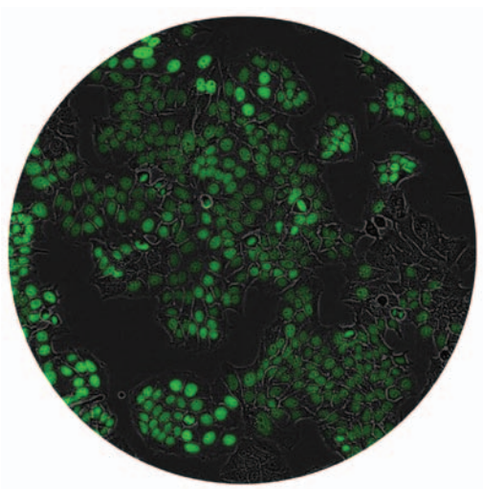
ESSEN
INCUCYTE™

You'll never look at cells the same way again.



ESSEN BioScience

The number of cell-based experiments conducted every day is growing dramatically. Through these experiments, and leveraging advances in microscopy, researchers have been able to make discoveries and scientific advances that were once thought impossible. However, even today a vast amount of microscopy is conducted using an old-fashioned, manual approach.

Now imagine an improvement in the overall process of microscopy—a method of obtaining more data on the quality, health, and current state of cells. Or better yet: imagine an entirely new paradigm, one which conveniently captures dynamic biological processes over long periods of time. Just consider what a comprehensive solution for capturing, processing, and archiving image data would mean to advancing the understanding of variables that affect cell health, morphology, and behavior.

THE BREAKTHROUGHS
WOULD TRULY BE LIMITLESS.

LET THE REVOLUTION BEGIN.
WITH INCUCYTE™.

The Essen IncuCyte family of products brings together for the first time a more efficient and more thorough set of solutions for long-term, live-cell imaging.

Our revolutionary microscope systems enable you to capture a much higher level of information, compared with what can be obtained from traditional laboratory microscopes.

The IncuCyte imaging method allows you to expand the ways you document and understand cellular growth, behavior, and morphology.

With assessments that are quantitative and non-subjective, IncuCyte offers label-free technology for determining factors that affect cell growth, plus an image database for documenting, archiving and retrieving kinetic image records.

In short, IncuCyte gives you the power to observe more, learn more, and understand more. And who knows what the knowledge gained in your lab could mean to the world outside of it.

INCUBATORS AND MICROSCOPES: *LIKE OIL AND WATER UNTIL NOW.*

The greatest hindrances to long-term, time-lapse microscopy have been technical in nature. Environmental changes, such as placing cells in poorly maintained "controlled environments" or frequent removal from the incubator, can adversely affect cells. Conversely, if your image acquisition is infrequent or untimely, there are limits to the information you gather. Compounding the problems of accurate long-term cell monitoring even further, are the issues of time and labor, the subjective nature of measuring changes, difficulties identifying low-level contamination, multiple passage culture drift, and the absence of a digital image database.

Recent innovations have attempted to solve these problems through the development of custom-manufactured incubation chambers built around standard laboratory microscopes. However, until now, there has been no fully integrated hardware and software solution that allows researchers to use their own incubator.

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A FAMILY OF PRODUCTS, *A NEW STANDARD OF RESEARCH.*

INCUCYTE

Our original model changed everything. It was the first – and still is the only – fully automated, phase-contrast, compact microscope that can be placed inside a standard tissue culture incubator enabling a range of uses including cell culture QC, cell-based assay optimization and several long-term, non-labeled, kinetic assay readouts.

INCUCYTE HD

The primary distinction between this and our base model is the High Definition imaging mode. The IncuCyte HD is suitable for the same broad range of applications, but is relatively insensitive to imaging aberrations caused by the fluid meniscus found in 96- and 384-well plates.

INCUCYTE FLR

Though it retains all the features of the base model and IncuCyte HD, this version is also a fluorescence microscope, enabling the detection of cells expressing GFP, as well as fluorescent dyes or tagged antibodies.

