automated incubator that, per third-party-hosted Agilent documents, holds up to eight plates (agilent.nt-rt.ru). The **Celigo** is a benchtop whole-well image cytometer that Revvity says integrates with robotic arms, stackers and automated incubators (resources.revvity.com).

The buying decision is therefore a scheduling and data-lineage decision, not a "best microscope" decision. A worked scheduling model in this report (hypothetical inputs, labeled as such) shows how six plates per cycle can be feasible at a 60 minute interval for one architecture and infeasible for another once plate handling, settling time, imaging time and analysis time are all counted. A hypothetical storage model (6 plates, 96 wells, 4 fields, 3 channels, 37 timepoints, 2304 by 2304 pixels at 2 bytes) yields **about 2.7 TB** of uncompressed images per experiment, which is roughly 3.3 TB once an assumed 2:1 compression, 20% derived files and two copies are applied. At the published Amazon S3 Standard list price of $0.023 per GB-month, that is **about $75 per month** (pricing.us-east-1.amazonaws.com).

Configuration matters as much as brand. Sartorius lists the AI Stem Cell QC module (catalog **BA-04909**) as a separate purchase (www.sartorius.com) and lists expanded CX3 application support in release 2026B (www.sartorius.com); those CX3 features must not be assigned to the SX5. Revvity states that the Image Artist platform and the Celigo are sold separately (resources.revvity.com). Agilent offers Gen5 editions, with Secure editions carrying 21 CFR Part 11 features (cqls.oregonstate.edu).

Independent evidence supports a pilot-first approach. In one study, outer wells of one 96-well plate brand (VWR) showed 35% lower metabolic activity than central wells, while another brand (Greiner) showed a smaller reduction of about 16% (pmc.ncbi.nlm.nih.gov), phototoxicity is reported to be unavoidable but manageable (publications.mpi-cbg.de), and segmentation models can generalize unevenly across cell types

(www.ncbi.nlm.nih.gov). Shortlist by assay, required time resolution and reusable data, set acceptance thresholds before testing, and require raw-image-to-result lineage in the vendor demo. This research is a desk analysis of vendor and independent documents; no hands-on throughput or accuracy measurements were run.

Introduction and Background

This report examines how a biotech cell-assay director, screening scientist, stem-cell researcher or R&D IT lead can compare three families of live-cell imaging systems when evaluating Incucyte, Cytation and Celigo side by side. It is a configuration-aware buying guide, not a ranking. The compared systems are the Sartorius **Incucyte** (S-series including the SX5, and the confocal CX3), the Agilent BioTek **Cytation C10** with BioSpa 8 incubation and automation options, and the Revvity **Celigo** image cytometer. It also answers the related questions buyers ask: Incucyte versus Celigo, Cytation C10 versus Incucyte, which comparison criteria matter for live-cell imaging systems, which platform is best for high-throughput assays, how Incucyte data management works, and what can honestly be said about the Cytation C10 without an independent review.

Start with the use case and required time resolution

Before comparing equipment, define the assay and the time resolution it needs. A growth or confluence curve may need an image every few hours. A cell-killing assay with a fast onset may need tighter sampling. A 3D spheroid or organoid assay may need Z-sampling or confocal sections, and an endpoint viability assay may need no kinetics at all. Time resolution is bounded by the sum of imaging, plate handling, settling and analysis time for every plate in a cycle, a model developed in the Performance and Benchmarks section. Because light exposure is itself a variable, an independent Nature Methods paper notes that fluorescence excitation generates damaging free radicals, so all live imaging involves some phototoxicity that can be reduced but not eliminated (publications.mpi-cbg.de).

Three architectures

- **Incubator-based imaging.** The instrument lives inside a standard incubator. Sartorius describes cells sitting stationary in the incubator while optics move below (www.sartorius.com).
- **Plate-reader/confocal imaging with automation.** The Cytation C10 is an imaging reader; BioSpa 8 adds an incubator with a robotic arm that moves plates to and from the connected instrument (www.szabo-scandic.com).
- **Whole-well cytometry.** Celigo captures whole-well images by moving the plate, using galvanometric mirrors for fast imaging of large areas (resources.revvity.com).

These architectures overlap for confluence, proliferation and some cytotoxicity assays, but they are not interchangeable for every experiment. Whole-well endpoint counting, kinetic imaging inside an incubator and confocal 3D sectioning stress different parts of the system.

Scope, sources and the publisher's perspective

All instruments discussed are described by their vendors as research tools. Under 21 CFR 809.10, a product in the laboratory research phase that is not represented as an effective in vitro diagnostic carries a research-use-only statement (www.ecfr.gov). Nothing here is a claim of clinical suitability or automatic compliance. This

report is an editorial desk analysis, and its focus is reproducible data flow rather than brand preference.

