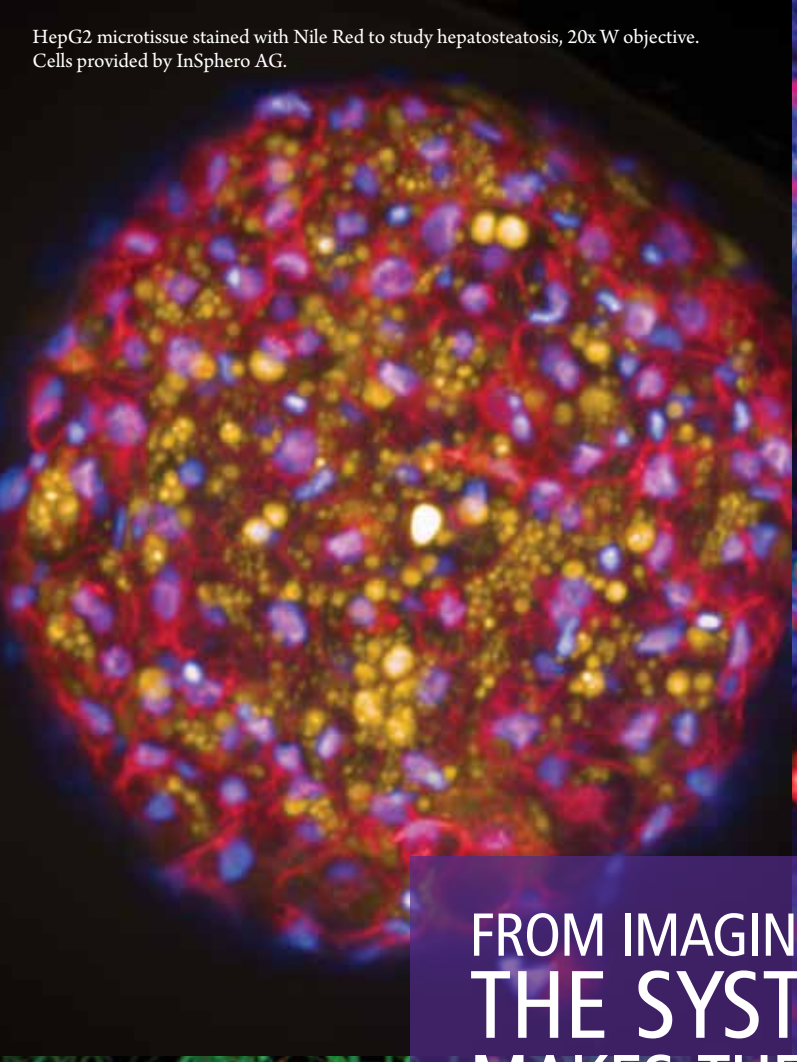
HUMAN HEALTH

ENVIRONMENTAL HEALTH

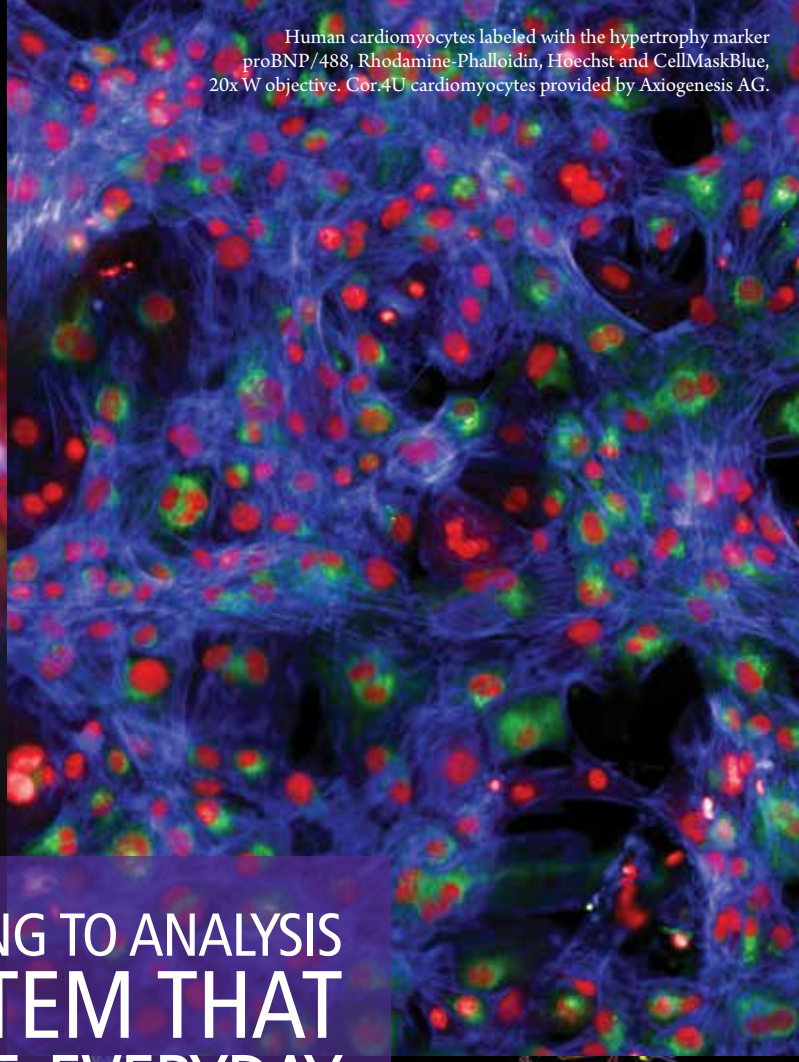
IT'S LIGHTING THE WAY TO A NEW LEVEL OF UNDERSTANDING

Operetta CLS™