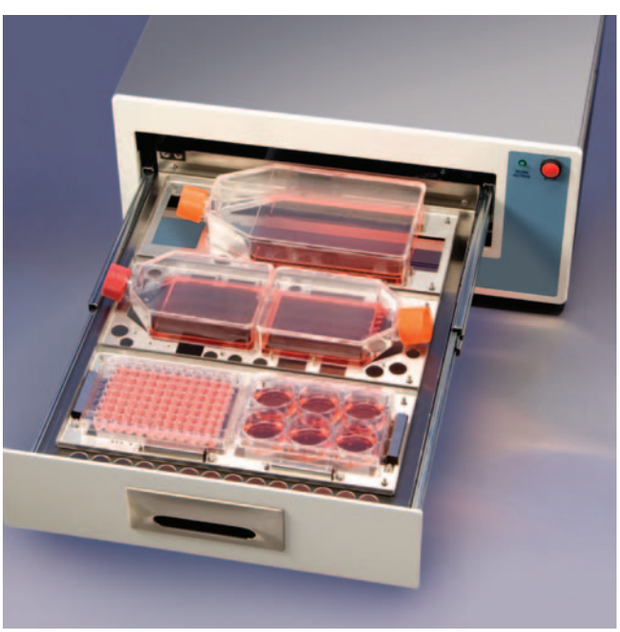
INCUCYTE EX

The IncuCyte EX, a single vessel system, is designed to exist outside the incubator and interface with robotics platforms. In this model, the timing of data acquisition is controlled by the robotics platform using a unique command language interface. Like the other IncuCyte models, the user defines where the images are taken and maintains access to the IncuCyte image database and retrieval system.

WHAT MAKES INCUCYTE *THE BETTER CHOICE?*

In a paradigm shift, IncuCyte actually allows you to place the microscope inside your incubator. And with three configurable trays, you can mix and match multiple cell culture vessels.

In an attempt to satisfy the environmental requirements of long-term imaging, several manufacturers offer heated stages or custom incubation enclosures. However, these solutions are inferior to the environment found in most commercial incubators. In a paradigm shift, IncuCyte actually allows you to place the microscope inside your incubator, taking advantage of an asset you already own and at the same time fits into your existing cell culture workflow. This automatically eliminates any potential problems that may result from disturbing cultures during the observation process.



The IncuCyte design also allows increased productivity, as it support hundreds of standard varieties of cell culture vessels, including 96- and 384-well plates, T-flasks, dishes, and tissue culture slides. With three configurable trays, you can mix and match multiple cell culture vessels and even monitor different experiments running at the same time. Image location and the frequency of acquisition are controlled by the user, and access to the kinetic image history is supported via a unique image database and retrieval system.

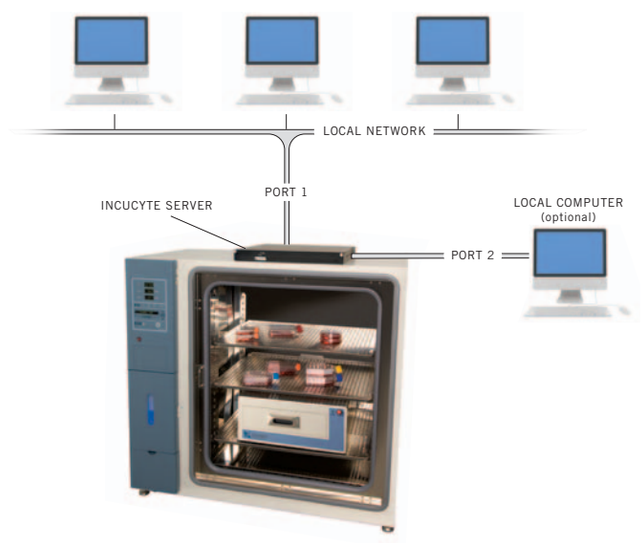
Because the microscope is located inside the incubator, the system is especially well suited to long-term monitoring of cell growth. Control of the system and access to the images and data are enabled from any computer on your local network. With this remote capability and convenience, you can view real-time imaging from conference rooms, offices, or even colleagues' labs throughout your facility or campus.

SOFTWARE AND INTERFACE

One of the best features of the IncuCyte system is the intuitive design of the software interface. Based on a client-server methodology, the interface enables you to acquire, access and analyze information from any computer on the local network. The IncuCyte is also designed to make it simple for you to retrieve information either chronologically or by experiment. Another popular benefit is how easy it is to create movies from your captured images – all of which are exportable in a number of formats.

