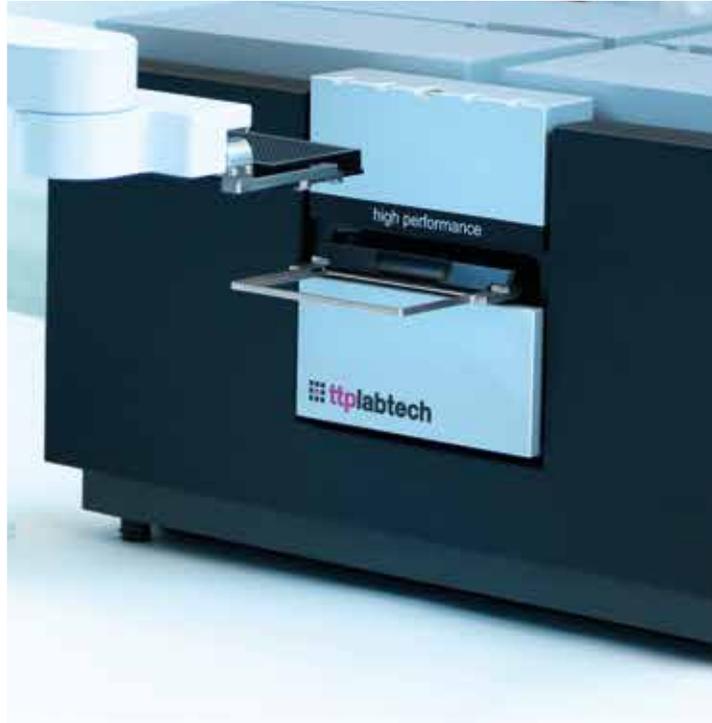




acumen[®] CELLISTA



**full library
phenotypic
screening
without
compromise**



www.ttplabtech.com



ttplabtech



full library phenotypic screening is within your reach

"acumen is unique, has sophisticated software and offers the best characteristics of microscopy to produce determinate data. It's a great addition to a cell biology lab"

Mei Zhang, EMD Serono

High content phenotypic assays have been widely adopted by researchers in drug discovery, as they represent more physiologically-relevant screening models, albeit with a compromise on throughputs.

Implementation challenges mean this approach has not been readily adopted within primary screening, where target-based screens predominate but don't offer the same degree of biologically-relevant data.

In order to maximise the benefits of phenotypic screening and minimise your chances of missing a blockbuster hit, you need to screen your full compound library rather than using library subsets selected by biased target-based data.

However, to run full library phenotypic screens is challenging as it requires:

- very rapid throughputs
- miniaturisation to minimise cell and reagent costs
- immediate hit identification
- a manageable approach to data

The problem is that screening groups perceive they have to compromise between the convenience of target-based high throughput screening (HTS) and the relevance of phenotypic screening.

TTP Labtech's acumen® Cellista provides the solution. It enables practical, full library phenotypic and/or target-based screening with throughputs of over 2 million data points a week. It can scan and simultaneously analyse a whole well 1536-well microplate in only 5 minutes, offering robust high content data for immediate hit identification. Its unique cytometric data option generates small file sizes, avoiding the need to invest in complex infrastructure and data management solutions.

acumen Cellista – removing the compromise



acumen Cellista: fourth generation laser scanning imaging cytometer



bring effortless high throughput to phenotypic screening

"acumen is a unique tool to quickly and easily gather high content data without the commitment of a conventional high content imager. The instrument is a 'sweet-spot' platform that brings together flexible HCS to primary HTS and uHTS."

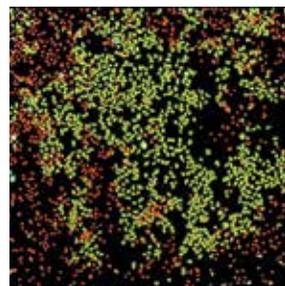
acumen Cellista is unique in providing the value of a high content approach to phenotypic screening, in a format that is both manageable and approachable for HTS.

acumen Cellista bridges the gap between HTS and microscope-based high content analysis, offering productivity enhancements without incurring infrastructure changes.

high throughput screening

Ensure you never miss that potential blockbuster.

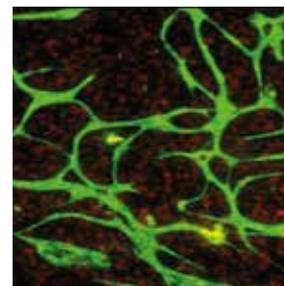
acumen Cellista adds biological relevance to your current throughput levels, enabling full library phenotypic screening without escalating costs.



high content analysis and imaging

acumen Cellista effortlessly improves workflow efficiency.