High-Content Analysis System

PerkinElmer®
For the Better

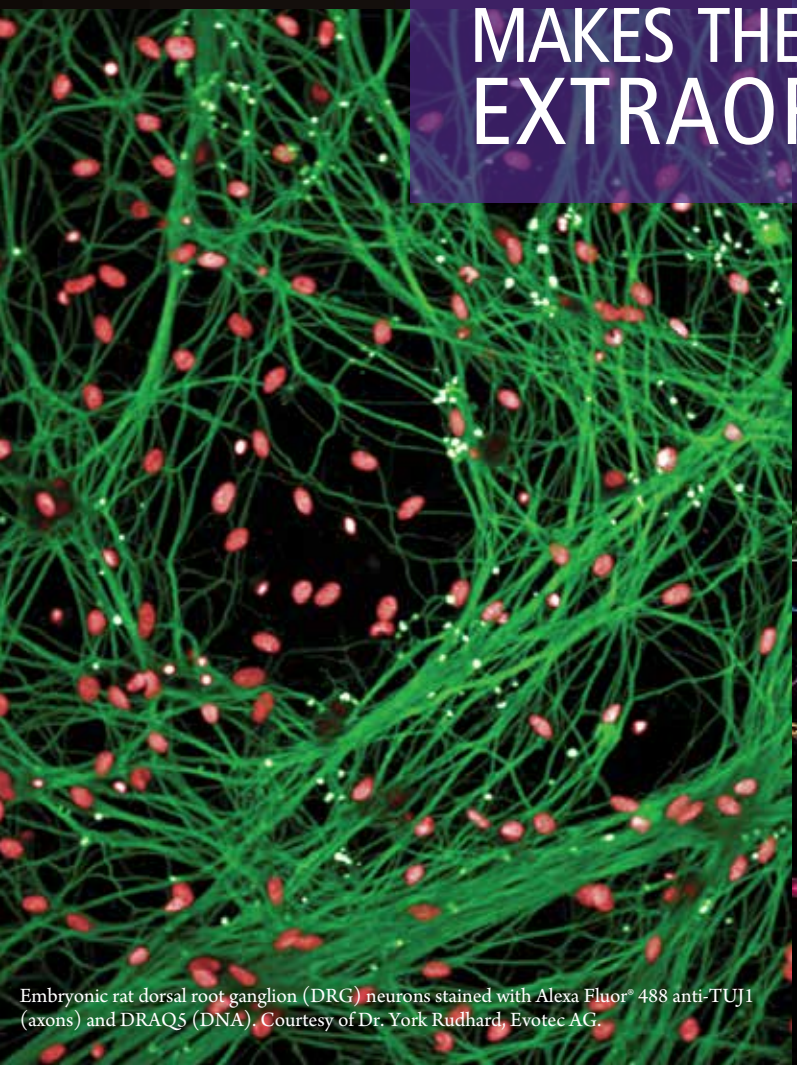


HepG2 microtissue stained with Nile Red to study hepatosteatosis, 20x W objective. Cells provided by InSphero AG.