The IncuCyte is designed to make it simple for you to retrieve information either chronologically or by experiment.

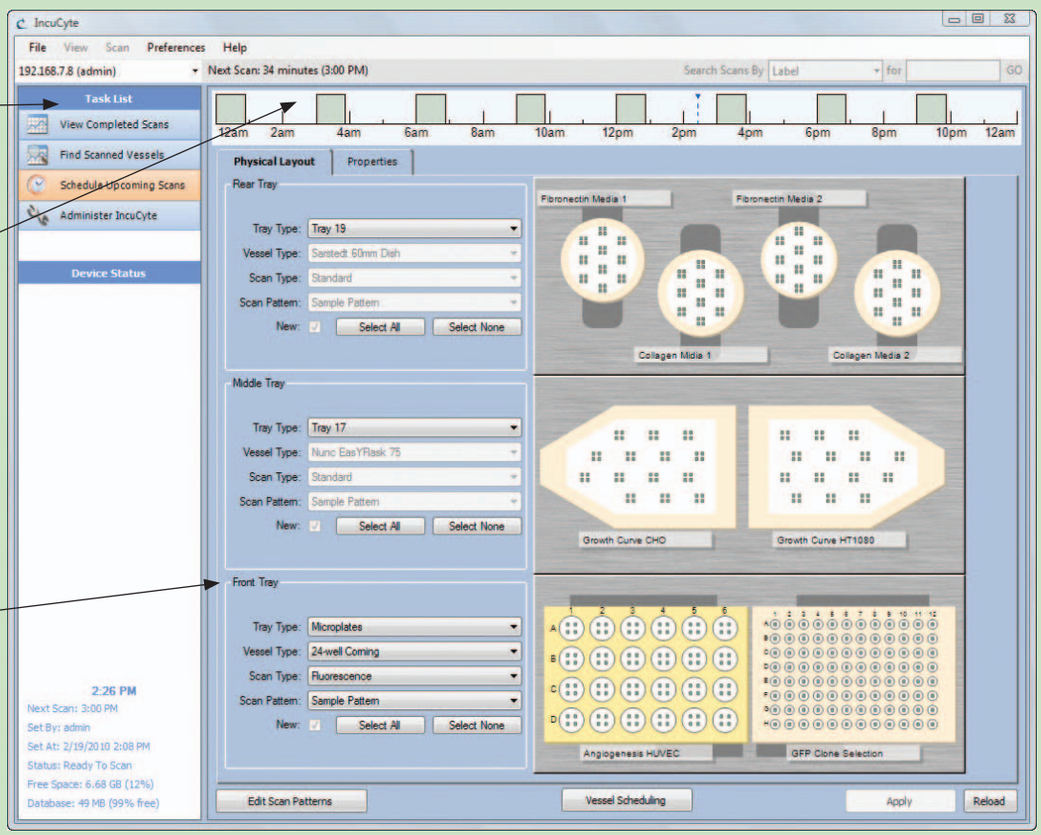
Software Architecture



Simple operation consists of four main menu items. Scheduling multiple experiments that contain a mixture of vessels is easily accomplished through the interface.

The interactive scan schedule graphically illustrates the next 24-hour window of activity. The schedule is based on the vessel configuration and desired frequency of scans.

As shown, a mixture of vessels can be included on the same scan. Users can select from over 20 tray types that support hundreds of common cell culture vessels.



APPLICATIONS

The technology and innovation represented by this family of products makes the IncuCyte suitable for a wide range of applications. This versatility and breadth of uses also makes the system a cost-effective investment.