Source limits matter. Agilent's current C10 product pages were not used for specifications: C10 and BioSpa 8 specifications below come from Agilent-authored documents hosted by third parties, some of them older than the C10, and Celigo facts come from Revvity PDFs. They may differ from current Agilent and Revvity web pages, so re-confirm each matrix row in a written quote.

Sartorius Incucyte: S-Series, SX5 and CX3

Capabilities

The **Incucyte SX5** supports 3 interchangeable vessel trays and up to six microplates in parallel, and Sartorius says it is compatible with flasks, dishes, slides and microplates (www.sartorius.com). Its optics are 4x, 10x and 20x objectives on an automated turret, and its fluorescence offering is up to five channels, up to three at a time (www.sartorius.com). A 2020 technical datasheet lists 2.82 micrometers per pixel at 4X for the SX5 (medicine.biu.ac.il). The SX5 product page itself contains figures that differ between its prose and its spec table (for example vessel counts and channel counts), so a buyer should request a written configuration quote instead of relying on page text.

The **Incucyte CX3** adds spinning-disk confocal alongside wide-field fluorescence, HD phase and brightfield imaging (www.sartorius.com). Sartorius's July 31, 2025 press release states it can run up to six 96-well plates simultaneously, a vendor claim without a published scan time (www.sartorius.com). Software release 2026B adds CX3-specific support for embedded multi-spheroid and organoid assays with the 10X objective and for organoid quality control workflows with 4X confocal imaging (www.sartorius.com). Those are CX3 features. They should not be attributed to the SX5.

Analysis modules, data management and adoption evidence

Base software includes classic and AI-driven analysis, and analysis definitions can be created once and reapplied to later experiments (www.sartorius.com). The 2023 Sartorius comparison datasheet states that all software modules are sold separately (www.sartorius.hr); the SX5 page text markets 11 application-specific modules while its compatibility table lists more entries, so confirm the module list in the quote. The **AI Stem Cell QC** module, catalog number BA-04909, segments stem cell colonies and classifies pluripotency from phase-contrast images, and the 2026B page lists it for purchase on CX3 systems running software 2026B or higher alongside S-Series systems (www.sartorius.com). The **AI Cell Health** module requires a GPU co-processor and is described by the vendor as based on training sets containing millions of cells (www.sartorius.com). No applicability limits by cell type were found on the vendor page, so buyers should test on their own lines against independent labels.

On data handling, Sartorius lists automatic archiving to a designated network location as included on S3 and SX5 systems, and release 2026A adds **Auto Backup** that copies acquisition data shortly after scans complete (www.sartorius.com). The SX5 lists 43.6 TB of controller storage expandable by 32.7 TB with Incustore (www.sartorius.com), while the older S3 datasheet listed 16.4 TB, so specifications vary by build date (sartorius.hr). The optional **21 CFR Part 11 software module** (BA-04876) captures an audit log of events and user actions; the vendor describes it as supporting Part 11 requirements, not as a certification

(www.sartorius.com). Adoption evidence is indirect: the public **LIVECell** dataset contains 5,239 expert-validated Incucyte HD phase-contrast images, with Sartorius staff among the authors (www.ncbi.nlm.nih.gov). Installed-base counts were not found.

Strengths and limitations

- **Strengths:** The plate stays in the incubator during acquisition, independent vessel scheduling is listed for the SX5 and S3 in the 2023 comparison guide, and archive and backup features are documented (www.sartorius.hr).
- **Limitations:** The instrument requires incubator space (more than 200 L for the SX5), modules are priced separately, no vendor scan-time figure was found on the fetched pages, and per-object and CSV export scope is documented only partly (AI Cell Health object-level export was added in 2025B) (www.sartorius.com).

Agilent BioTek Cytation C10 with BioSpa 8

Capabilities

The **Cytation C10** is a spinning-disk confocal plus widefield imager. A third-party-hosted, undated copy of Agilent technical details lists a 6-line laser for confocal imaging and four user-replaceable fluorescence cubes plus brightfield for widefield (agilent.nt-rt.ru). A March 2024 Agilent brochure describes a Hamamatsu sCMOS camera with 60 and 40 micrometer Nipkow disks and water-immersion objectives, which Agilent says reduce phototoxicity potential, a vendor claim without data in the excerpt (genomics2.lsu.edu). Laser and image-based autofocus are listed, and Gen5 supports Z-stacks of up to 200 slices and montage capture of up to 2,000 tiled images per channel (genomics2.lsu.edu). Reseller catalog text shows configurations differ by catalog number, for example Sony versus Hamamatsu cameras, so the exact catalog number belongs in the quote (www.fishersci.com).