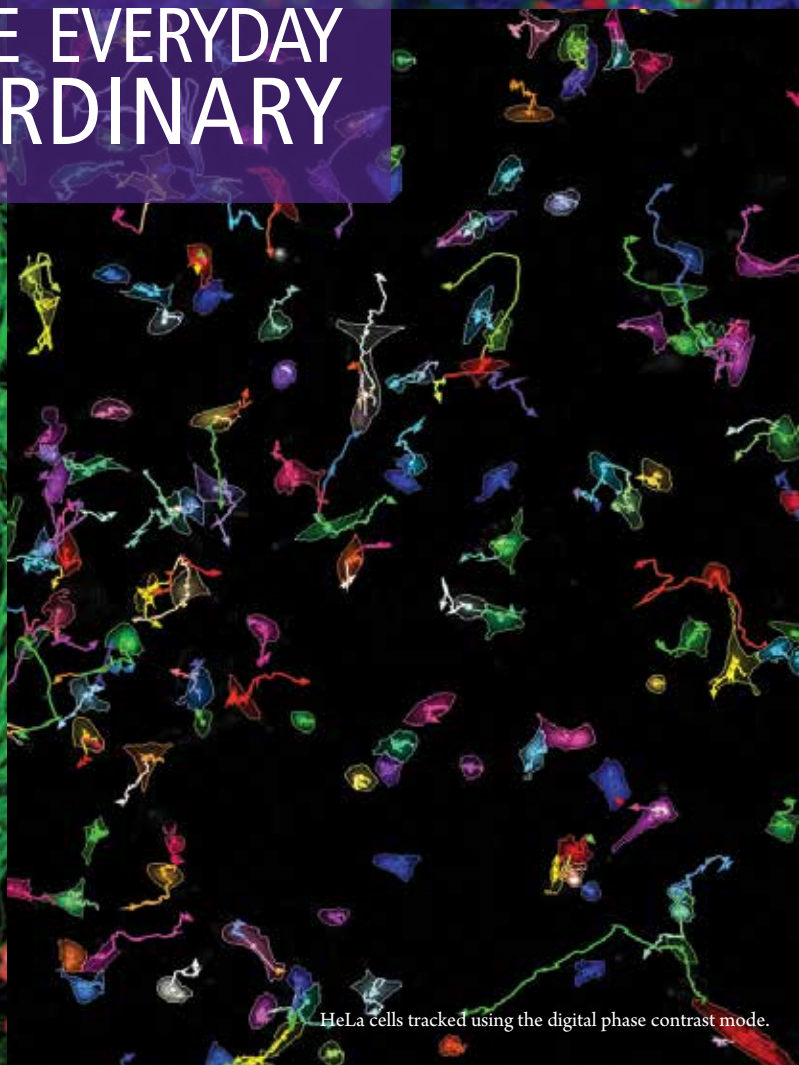


Human cardiomyocytes labeled with the hypertrophy marker proBNP/488, Rhodamine-Phalloidin, Hoechst and CellMaskBlue, 20x W objective. Cor.4U cardiomyocytes provided by Axiogenesis AG.

FROM IMAGING TO ANALYSIS
THE SYSTEM THAT MAKES THE EVERYDAY EXTRAORDINARY



Embryonic rat dorsal root ganglion (DRG) neurons stained with Alexa Fluor® 488 anti-TUJ1 (axons) and DRAQ5 (DNA). Courtesy of Dr. York Rudhard, Evotec AG.



HeLa cells tracked using the digital phase contrast mode.

Everything you've come to rely on (and so much more)

Across nearly every therapeutic area and application in basic research and assay development – whether it's systems biology or drug discovery – there's a growing demand for greater physiological relevance.

Scientists want to study more complex models such as primary cells, live cells, or cells cultured in 3D, and generate detailed phenotypic fingerprints for deeper biological insights. But to gain these insights, you need the throughput to assess varied conditions, the resolution to capture high-quality image data – and the tools to turn that data into knowledge.