Some of the more popular applications include:

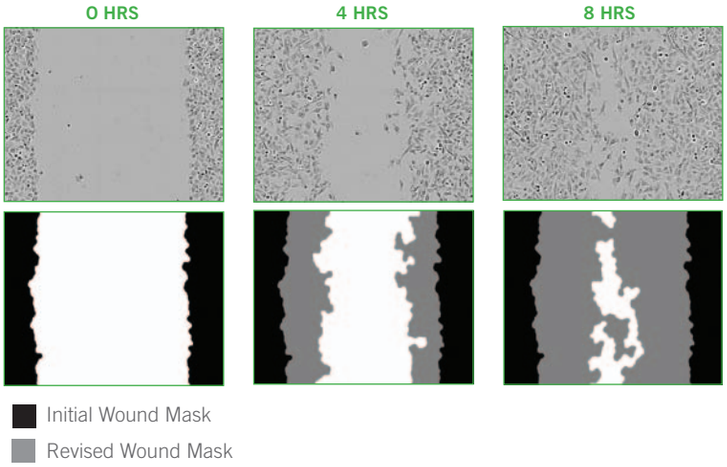
> Kinetic Cell Migration Assay
> Kinetic Proliferation and Cell Growth Monitoring
> Kinetic Angiogenesis Assay
> Cell Culture Quality Control
> Cell-Based Assay Optimization
> Morphological Characterization

Let's take a look at a few of the applications in more detail.

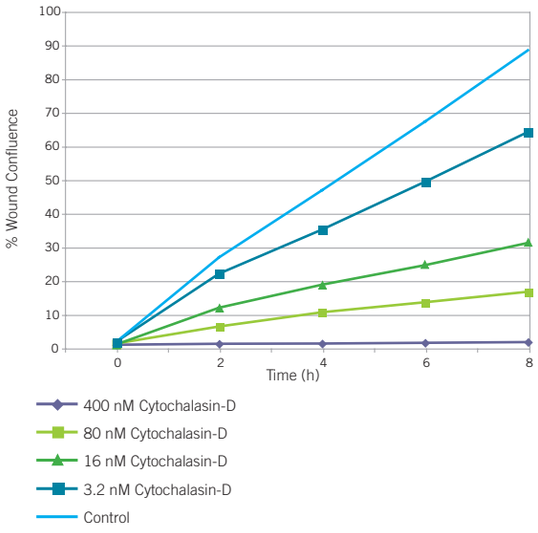
KINETIC CELL MIGRATION ASSAY

In contrast to existing cell migration assays, this is a label-free method that provides a continuous kinetic output. It utilizes a highly consistent and precise 96-well wound-making tool that impacts only the intended cells and leaves the remaining cells and growth surface unharmed. Once inside IncuCyte, the system collects images for each well and computes an initial wound mask. A revised mask is generated for subsequent images to track wound closure. Both the phase contrast images and the wound mask overlays can be viewed via the IncuCyte software—as below.

Wound Width Progression



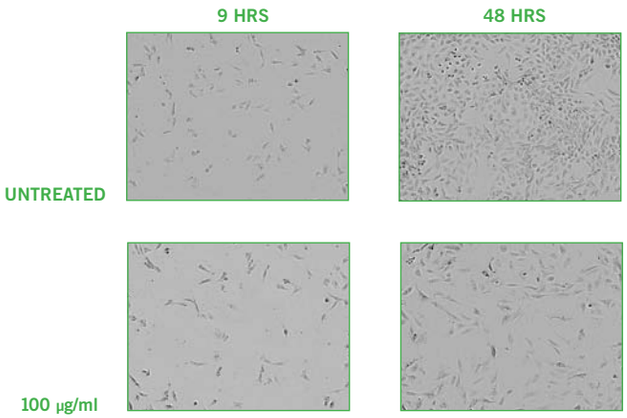
Wound Confluence vs. Time
Cytochalasin-D Titration, HT-1080 Cells



Wound confluence can be graphed over time to quantitatively evaluate the characteristics of wound closing in the presence of pharmacological agents.