Live-cell work depends on incubation. The **BioSpa 8** holds up to 8 microplates or other labware, with a robotic arm moving plates between the incubator and the connected instrument (www.szabo-scandic.com). Its technical details, from the same third-party-hosted copy, list a plate height range of 7.6 to 25.4 mm and 80 to 95% relative humidity for lidded plates at 5% CO2 (agilent.nt-rt.ru). A legacy BioTek datasheet claims uninterrupted runs of up to 2 weeks and an OnDemand mode for multi-user labware changes, but it predates the C10 and does not list it (www.szabo-scandic.com). The **BioStack**, a separate stacker, manages up to 50 plates for automated imaging (genomics2.lsu.edu).

Analysis, data and adoption evidence

Gen5 edition families include Gen5, Image+ and Image Prime, plus Secure editions carrying 21 CFR Part 11 features, and an optional OLE Automation Toolkit supports robotic integration, per Agilent's Gen5 Getting Started Guide (2022) (cqls.oregonstate.edu). The current Gen5 page adds an optional AI cell identification and segmentation module and notes image-based or laser-based autofocus (www.agilent.com). A core-facility guide for Gen5 3.12 reports raw images saved as 16-bit TIFFs and quick export to Excel in several views

(uoguelph.ca); that is a third-party guide, not Agilent documentation. A third-party SiLA 2 connector was developed and tested against Gen5 version 3.14, which indicates a path to lab automation software but not a vendor guarantee (docs.unitelabs.io).

Independent adoption evidence for the C10 is thin in this research. A 2025 peer-reviewed study used a Cytation 5, not a C10, and observed that the instrument has no humidified environment, which is a reminder that incubation configuration differs across the Cytation family (www.ncbi.nlm.nih.gov). No independent review of the C10 with measured benchmarks was found.

Strengths and limitations

- **Strengths:** Confocal and widefield modes in one instrument, Z-stack and montage capture, a documented automation toolkit and a Secure edition option.
- **Limitations:** Plates are moved between incubator and imager, so handling and settling time enter every cycle; no Agilent plate-transfer time was found; and the BioSpa datasheet cited here is older than the C10, so confirm current figures with Agilent.

Revvity Celigo and Image Artist

Capabilities

The **Celigo** is described by Revvity as imaging in brightfield and up to four fluorescent channels, with microplates from 6 to 1536 wells and T-flask formats (resources.revvity.com). Its camera is a 2024 by 2024 pixel large-chip CCD, and it offers hardware autofocus, image-based autofocus and manual focus (resources.revvity.com). The brochure claims under 2 minutes per 384-well plate, and the applications guide claims about 9 minutes for a 96-well high-throughput counting and viability workflow and about 18 minutes to results for a T cell cytotoxicity workflow in 96-well format; these are vendor claims and assay-specific, not benchmarks (resources.revvity.com). The Basic suite lists Direct Cell Counting, and the Classic suite adds zonal tumorsphere analysis, with a separate virology license for virology applications (resources.revvity.com).

Celigo is not an in-incubator imager. Revvity's brochure describes an automation configuration pairing it with an external incubator and a robotic arm, and a stacker option of up to 50 plates aimed at endpoint assays (resources.revvity.com). Native acquisition and analysis run in Celigo software with a Project Mode workflow, and data and images export through FCS Express in **FCS and ICE** formats (resources.revvity.com). The applications guide also says counting results export as standard CSV files for graphing programs (resources.revvity.com).

Image Artist, data and compliance options

Image Artist is separate from native acquisition. Revvity states that the Image Artist platform and the Celigo are sold separately (resources.revvity.com). The Image Artist flyer lists remote browser-based data access and analysis and cloud or on-premise deployment (resources.revvity.com), and a Revvity brochure describes a central location for all image data with associated instrument metadata (resources.revvity.com). A 2023 brochure describes building blocks with integrated AI (revvitysignals.com). The Celigo specification sheet lists a Microsoft SQL Server 2019 license in the included PC (resources.revvity.com). The optional 21 CFR Part 11

ready module provides an audit trail, e-signatures and user roles, runs in **Celigo Express** and may be enabled at purchase or added later (resources.revvity.com). No Celigo-specific permission or Part 11 details were found for Image Artist, and no public application programming interface (API) was documented in the pages read.

Adoption, strengths and limitations

A 2016 peer-reviewed validation described Celigo cell counting compared with an automated counter and reported 96- to 384-well plates analyzed in under 7 minutes, though the abstract gives no agreement statistic and the study did not involve Incucyte or Cytation (pmc.ncbi.nlm.nih.gov).