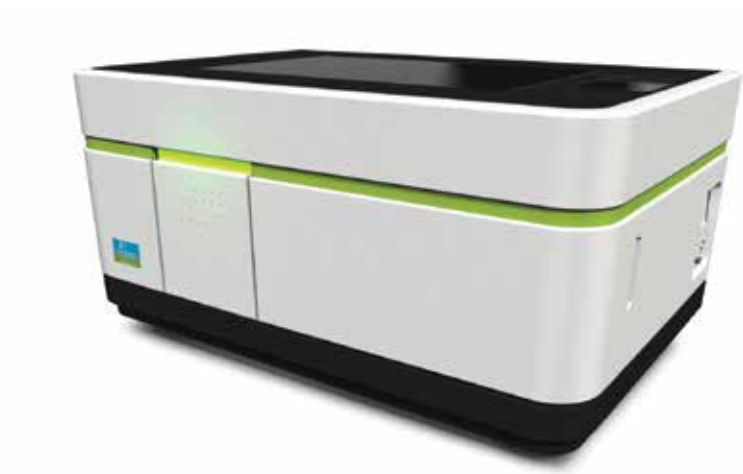
Now there's a system that combines speed and sensitivity with the powerful and intuitive data analysis you've come to trust from the Operetta platform: It all comes together in the Operetta CLS system.

The all-new Operetta CLS delivers everything you need from high-content analysis – and more: Water-immersion objectives that capture more light than air objectives for exceptional image data quality. A more stable LED light source with up to eight excitation wavelengths for flexible staining and labeling, and more power for better results with less background noise. Confocal and widefield imaging that enable you to select the right imaging technology to match your application. And a highly sensitive sCMOS camera that provides a large field of view and high-resolution image capture.

What's more, the Operetta CLS system is part of our comprehensive HCS workflow – everything from HCS systems and microplates to automation and informatics for every application. All from one knowledgeable, trusted vendor.

Put that together with our Harmony® high-content imaging and analysis software – the easy-to-learn, easy-to-use software that empowers biologists to do their own analysis – and you have everything you need to run your everyday (and complex) analyses right away.

The Operetta CLS system: Everything about it says *extraordinary*.



WHEN GREAT TECHNOLOGIES COMBINE THE RESULT IS ILLUMINATING

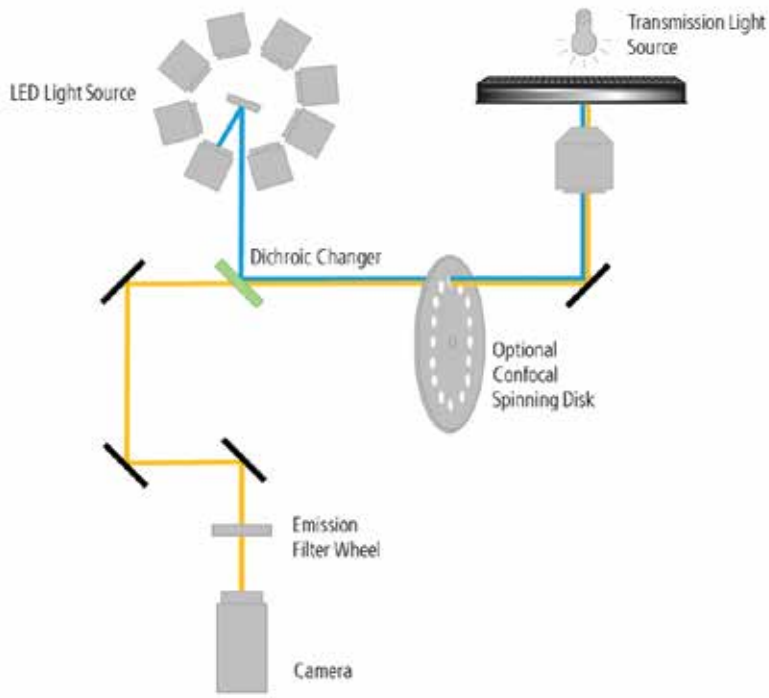
The product of more than a decade of experience in high-content screening, the Operetta CLS delivers the speed and sensitivity for everyday assays, and even complex challenges – live cells, phenotyping, rare events, and much more. All in an easy-to-use system that everyone in your lab can get started with right away.

Top corner: HeLa cells stained with Hoechst (DNA), Alexa Fluor™ 488 labeled anti-tubulin and TRITC-Phalloidin (actin) imaged with a high NA 40x water immersion objective (NA 1.1). Bottom corner: Same sample imaged with a 40x air objective NA 0.75 with the same exposure settings resulting in a dimmer image as the objective captures fewer photons.