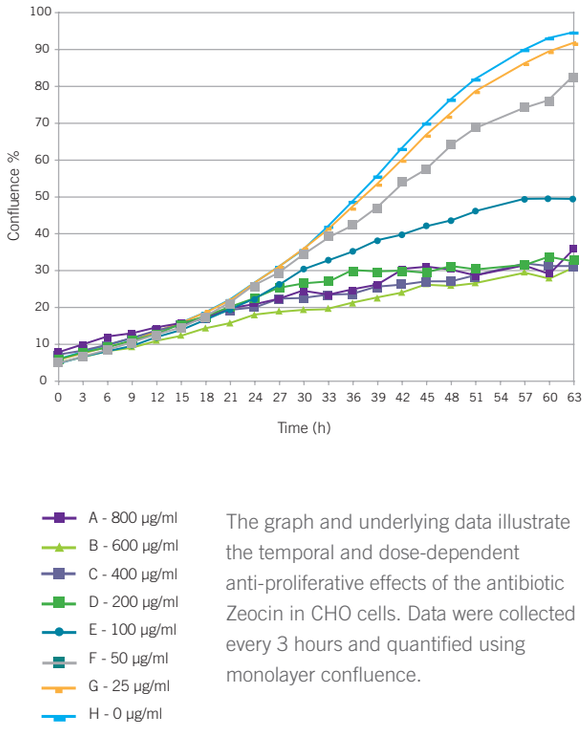
KINETIC PROLIFERATION AND CELL GROWTH MONITORING

Using proprietary algorithms, IncuCyte HD enables high-contrast, phase-contrast imaging even in 96- and 384-well plates. In this example, IncuCyte HD was used to quantify CHO cell proliferation in the presence of varying concentrations of the popular antibiotic Zeocin.™ Non-labeled CHO cells were grown in a 384-well microplate and kinetic growth curves were calculated using the integrated confluence algorithm. Unlike other kinetic, non-labeled readouts such as electrical impedance sensing, IncuCyte also allows users to document cell morphology with images and movies.



These images show morphological and anti-proliferative effects of Zeocin on CHO Cells at 9- and 48-hour exposures.

Rapid Quantification of Zeocin's Potency on Inhibiting CHO Cell Growth

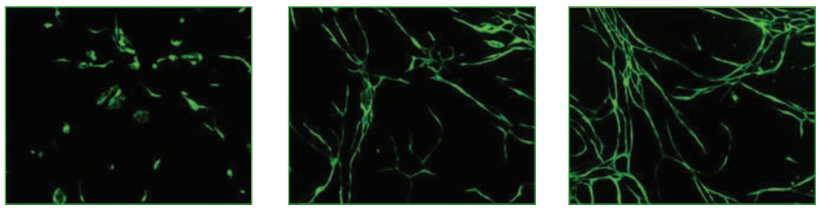


The graph and underlying data illustrate the temporal and dose-dependent anti-proliferative effects of the antibiotic Zeocin in CHO cells. Data were collected every 3 hours and quantified using monolayer confluence.

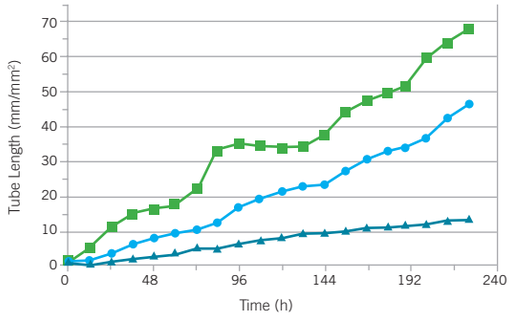
KINETIC ANGIOGENESIS

Angiogenesis is a complex, multi-step process involving cell proliferation, migration and tube formation. IncuCyte FLR along with our GFP-AngioKits enables the measurement of multi-phase *in vitro* microvascular tube formation over time. Together, the system can be used to quantify both positive and negative modulators of angiogenesis as well as elucidate drug mechanism.

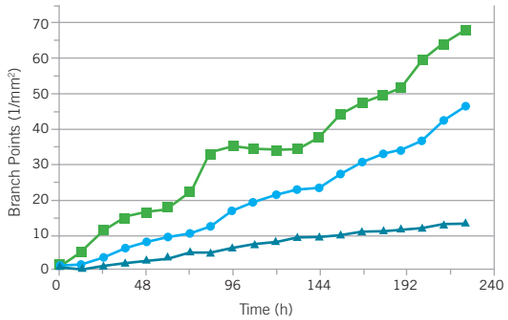
Progressive Tube Formation

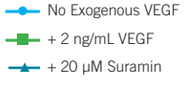


Tube Length



Branch Growth





Analysis of GFP-AngioKit™ using IncuCyte FLR angiogenesis processing. Tube length and branch point quantitation of VEGF and Suramin angiogenic effects over time.