- **Strengths:** Whole-well coverage rather than sampled fields, fast endpoint scanning claims, and colony records traceable to scan date, time and well location (resources.revvity.com).
- **Limitations:** No documented in-instrument environmental control, kinetic cadence depends on an external incubator and robot, no objective magnification was found in the documents read, and the extra data platform is a separate purchase.

Feature Comparison

Table 1 below is a configuration matrix, not a scorecard. Each row should be dated and tied to a written quote: the Incucyte rows reflect Sartorius pages read in November 2026 (software 2026B family), the Cytation row reflects Agilent documents with undated or 2017 to 2024 provenance, and the Celigo row reflects Revvity PDFs copyrighted 2024 to 2025.

Dimension	Incucyte SX5	Incucyte CX3	Cytation C10 + BioSpa 8	Celigo (brightfield + up to 4 fluorescence)
Architecture	In-incubator, stationary plates	In-incubator, stationary plates	Imager with robotic plate transfer from incubator (www.szabo-scandic.com)	Benchtop whole-well scanner; external incubator and robot for kinetics
Sample capacity	Up to 6 microplates, 3 trays	Up to six 96-well plates (vendor press claim)	BioSpa 8 holds up to 8 plates (per third-party-hosted documents)	Stacker option up to 50 plates
Optics and channels	4x/10x/20x; up to 5 fluorescence channels, 3 at a time (the vendor spec table says "up to 6"; confirm in the written quote)	Spinning-disk confocal and widefield	Confocal and widefield; 4 widefield cubes plus brightfield	Brightfield plus up to 4 fluorescent channels; pixel-size based optics
Environment	Incubator you provide (more than 200 L)	Incubator you provide (vendor lists more than 250 L)	BioSpa humidity 80 to 95% for lidded plates	External incubator option
Analysis modules	Separately sold	Separately sold; 2026B adds CX3 support	Gen5 editions; optional AI module (www.agilent.com)	Application suites; Image Artist sold separately

Dimension	Incucyte SX5	Incucyte CX3	Cytation C10 + BioSpa 8	Celigo (brightfield + up to 4 fluorescence)
Archive and export	Auto archive and backup	Auto backup (2026A)	TIFF images, Excel export (core-facility guide) (uoguelph.ca)	FCS/ICE via FCS Express; CSV for some applications
Compliance option	Part 11 module sold separately	Part 11 module listed on page	Gen5 Secure editions (Part 11 features)	Part 11 ready module
Quote scope to confirm	Tray set, optical module, modules, storage	Confocal modules, 2026B features	Catalog number, camera, BioSpa, Gen5 edition	Config number, suites, stacker, Image Artist

Table 1 shows that the same word, "capacity", means different things: six plates inside an incubator, eight plates in a separate incubator behind a robot, or fifty plates in a stacker for endpoint work. Cells without a citation restate facts cited in the vendor sections above or are items for the buyer to confirm in writing. The matrix also shows why optics grids alone mislead: the bottleneck often sits in handling, storage, analysis licensing or export.

Performance and Benchmarks

No independent benchmark that runs Incucyte, Cytation C10 and Celigo on the same assay was found. Brochure timings are therefore vendor claims for different assay definitions, and they cannot be ranked against each other.

Scheduling calculator

For a cycle of N plates, define per-plate acquisition time a = imaging + plate handling + settling. With c plates acquired in parallel and analysis run on m workers, the minimum interval is bounded as follows.

- **Pipelined analysis:** interval is at least the larger of N times a divided by c, and N times analysis time divided by m.
- **Blocking analysis** (analysis uses the acquisition computer): interval is at least N times a divided by c, plus N times analysis time divided by m.
- **Exposure out of the incubator** per plate per cycle is handling + settling + imaging for architectures that move plates, and near zero for stationary-plate systems.

Table 2 applies the model to labeled hypothetical inputs for six plates per cycle over 72 hours, assuming one plate acquired at a time (c = 1) and one analysis worker (m = 1). These are not vendor or benchmark values.