Brighten things up

At the core of the Operetta CLS system is a whole new way to "see" your sample, with a new light path that ensures efficient excitation of your samples and careful collection of emitted signals. The compact 8x LED light source lets you choose the optimal wavelength for your fluorophore and delivers the power directly to your cellular samples. User-accessible emission filters let you further optimize detection.

With the stable LED light source and optional temperature and CO_2 control, you can run your live-cell assays reliably, assured in the knowledge that the changes you're seeing in the sample are due to the biology, *not* the technology. Once your assay parameters are optimized, you know you can trust the results you're seeing, time after time.

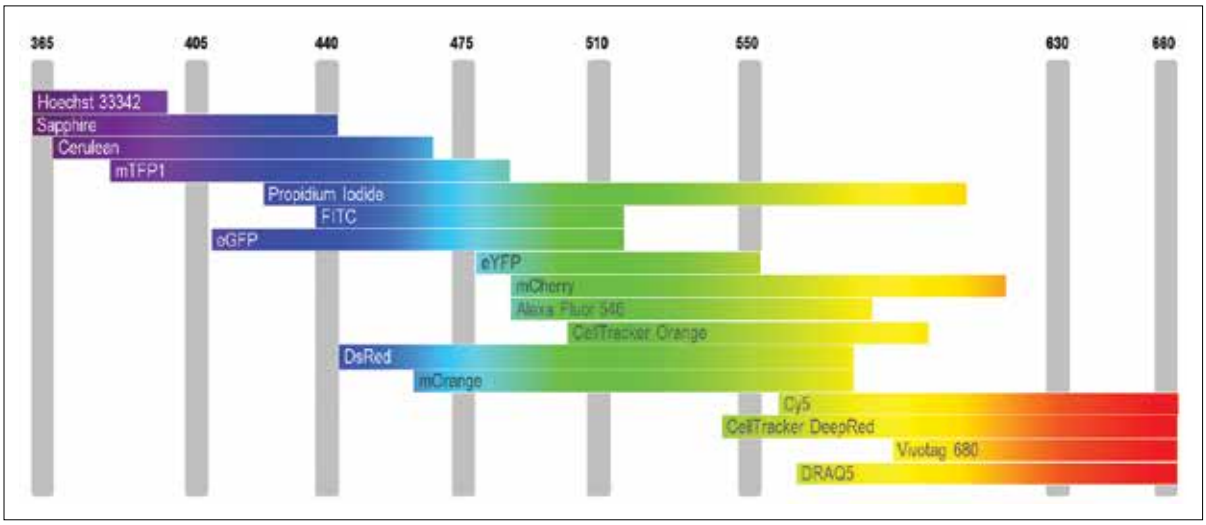


More light on the subject

Proprietary automated water-immersion objectives with very high numerical aperture deliver and capture more photons and provide a higher resolution in XYZ than conventional objectives – in fact, they capture up to four times more light than high numerical aperture air objectives can. You can benefit in two ways: Delicate live-cell samples can be excited with less light to protect them from photodamage or you can significantly increase the throughput of applications such as 3D stack acquisition.

The picture perfect way to image

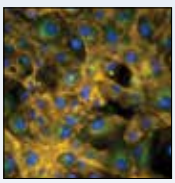
The Operetta CLS system's proven spinning disk technology minimizes photobleaching and phototoxicity, and provides several advantages over conventional confocal microscopy techniques: Since multiple points are collected simultaneously rather than by scanning a single point at a time, the imaging process is much faster and gentler, enabling efficient background rejection, live-cell experiments, and 3D imaging. What's more, the large-format sCMOS camera delivers low noise, wide dynamic range, and high resolution – perfect for sensitive and quantitative measurements at short exposure times.



Up to eight LEDs excite a wide range of fluorophores, from UV to NIR, including DNA stains, live-cell stains, fluorescent proteins, and typical covalent labels. Some popular dyes are shown here.

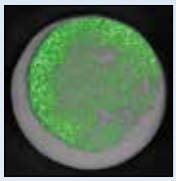
Your Applications *Your* Way

From everyday assays to more demanding applications, the Operetta CLS high-content analysis system delivers just the right combination of flexible excitation, sensitive optics, and advanced software features to enable you to gain deeper biological insights from all your critical applications.