SPECIFICATIONS

	Incucyte	IncuCyte HD	IncuCyte FLR	IncuCyte EX
Operating Systems	Microsoft Windows® XP Microsoft Windows® Vista Windows® 7	Microsoft Windows® XP Microsoft Windows® Vista Windows® 7	Microsoft Windows® XP Microsoft Windows® Vista Windows® 7	Microsoft Windows® XP Microsoft Windows® Vista Windows® 7
Image Resolution	0.93µm 1280 x 1024 Pixels	0.93µm 1280 x 1024 Pixels	10X Objective : 1.49µm or 20X Objective : 0.74µm 1280 x 1024 Pixels	0.93µm 1280 x 1024 Pixels
Objective	20X	20X	10X or 20X	20X
Native Image Format	JPEG	JPEG	Phase : JPEG Fluorescence : 16-bit PNG	JPEG
Exported Image Format	JPEG, TIFF	JPEG, TIFF	JPEG, PNG, TIFF, RAW	JPEG, TIFF
Exported Movie Format	WMV, AVI, Metamorph®	WMV, AVI, Metamorph®	WMV, AVI, Metamorph®	WMV, AVI, Metamorph®
High Definition (HD) Optics	No	Yes	Yes	Optional
Image Size (typical)	150 Kbytes	400 Kbytes	Phase : 400 Kbytes Fluorescence : 1.1 Mbytes	150 Kbytes with HD: 400 Kbytes
Fluorescence Excitation/Emission	n/a	n/a	450-490 nm/500-530 nm	n/a
Internal Image Storage	500 Gbyte Hard Disk 2 Gbyte RAM	500 Gbyte Hard Disk 2 Gbyte RAM	>900 Gbyte Hard Disk 2 Gbyte RAM	>900 Gbyte Hard Disk 2 Gbyte RAM
Network Connection	Ethernet 10/100 Mbps RJ45 Connector	Ethernet 10/100 Mbps RJ45 Connector	Ethernet 10/100 Mbps RJ45 Connector	Ethernet 10/100 Mbps RJ45 Connector
Power	100-240 VAC 47-63Hz 2.0 Amps max @ 120V 1.0 Amps max @ 230V	100-240 VAC 47-63Hz 2.0 Amps max @ 120V 1.0 Amps max @ 230V	100-240 VAC 47-63Hz 2.0 Amps max @ 120V 1.0 Amps max @ 230V	100-240 VAC 47-63Hz 2.0 Amps max @ 120V 1.0 Amps max @ 230V
Controller Dimensions (H x W x D)	3.75" x 17.25" x 20.5" 9.5cm x 44cm x 52cm	3.75" x 17.25" x 20.5" 9.5cm x 44cm x 52cm	3.75" x 17.25" x 20.5" 9.5cm x 44cm x 52cm	3.75" x 17.25" x 20.5" 9.5cm x 44cm x 52cm
Microscope Dimensions (H x W x D)	8.8" x 17.7" x 18.3" 224mm x 450mm x 465mm	8.8" x 17.7" x 18.3" 224mm x 450mm x 465mm	9.9" x 17.7" x 18.3" 251mm x 450mm x 465mm	8.8" x 17.7" x 18.3" 224mm x 450mm x 465mm
Controller Weight	30 lbs 13.6 kg	30 lbs 13.6 kg	33 lbs 15.0 kg	33 lbs 15.0 kg
Microscope Weight	32.5 lbs 14.8 kg	32.5 lbs 14.8 kg	36 lbs 16.3 kg	37 lbs 16.8 kg
Operating Environmental Controller	0°C to 33°C 5% to 90% RH Non-Condensing	0°C to 33°C 5% to 90% RH Non-Condensing	0°C to 33°C 5% to 90% RH Non-Condensing	0°C to 33°C 5% to 90% RH Non-Condensing
Operating Environmental Microscope	0°C to 42°C 5% to 95% RH Non-Condensing	0°C to 42°C 5% to 95% RH Non-Condensing	0°C to 42°C 5% to 95% RH Non-Condensing	0°C to 33°C 5% to 90% RH Non-Condensing

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