(Hypothetical Example) Scenario	Imaging per plate	Handling + settling	Analysis per plate	Min interval, pipelined	Min interval, blocking	Timepoints in 72 h at pipelined minimum	Feasible at 60 min?
A: in-incubator, stationary plates	10 min	0 min	3 min	60 min	78 min	73	Yes if pipelined, no if blocking

(Hypothetical Example) Scenario	Imaging per plate	Handling + settling	Analysis per plate	Min interval, pipelined	Min interval, blocking	Timepoints in 72 h at pipelined minimum	Feasible at 60 min?
B: reader plus automated incubator	12 min	2.5 min (1.5 + 1.0)	4 min	87 min	111 min	50	No
C: whole-well scanner, external incubator and stacker	5 min	1.5 min (1.0 + 0.5)	2 min	39 min	51 min	111	Yes in both cases

The hypothetical calculation shows three things. First, scenario B cannot meet a 60 minute interval for six plates: its imaging alone (6 x 12 = 72 min) already exceeds 60 minutes, and handling and settling (2.5 min per plate) add a further 15 minutes per cycle. Second, whether analysis is pipelined or blocking changes feasibility for A by 18 minutes. Third, each fast scenario still leaves cells exposed to light and handling that the pilot must evaluate. Replace every input with timed measurements from the vendor demo, using your plates, volumes and objectives.

What independent evidence says about the cost of speed

Frequent imaging has biological costs. One study irradiating unlabeled RPE1 cells found a dose-dependent decrease in the fraction entering mitosis, and splitting a fixed dose into brief pulses gave only a minor, inconsistent improvement (pubmed.ncbi.nlm.nih.gov). The review authors recommend building a dose-response curve per sample and instrument, and note that phototoxicity thresholds differ between species and life-cycle stages, so a pilot must set its own limits (publications.mpi-cbg.de). Plate position matters too: a 72 hour study found 35% lower metabolic activity in outer wells of one plate brand, different brands showed different edge effects, and filling spaces around outer wells improved results; the authors recommend each laboratory test its own plates in its own environment (pmc.ncbi.nlm.nih.gov). These are single-study findings with one cell line, not platform properties.

Segmentation and AI evidence

Agreement with human annotation depends on the annotator and the cell type. The Cell Tracking Challenge segmentation metric is an averaged Jaccard index matched to each annotation (arxiv.org), and Cellpose 2.0 authors note annotation styles can vary dramatically between annotators (pmc.ncbi.nlm.nih.gov). In LIVECell, label-free counts correlated with nuclear counts at 98% and 94% for two cell lines up to 95% confluency, yet all images came from one imaging platform and magnification, and models trained on a single cell type varied greatly in generalization (www.ncbi.nlm.nih.gov). **Cellpose** is a generalist model trained on over 70,000 segmented objects (pubmed.ncbi.nlm.nih.gov), yet pretrained models can perform suboptimally on images very different from their training images, and a 2025 preprint likewise reports that generalist segmenters degrade on domains that differ from their training data (pmc.ncbi.nlm.nih.gov) (arxiv.org). This is a reason to test any AI module, including Incucyte AI modules and Gen5's optional AI segmentation, on buyer cell types with independent labels.

Pilot design

- **Identical controls:** Plate the same cell lines, densities and reference wells (blank, untreated, positive kill control) on each platform.
- **Lock settings first:** Freeze objectives, exposure, analysis definitions and software version before scoring.
- **Blinded annotation:** Have two annotators label a sample of fields; measure agreement as Jaccard or counts against labels, with thresholds set by assay owners beforehand.
- **Completeness:** Record edge-well and timepoint completeness, reruns and recovery success from archive.
- **Reproduction test:** A second analyst reproduces results from raw images and settings alone.

Data Analysis and Evidence

Raw-image-to-result lineage

Reproducible results need **images, analysis settings, software version and instrument metadata**, not just a metrics file. A minimum lineage record per accepted result has these parts:

- **Raw images:** the original files for every well, field, channel and timepoint, with an identifier.
- **Analysis settings:** the exact analysis definition or protocol file used, frozen before scoring.
- **Software versions:** acquisition and analysis software release (for example Incucyte 2026B or Gen5 3.14).
- **Instrument metadata:** objective, exposure, channel, plate, well and timestamp fields.
- **Derived data:** masks, object tables and the metrics CSV, stored apart from raw images.
- **Audit and access:** who ran, edited and exported the data, and who can restore it.

Published guidance supports this list. A Nature Methods community checklist states that at the minimal level key processing parameters must be reported, and recommends stating all settings in the methods (www.nature.com). The **REMBI** metadata guidelines state that metadata on imaging methods are vastly under-reported in biomedical research, and its authors acknowledge that expanding required metadata beyond the basic information is currently difficult (pmc.ncbi.nlm.nih.gov). The Findable, Accessible, Interoperable, Reusable (FAIR) principles require, for example, a globally unique and persistent identifier for data, retrieval by identifier over a standardized protocol, and a shared language for knowledge representation (www.nature.com). Under 21 CFR 11.3, an electronic record includes pictorial information in digital form, so images are records, not just metrics (www.ecfr.gov). For formats, **OME-TIFF** embeds OME-XML in the ImageDescription tag of the first image file directory and allows BigTIFF extensions such as .ome.tf2, while OME-Zarr uses the Zarr format and its arrays are up to five-dimensional (ome-model.readthedocs.io) (ngff.openmicroscopy.org). A 4D Nucleome proposal defines one descriptive and two analytical metadata tiers (pmc.ncbi.nlm.nih.gov).