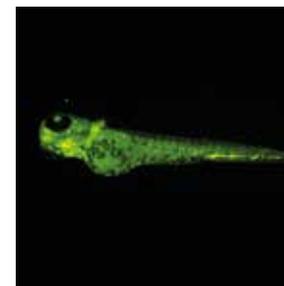
Eliminate resource and throughput bottlenecks by moving routine assays to acumen.



applications

Get robust decision-making data straight away, without delays induced by image analysis or data validation times.

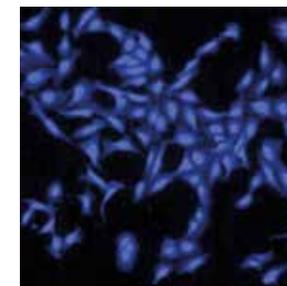
Easily bring high throughput to cell health, 3D, cell cycle and rare event detection assays.



automation and integration

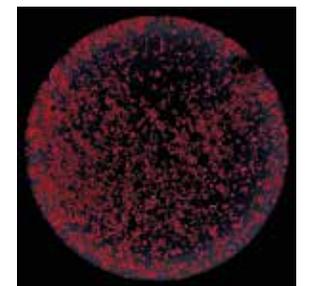
Gain the benefits of phenotypic screening without changing your infrastructure.

acumen Cellista is simple to integrate into standalone workstations or large-scale automation platforms without tying you to a supplier.



support

The end of training is the start of our partnership: we offer the value of continuous collaboration and an enviable reputation for customer support.





work the way you want to, **without compromise**

acumen's unique positioning benefits:

HTS departments needing to improve the biological relevance of screening assays without compromises to throughput and costs per well.

high content imaging groups currently running low throughput assays looking to benefit from increased capacity without compromising biological relevance.



HTS departments:

acumen ensures you never miss that potential blockbuster

- achieve **throughputs of over 2 million compounds** per week from assays with greater biological relevance
- **easily miniaturise assays** to drive down reagent and cell cost per well and significantly increase daily throughputs. acumen Cellista handles even high-density microplate formats in the same 5 minute read times
- **eliminate the potential for focussing errors** as there is no reliance on laser- or image-based autofocussing methods
- on-the-fly data analysis means you **don't wait for decision-making data**
- **validate as you go**, as acumen's total object number per well measurement provides in-built quality control
- **be productive straight away:** straightforward training means there is no requirement for specialised operators
- **seamless hardware and data integration:** acumen Cellista easily slots into your existing infrastructure thanks to its simple automation interface and manageable data output file sizes in CSV format

high content imaging groups:

acumen effortlessly raises productivity

- **optimise your throughput** by moving routine phenotypic assays to acumen Cellista, freeing your existing specialist resources to focus on complex high magnification assays
- **remove image analysis and data validation bottlenecks** and gain decision-making data in as little as 5 minutes
- **whole well imaging is standard**, meaning there is no loss of throughput for rare event detection or analysis of large 3D objects
- increase **throughput without creating a data mountain** as acumen's cytometric data output creates files in the Kb range
- **whole-well open-source TIFF image export** enables image analysis using your existing third party packages, if required
- **be productive straight away.** Low training requirements for operation decreases the workload on expertly trained staff

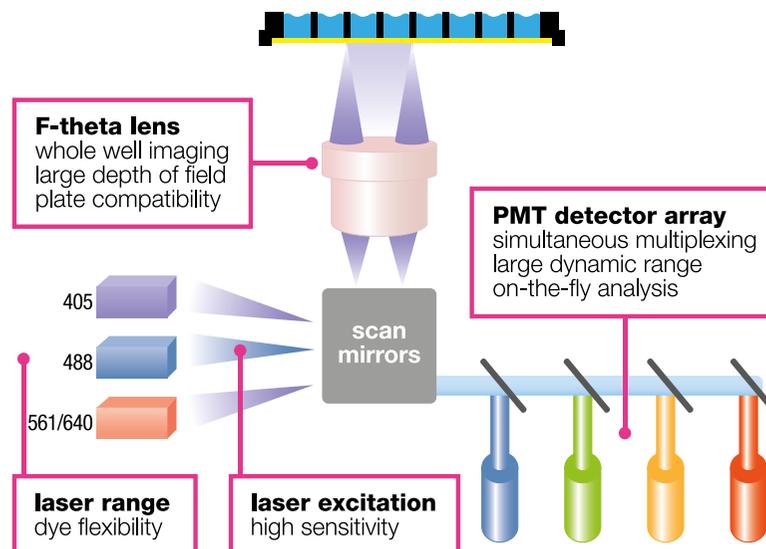
how do we achieve this?