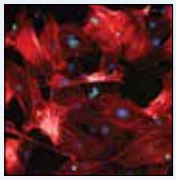
Fixed-cell assays

To develop robust, content-rich assays, you may need a wide range of fluorescent stains and labels. With the Operetta CLS, you can choose from fluorescent widefield and confocal spinning-disk imaging with up to eight high-power excitation sources and user-accessible emission filters for maximum flexibility – so you can optimize your assays quickly.



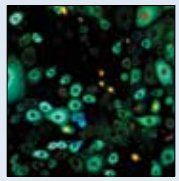
Live-cell assays

Meaningful live-cell assays depend on stable excitation and minimal photodamage, spinning disk confocal optics, and synchronized LED illumination. For live-cell analysis without fluorescent labels, you can also choose brightfield or digital-phase contrast imaging modes.



Complex cellular models

Complex models such as co-culture systems used in stem-cell research, drug discovery, and similar applications pose unique challenges for imaging and analysis. The Operetta CLS combines a large-format sCMOS camera with water-immersion objectives for sensitivity and high resolution, while advanced software helps you identify and characterize stem cell colonies and cells within them.



Advanced assays

FRET is a powerful tool for investigating conformational changes and protein-protein interactions. With a good FRET sensor, it's possible to track activity of kinases such as ERK in live cells and much more. And with sensitive imaging and dedicated analysis tools for ratiometric imaging, robust results are easy to obtain with Operetta CLS.

Phenotypic fingerprinting

At the core of successful phenotypic assays is the ability to create robust fingerprints of subtle differences. The Operetta CLS system combines high-resolution imaging with advanced software tools such as STAR morphology and machine learning for true multiparametric hit selection.

IT ALL COMES TOGETHER IN PERFECT HARMONY

With Harmony high-content imaging and analysis software, you can simply and easily turn the data you glean from your assays into deep, relevant knowledge. Harmony software enables you to handle all the data your experiments generate, analyze it quickly, discriminate phenotypes, and much more. You concentrate on your science – and Harmony does the rest.

A. Workflow-based interface with easy-to-read icons
B. Analysis building blocks for easy protocol design
C. Clear plate navigation and wizard for easy setup of new plate types
D. XYZ-viewer to navigate through stacks by using xy-, xz- and yz-sections

Your entire lab is on the same page

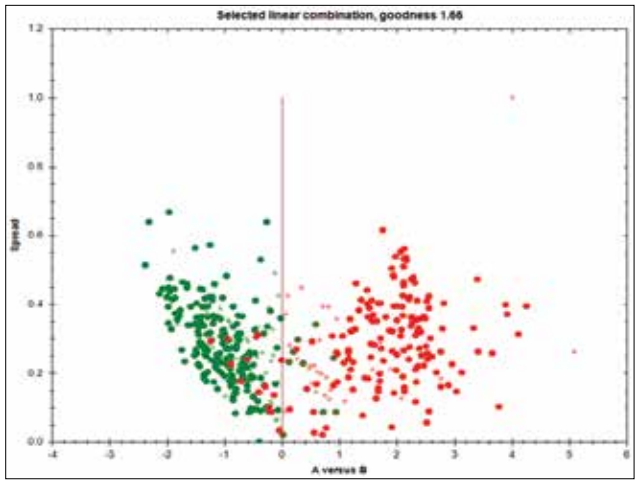
Simple, powerful Harmony high-content imaging and analysis software unleashes the full potential of your Operetta CLS system. Harmony provides a complete solution, enabling you to set up assays and automate high-content imaging experiments, acquire images and analyze data, and store, retrieve, and present those results in meaningful ways. Its workflow-based interface makes the whole process simple and straightforward, even for new users with little microscopy or programming knowledge.

- Easy setup of acquisition channels and parameters
- Intelligent control of complex experiments
- A full range of preinstalled, ready-made solutions for common assays
- Image analysis building blocks that enable you to create, configure, and customize your own protocols
- Advanced analysis features that give detailed cellular phenotype descriptions for more robust, reproducible classification
- Storage of metadata such as assay layout, instrument settings, analysis results, and user-defined keywords and annotations – automatically

Harmony software also powers the Opera Phenix™ high-content screening system so you can transfer your Operetta CLS assays to higher throughput with ease. And with regular upgrades, it's a flexible solution for gathering unbiased data from your cell samples, keeping you ahead of your growing research needs.