Mapped to the vendors: Incucyte documents reusable analysis definitions and archive/backup (www.sartorius.com); Agilent saves each image as a TIFF with metadata per its Gen5 guide (cqls.oregonstate.edu); Revvity ties colony records to scan date, time and well. Where audit trails are required,

21 CFR 11.10(e) calls for secure, computer-generated, time-stamped audit trails and says record changes shall not obscure previously recorded information (www.ecfr.gov). The FDA and the UK MHRA describe attributable, legible, contemporaneous, original and accurate records (ALCOA), with MHRA extending it to complete, consistent, enduring and available (ALCOA+) (fda.gov) (assets.publishing.service.gov.uk). These are generic principles, and vendor Part 11 options are feature descriptions, not certification of a lab's process.

For electronic lab notebook (ELN) and automation transfer, the documented hooks are uneven: the Gen5 guide documents an OLE automation toolkit, third-party SiLA 2 connectors exist for Gen5, Celigo exports FCS/ICE files, and Incucyte documents file and metric exports in older datasheets (sila-standard.com) (docs.unitelabs.io) (medicine.biu.ac.il). Allotrope describes itself as a consortium on how scientific data is acquired, shared and analyzed, and its data format uses HDF5 as the underlying container (www.allotrope.org) (www.hdfgroup.org). Ask each vendor what metadata fields travel in each export.

Storage estimate and calculator

Storage = plates times wells imaged times fields per well times channels times timepoints times pixels per image times bytes per pixel, then adjusted for compression, derived files, replicas and retention. A TIFF stores width and height in pixels, and 16 bits per sample (www.itu.int); scientific CMOS cameras offer 16-bit output (hep.hamamatsu.com). The Library of Congress describes TIFF as a tag-based file format for storing and interchanging raster images (www.loc.gov). Lossless compression is dataset-dependent: one preprint recommends BLOSC with ZSTD while noting little consensus, and another reports a lossless ratio of only 2.7 on a localization image (pmc.ncbi.nlm.nih.gov) (www.biorxiv.org).

Table 3 shows a hypothetical worked example. Inputs are labeled hypothetical, and the image size is chosen from a 2304 by 2304 pixel sensor format for arithmetic only.

(Hypothetical Example) Step	Input or formula	Result
Images per experiment	6 plates x 96 wells x 4 fields x 3 channels x 37 timepoints	**255,744 images**
Bytes per image	2304 x 2304 x 2 bytes	10,616,832 bytes (about 10.1 MiB)
Raw volume	255,744 x 10,616,832	**about 2.72 TB (2.47 TiB)**
After assumed 2:1 lossless compression	Raw divided by 2	about 1.36 TB
Add 20% masks and pyramids, two replicas	1.36 x 1.2 x 2	**about 3.26 TB**
S3 Standard storage, us-east-1	3,260 GB x **$0.023** per GB-month (pricing.us-east-1.amazonaws.com)	about $75 per month, about $900 per year
S3 Glacier Flexible Retrieval	3,260 GB x $0.0036 (pricing.us-east-1.amazonaws.com)	about $12 per month
S3 Glacier Deep Archive	3,260 GB x $0.00099 (aws.amazon.com)	about $3 per month; 180 day minimum (aws.amazon.com)

The example implies that a 43.6 TB controller volume would hold only about 16 experiments of raw images of this design at the assumed size, but Incucyte's internal storage format and compression are not documented in the sources read, so this ratio is illustrative, not a claim about the SX5. Cloud prices vary by region and tier (Google lists a regional Standard rate as $0.000027397 per gibibyte-hour, about $0.020 per GiB-month by our calculation) (cloud.google.com). Keep metrics CSV files separate from raw images and settings, since the CSV is small but cannot reproduce segmentation.

Total cost of ownership

TCO = annualized hardware + service + modules + automation and incubation + storage and backup + integration + review and reruns. Cost per accepted assay = annual TCO divided by (runs times observed pass fraction). In a unitless illustration (hypothetical), an annual cost of 100 units over 200 runs gives 0.588 units per accepted assay at an 85% pass fraction and 0.714 at 70%, a 21% increase. No quotes were obtained, so no instrument prices are given. Request itemized quotes for each module named in Table 1.