As a company, TTP Labtech has collaborated with cell biologists since 1997. This enabled us to spot a market opportunity early on: a need for a screening system that was as fast as a bulk reader but provides high content data.

We combined the object recognition capabilities of microscope-based high content systems with the ultra-fast speeds of bulk fluorescence readers to create acumen: a laser scanning imaging cytometer, now in its fourth generation.

Through a combination of unique optical design and an intelligent approach to data acquisition and analysis, acumen Cellista is uniquely straightforward to integrate and operate within a screening environment.

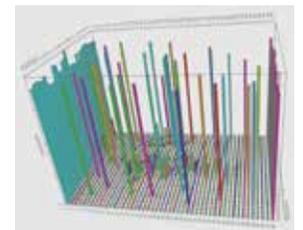
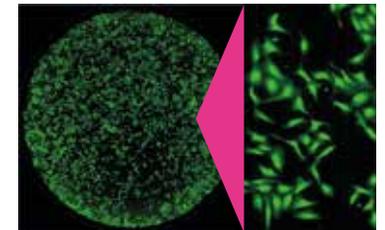
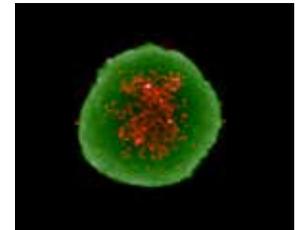
acumen Cellista handles even high density 1536-well microplate formats in the same 5 minute read times.



Cellular imaging at high throughput is achieved by laser scanning excitation through a specialised f-theta lens and photomultiplier tube (PMT) signal detection. This design enables rapid whole-well imaging for up to 4 multiplexed colours over an area of 20 mm x 20 mm without re-focusing. It also facilitates the imaging of 3D models due to its large depth of field.

Using the principles of cytometry, acumen Cellista simultaneously acquires and analyses every object within each well, immediately reporting object-level data from which cellular sub-classifications may be derived. Those cellular characteristics indicative of a hit are reported within the 5 minutes scan time, even for 1536-well plates.

This cytometric approach is quick to learn and data output files are small, making it simple to integrate acumen Cellista into a screening workflow with little change to your existing infrastructure.



the best of both worlds for phenotypic assays

applications:

adipogenesis
angiogenesis
apoptosis
beta-lactamase
cell cycle analysis
cell differentiation
cell migration
chemotaxis
colony formation
cytotoxicity
mitotic index
phagocytosis
phospholipidosis
proliferation
protein kinase profiling
protein translocation
reporter gene activation
small organism imaging
spheroid analysis
stem cell phenotyping
steatosis
tissue imaging

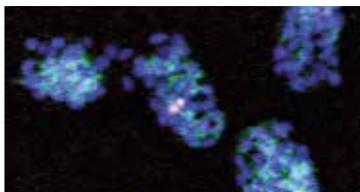
case study #1: cell health

acumen Cellista makes it easy to incorporate toxicity screening into the early phases of drug discovery to identify compounds with potential adverse effects.

- fast scan times and instant results report biologically-relevant data at the throughputs needed for primary screening
- multiple toxicity readouts give a wealth of results for compound profiling
- whole well analysis gives you the confidence of robust data, quality controlled for cell number

These assays include:

- **live/dead:** standard dyes such as calcein-AM/PI or TOTO-3/TMRM facilitate a more cost-effective and data rich approach to bulk read assays, such as CellTiter-Glo® (TTP Labtech application note)
- **cell cycle analysis:** in contrast to flow cytometry, acumen Cellista allows determination of cell number, cytotoxicity and cell cycle analysis in a single, fast, dual laser read (TTP Labtech application note)



Treatment of HepG2 cells with 2 μ M Camptothecin for 72 hours (see right image) significantly reduces cell proliferation, decreases mitochondrial health and increases the proportion of dead cells (determined by multiplexed staining with Hoechst, TMRM and TOTO-3)

case study #2: 3D assays

acumen Cellista allows you to combine biologically-relevant 3D cell culture models with high throughput methods to improve the quality of your hits in applications such as cancer treatment research.