Creating algorithms just got a lot easier

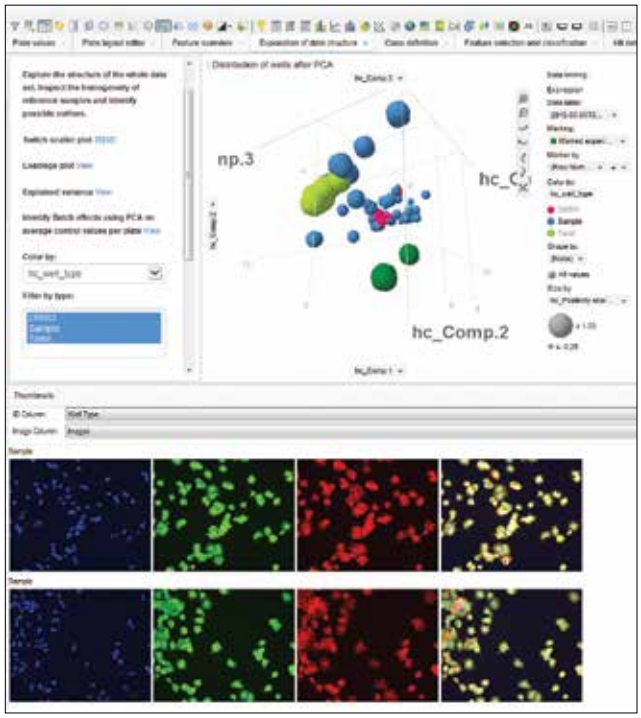
With our advanced, proprietary PhenoLOGIC™ machine-learning plug-in, image analysis that might have taken hours can be completed in a matter of minutes. Simply click on a few cells of each class to teach the software to recognize different cell populations and regions. PhenoLOGIC machine learning sets parameters for optimal image segmentation and cell classification, combining the most meaningful parameters, so you can achieve accurate classification of cells – and highly robust and statistically relevant results. Or you can export your results automatically into the powerful Columbus™ image-data storage and analysis system, enabling you to access, analyze, store, and share image data from Operetta CLS and other HCS systems across your organization.



The PhenoLOGIC software plug-in makes it easy to create optimized algorithms. Click on a few objects to teach the algorithm to recognize the different types, then PhenoLOGIC calculates a linear classifier and identifies them in all images.

Breakthrough results are closer than you think

Harmony and Columbus work seamlessly with our High Content Profiler™, powered by TIBCO Spotfire® software, which enables you to turn your high-content screening analyses into accurate – and *actionable* – biological insights, then share them with the whole lab in a matter of minutes. With High Content Profiler, you can leverage the most advanced statistics, classifications, and machine-learning methods available, so you can implement exhaustive QC analyses, calculate reliable normalizations, and perform multivariate phenotypic hit stratifications and drug-response profiling – simply and quickly.



High Content Profiler software's powerful visualizations help turn data into actionable insights. This illustration shows a principal component (PCA) plot for exploring the phenotypes caused by positive controls (light green) and samples (blue).

Take productivity to the next level

With our automation solutions for the Operetta CLS and other HCS systems, you benefit from higher throughput, improved productivity, better consistency, reagent cost savings, and much more. Our plate::handler™ system for automated plate loading enables overnight runs, while our cell::explorer™ solution can automate your entire high-content screening workflow.

What's more, our HCS microplates are developed and validated specifically for high-content imaging applications, delivering superior results day in and day out.

CellCarrier™ Ultra plates, part of our family of microplates for high-content imaging applications.

With cell::explorer you can automate your entire HCS workflow.

A solution configured to suit every need

Whatever your application, there's an Operetta CLS system configured to meet your requirements. And the system is modular, so it can change with your research demands. Configuration options include:

Operetta CLS Quattro

With four LEDs and widefield fluorescence, the basic configuration of the Operetta CLS system is ideal for common applications that need sensitivity and resolution, with the capacity to grow if the need arises.

Operetta CLS FLEX

With eight LEDs, and confocal and widefield fluorescence, the FLEX configuration offers flexibility in excitation and imaging modes for many challenging applications – and it can be upgraded to even higher performance.

Operetta CLS LIVE

With all the features of the FLEX configuration, plus gas and temperature control and water-immersion objectives, this system is ideal for gentle yet highly sensitive live-cell imaging.

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com

PerkinElmer®

For a complete listing of our global offices, visit www.perkinelmer.com/ContactUs

012495_02 PKI