Implications and Future Directions

Conditional shortlist

- **Continuous kinetic growth or killing across many plates:** An in-incubator system fits when long runs with minimal plate movement matter, subject to your confirmed tray, module and storage quote.
- **3D, organoid or sub-cellular detail:** Confocal options (CX3 or C10) fit; test Z-sampling and light dose on your model before assuming 3D accuracy.
- **Endpoint or high-throughput whole-well counting and viability:** Celigo's whole-well workflows are a candidate, with an external incubator and robot only if kinetics are needed.
- **Mixed needs and heavy regulatory or ELN traceability:** Prioritize export scope, audit options and reanalysis from archive over optics.

Current documentation is a reason to revisit configuration-aware procurement, not proof of superior biology or AI accuracy. The Incucyte stem-cell AI module, Gen5's AI option and Image Artist's AI blocks are all newly documented vendor features; none has independent labels-based validation in the sources read.

Evidence gaps and vendor-demo questions

- **Timing:** What is the measured scan time for the buyer's plates, objectives and channels, including handling and settling?
- **Environment:** What temperature and CO2 excursions occur during plate transfer, and how are edge wells handled?
- **Data:** Which formats, metadata fields and analysis settings export with the images, and can another analyst rerun a result from an archive?
- **Permissions and recovery:** How are roles set, and can archived experiments be restored and reanalyzed?
- **AI modules:** What were the training cell types, and how does the module behave on the buyer's own cell lines?

- **Scope:** Which items are in the quote, and which are optional?

Not yet established: independent cross-platform segmentation agreement, measured phototoxicity differences between platforms, and instrument price lists. Vendor documentation changes frequently, so recheck versions at quote time.

Frequently Asked Questions (FAQs)

Incucyte vs Celigo: which is better?

Neither is better in general. Incucyte is an incubator-resident kinetic system (www.sartorius.com), whereas Celigo, as described in its Revvity brochure and covered above, is a whole-well scanner that needs an external incubator and robot for kinetic work. Choose by assay and cadence.

Cytation C10 vs Incucyte: how do they differ?

The C10 combines confocal and widefield imaging with optional BioSpa incubation and robotic transfer, while Incucyte keeps plates stationary inside your incubator (www.sartorius.com). Handling time is the practical difference for multi-plate schedules.

Celigo image cytometer vs Incucyte: do they overlap?

Yes for confluence, counting and some cytotoxicity workflows, but exports, modules and compliance options differ (www.sartorius.hr).

What is the best live-cell analysis system for high-throughput assays?

No source supports a single answer. In-incubator systems are positioned for kinetic multi-plate work, as the Sartorius announcement describes for the CX3 (www.sartorius.com); whole-well scanners and stackers are described in the Celigo section above as aimed at endpoint throughput. Confirm both with timed demos.

How does Incucyte live-cell analysis data management work?

Software stores analysis definitions for reuse, supports automatic archiving and, from 2026A, automatic backup; Part 11 features are a separate module (www.sartorius.com).

Is there an independent review of the Cytation C10?

Not one with measured cross-platform benchmarks was found. Instead, pilot each shortlisted configuration with your own cells and pre-set acceptance criteria.

Conclusion

Incucyte, Cytation C10 and Celigo are best compared as workflows with different bottlenecks. The Incucyte SX5 and CX3 minimize plate movement but depend on incubator space, separately sold modules and a storage plan. The Cytation C10 with BioSpa 8 adds confocal flexibility and robotic scheduling, at the price of

plate handling in every cycle. The Celigo emphasizes whole-well coverage and endpoint speed, with kinetic work and data management extended through external hardware and Image Artist.

The defensible buying process is short: define the time resolution, model the schedule with your own measured times, lock analysis settings, score segmentation against blinded annotation, test export and recovery, and cost accepted assays rather than instruments. Shortlist the configuration, not the brand, and set acceptance thresholds before the pilot begins. All instrument documentation in this report is vendor-authored, and no hands-on throughput or accuracy testing was performed here.

Source links

Links cited in this article, in order of first appearance. Full addresses are provided for readers using extracted text.

1. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-instruments/sx5-live-cell-analysis-instrument
2. https://agilent.nt-rt.ru/images/manuals/2-Cytation_C10_7_5_1_BioSpa.pdf
3. https://resources.revvity.com/pdfs/bro-celigo-image-cytometer-whole-well-imaging.pdf
4. https://pricing.us-east-1.amazonaws.com/offers/v1.0/aws/AmazonS3/current/us-east-1/index.json
5. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-software/incucyte-software-v2026b
6. https://resources.revvity.com/pdfs/fly-signals-image-artist-for-celigo.pdf
7. https://cqls.oregonstate.edu/sites/cqls.oregonstate.edu/files/5321045_rev_r_gen5_gettingstartedguide.pdf
8. https://pmc.ncbi.nlm.nih.gov/articles/PMC8024881
9. https://publications.mpi-cbg.de/Laissue_2017_6887.pdf
10. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8440198
11. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-instruments/cx3-live-cell-analysis-instrument
12. https://www.szabo-scandic.com/shop/media/product_data/datasheet/BTK/BTK-DATA-BTKBIOSPA.pdf
13. https://resources.revvity.com/pdfs/fly-celigo-image-cytometer.pdf
14. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-H/part-809/subpart-B/section-809.10
15. https://medicine.biu.ac.il/sites/medicine/files/shared/ZABAM/docs/Incucyte-SX5-Technical-Specs-datasheet-en-L-8000-0736-A00-Sartorius%20%281%29.pdf
16. https://www.sartorius.com/en/company/newsroom/product-news/incucyte-cx3-system-transforms-continuous-analysis-of-3d-cell-models-with-confocal-imaging-and-unmatched-throughput-1737280
17. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-software
18. https://www.sartorius.hr/media/nthmbm5c/live-cell-analysis-incucyte-comparability-guide-datasheet-en-sartorius.pdf
19. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-software/incucyte-ai-stem-cell-qc
20. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-software/incucyte-ai-cell-health-analysis-software-module
21. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-software/incucyte-software-v2025a
22. https://sartorius.hr/media/4jpnr4my/incucyte-s3-technical-specification-sheet-8000-0527-c00-en-s-1-data.pdf

23. https://www.sartorius.com/en/products/live-cell-imaging-analysis/live-cell-analysis-software/incucyte-21-cfr-part-11-software-module
24. https://genomics2.lsu.edu/documentation/vendor/potential-acquisitions-agilent_biotek.pdf
25. https://www.fishersci.com/shop/products/cytation-c10-confocal-imaging-reader-20/BTC10IPC2SN
26. https://www.agilent.com/en/p/cell-analysis/microplate/gen5-imaging-microscopy-1623226
27. https://uoguelph.ca/aac/system/files/Manual%20Cytation%20C10.pdf
28. https://docs.unitelabs.io/device-guides/readers/biotek-gen5
29. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12408787
30. https://resources.revvity.com/pdfs/gde-celigo-image-cytometer-applications-guide.pdf
31. https://resources.revvity.com/pdfs/spc-celigo-specification-sheet.pdf
32. https://resources.revvity.com/pdfs/bro-next-generation-hcs-image-managment.pdf
33. https://revvitysignals.com/sites/default/files/2023-09/rs-brochure-signals-image-artist-09212023.pdf
34. https://resources.revvity.com/pdfs/fly-21-CFR-part-11-ready-module-celigo.pdf
35. https://pmc.ncbi.nlm.nih.gov/articles/PMC5023569
36. https://pubmed.ncbi.nlm.nih.gov/27608139
37. https://arxiv.org/pdf/2408.11571
38. https://pmc.ncbi.nlm.nih.gov/articles/PMC9718665
39. https://pubmed.ncbi.nlm.nih.gov/33318659
40. https://arxiv.org/pdf/2508.11411
41. https://www.nature.com/articles/s41592-023-01987-9.pdf
42. https://pmc.ncbi.nlm.nih.gov/articles/PMC8606015
43. https://www.nature.com/articles/sdata201618
44. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-A/part-11/subpart-A/section-11.3
45. https://ome-model.readthedocs.io/en/stable/ome-tiff/specification.html
46. https://ngff.openmicroscopy.org/specifications/0.5/index.html
47. https://pmc.ncbi.nlm.nih.gov/articles/PMC9271325
48. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-A/part-11/subpart-B/section-11.10
49. https://fda.gov/media/119570/download
50. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/687246/MHRA_GxP_data_integrity_guide_March_edited_Final.pdf
51. https://sila-standard.com/standards
52. https://www.allotrope.org
53. https://www.hdfgroup.org/wp-content/uploads/2020/10/Leveraging_HDF5_infrastructure_by-_ADF_Amnon_Ptashek.pdf
54. https://www.itu.int/itudoc/itu-t/com16/tiff-fx/docs/tiff6.pdf
55. https://hep.hamamatsu.com/eu/en/products/C14440-20UP.html
56. https://www.loc.gov/preservation/digital/formats/fdd/fdd000022.shtml
57. https://pmc.ncbi.nlm.nih.gov/articles/PMC9900847

58. https://www.biorxiv.org/content/10.1101/164624.full.pdf
59. https://aws.amazon.com/s3/storage-classes/glacier
60. https://aws.amazon.com/s3/pricing
61. https://cloud.google.com/storage/pricing

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