- whole well imaging means all 3D objects are counted
- 3D volumes are determined without z-stacking
- easily distinguish between colonies and small clusters of cells
- robust data is obtained in a little as 5 minutes per plate

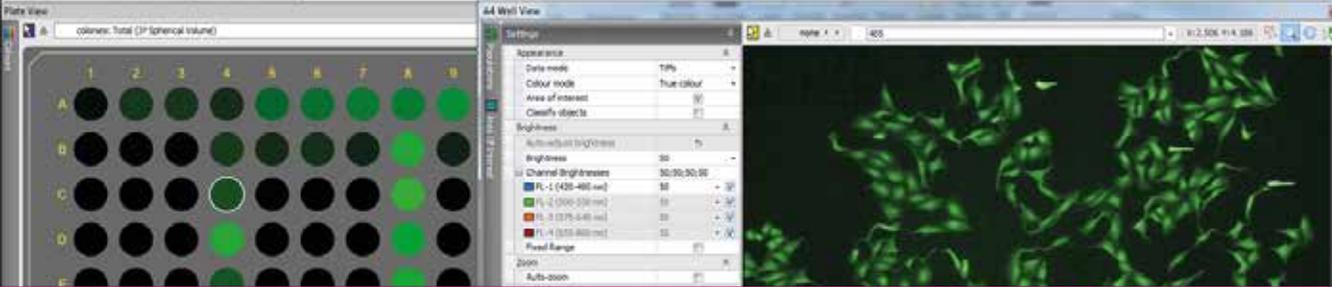
This represents a paradigm shift where the benefits of screening against complex biological models may be realised at high throughputs.

acumen has been successfully used to describe the formation of 3D cell cultures in a variety of formats:

- 3D spheroids in ultra-low attachment plates (TTP Labtech application note)
- 3D spheroids in hanging drop plates (Horman, S. *et al.* (2013), *J Biomol Screen*)
- colonies in semi-solid agarose (Bowen, W. & Wylie, P. (2007), *Clin Lab Med*)



Calcein/PI stained spheroid scanned on acumen Cellista



Cellista

software without barriers

“the end of training is the beginning of our partnership”

Paul Wylie, PhD, TTP Labtech

Remove the adoption barriers associated with image analysis with acumen’s Cellista software.

Powerful yet approachable, Cellista gives you the best of both worlds: application flexibility combined with simplicity of operation.

acumen Cellista uses the principles of cytometry, rather than image analysis. This intelligent cytometric approach is quick and easy to learn, eliminating the requirement for specialised operators and endless ongoing training. Data output files are small, enabling acumen Cellista to be integrated into a screening workflow with little change to your existing infrastructure.

acumen Cellista software:

- provides on-the-fly analysis for instant data output
- enables the reanalysis of scanned data off-line
- outputs small CSV files, thus reducing the data burden whilst providing easy compatibility with data management solutions
- outputs OME-compliant TIFFs
- analyses whole wells as standard: no image stitching required
- contains colour compensation for easy multiplexing
- represents the ideal choice for busy, multiple user environments

supporting your work

TTP Labtech strives to offer customers the very best in application and instrument support services. We listen, we partner.

We offer easy set-up and ongoing support from the very first meeting. TTP Labtech instruments typically have a life cycle in excess of 10 years, proving a great return on investment!





an effortless route to high throughput automation

For **HTS departments**, acumen Cellista provides enhanced data quality using relevant cellular models, easy data integration and small data file sizes.

For **high content imaging groups**, acumen Cellista ensures there is no burden on infrastructure: no need for extra data storage, expert operators, or additional software development.

Inclusion in an automated HTS solution allows you to benefit fully from acumen Cellista's throughput potential. The system has been integrated with automation solutions from major vendors, including:

- PAA
- Thermo Scientific
- HighRes Biosolutions
- Wako Automation
- Agilent Technologies
- Cybio
- Beckman Coulter
- GNF Systems

For simple automation, acumen Cellista can be supplied with a fully-integrated plate stacker.

specifications

	acumen® Cellista
main application	phenotypic high throughput screening
laser excitation	choice of up to 3 lasers: 405, 488, 561 or 640 nm
detection	photomultiplier tube (sequential)
fluorescence detection	4 channels
scan area	whole well as standard
standard data format	CSV file
TIFF export	OME-compliant, whole well, with no compromise on speed
plate compatibility	96, 384 and 1536

Any plate is the perfect plate: acumen's optics are compatible with any SBS-format clear bottom microplate. There is no need to invest in high-end specialist plates.

application	high content analysis			high throughput screening		
	acumen® Cellista			acumen® Cellista HP		
instrument	96-well	384-well	1536-well	96-well	384-well	1536-well
plate format						
plate scan time (mins)*	10	10	10	5	5	5
plates per 24 h	140	140	140	280	280	280
wells per 24 h	13,440	53,760	215,040	26,880	107,520	430,080
total data for 24 h operation	9 Mb	30 Mb	100 Mb	18 Mb	60 Mb	200 Mb

* acquisition plus analysis times for obtaining whole well data

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